STANFORD BULLETIN

2010-11

ACCREDITATION

Stanford University is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC), 985 Atlantic Avenue, Suite 100, Alameda, CA 94501; (510) 748-9001. In addition, certain programs of the University have specialized accreditation. For information, contact the Office of the University Registrar.

Stanford University is committed to complying with the following requirements enumerated by the Western Association of Schools and Colleges (WASC) in its accreditation process:

"Core Commitment to Institutional Capacity—The institution functions with clear purposes, high levels of institutional integrity, fiscal stability, and organizational structures to fulfill its purposes.

"Commitment to Educational Effectiveness—The institution evidences clear and appropriate educational objectives and design at the institutional and program level. The institution employs processes of review, including the collection and use of data, which ensure delivery of programs and learner accomplishments at a level of performance appropriate for the degree or certificate awarded."

For more information, see the University's WASC Accreditation web site.

Also, see the President Hennessy's statement (pdf) on Stanford's fulfilment of the Core Commitments to Institutional Capacity and Educational Effectiveness.

NONDISCRIMINATION POLICY

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, it prohibits discrimination, including harassment, against students or applicants for admission, or employees or applicants for employment on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of its educational policies, admissions policies, scholarships and loan programs, and athletic and other University-administered programs. The following person has been designated to handle inquiries regarding this policy: the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

THE FUNDAMENTAL STANDARD

Students at Stanford are expected to know, understand, and abide by the Fundamental Standard, which is the University's basic statement on behavioral expectations articulated in 1896 by Stanford's first President, David Starr Jordan, as follows:

Students are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University.

See the "Judicial Affairs and Student Conduct" section of this bulletin for further information on The Fundamental Standard and The Honor Code.

HONOR CODE

The Honor Code is the University's statement on academic integrity. It is essentially the application of the Fundamental Standard to academic matters. Provisions of the Honor Code date from 1921, when the honor system was established by the Academic Council of the University Faculty at the request of the student body and with the approval of the President.

The Honor Code reads:

A. *The Honor Code is an undertaking of the students, individually and collectively:*
   1. *that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;*
   2. *that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.*

B. *The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.*

C. *While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.*

See the "Judicial Affairs and Student Conduct" section of this bulletin for further information on The Fundamental Standard and The Honor Code.

CURRENT INFORMATION AND ACCURACY STATEMENT

Every effort is made to ensure that the degree requirement and course information, applicable policies, and other materials contained in the *Stanford Bulletin* are accurate and current. The University reserves the right to make changes at any time without prior notice. The Bulletin in the form as it exists online at http://bulletin.stanford.edu and http://explorecourses.stanford.edu is therefore the governing document, and contains the then currently applicable policies and information.

Courses of Instruction are available at the *Stanford Bulletin's* ExploreCourses web site.

A non-official pdf of the Bulletin and pdfs of individual sections of the Bulletin are made available for download in September; these pdfs are produced once in September and are not updated to reflect corrections or changes made during the academic year.

REGISTRAR'S OFFICE

The *Stanford Bulletin* is an online publication of the Office of the University Registrar, Stanford University.

Address:
Office of the University Registrar
630 Serra Street
Suite 120
Stanford University
Stanford, California 94305-6032

Students with questions or issues should contact the Student Services Center or file a help ticket with Stanford's HelpSU system. Alumni, staff, or the general public may also file a help ticket to request the Registrar's Office assistance or to ask for information.

Additional information on Stanford University can be obtained through Stanford's web site at http://www.stanford.edu.

Telephone number for all University departments: Area code: (650) 723-2300

ACADEMIC CALENDAR 2010-11

This calendar is also available at the University Registrar's web site: http://registrar.stanford.edu/academic_calendar. All dates are subject to change at the discretion of the University.

AUTUMN QUARTER 2010-11

- August 1 (Sun) Axess opens for course enrollment.
- August 23 (Mon) M.D. first-year students, first day of instruction.
- August 26 (Thu) M.D. second-year students, first day of instruction.
- August 30 (Mon) Law School instruction begins for 1st-year J.D. students
- September 10 (Fri, 5:00 p.m.) Course enrollment deadline to receive stipend or refund check on first day of term.
- September 14 (Tue) New undergraduates arrive; Convocation.
- September 20 (Mon) First day of quarter; instruction begins; Law School instruction begins for 2nd/3rd-year J.D. & Adv. Degree Students
- September 20 (Mon, 5:00 p.m.) Preliminary Study List deadline. Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is $200.
- September 20 (Mon, 5:00 p.m.) Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- September 23 (Thu) Conferral of degrees, Summer Quarter 2009-10.
- October 8 (Fri, 5:00 p.m.) Final Study List deadline. Last day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a 'W' notation will appear on the transcript.
- November 8 (Mon, 5:00 p.m.) Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- November 12 (Fri, 5:00 p.m.) Change of grading basis deadline.
- November 12 (Fri, 5:00 p.m.) Course withdrawal deadline.
- November 12 (Fri, 5:00 p.m.) Application deadline for Autumn Quarter degree conferral.
- November 22-26 (Mon-Fri) Thanksgiving Recess (no classes).
- November 29-December 5 (Mon-Sun) End-Quarter Period.
- December 3 (Fri) Last day of classes (unless class meets on Sat.)
- December 3 (Fri) Last opportunity to arrange Incomplete in a course, at last class.
- December 3 (Fri, noon) University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.
- December 3 (Fri, 5:00 p.m.) Late application deadline for Autumn Quarter degree conferral ($50 fee).
- December 6-10 (Mon-Fri) End-Quarter examinations.
- December 6-13 (Mon-Mon) Law School examinations
- December 14 (Tue, 11:59 p.m.) Grades due.
- January 6 (Thu) Conferral of degrees, Autumn Quarter.

WINTER QUARTER 2010-11

- October 24 (Sun) Axess opens for course enrollment.
- December 10 (Fri) Course enrollment deadline to receive stipend or refund check on first day of term.
- January 3 (Mon) First day of quarter; instruction begins for all students.
- January 3 (Mon, 5:00 p.m.) Preliminary Study List deadline. Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is $200.
- January 3 (Mon, 5:00 p.m.) Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- January 17 (Mon) Martin Luther King, Jr., Day (holiday, no classes).
- January 21 (Fri, 5:00 p.m.) Final Study List deadline. Final day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a 'W' notation will appear on the transcript.
- February 16 (Wed, 5:00 p.m.) Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- February 21 (Mon) Presidents' Day (holiday, no classes; Law and GSB do hold classes).
- February 25 (Fri, 5:00 p.m.) Change of grading basis deadline.
- February 25 (Fri, 5:00 p.m.) Course withdrawal deadline.
- February 25 (Fri, 5:00 p.m.) Application deadline for Winter Quarter degree conferral.
- March 7-13 (Mon-Sun) End-Quarter Period.
- March 11 (Fri) Last day of classes (unless class meets on Sat.)
- March 11 (Fri) Last opportunity to arrange Incomplete in a course, at last class.
- March 11 (Fri, noon) University thesis, D.M.A. final project, Ph.D. dissertation, last day to submit.
- March 11 (Fri, 5:00 p.m.) Late application deadline for Winter Quarter degree conferral ($50 fee).
- March 11-18 (Fri-Fri) Law School examinations
- March 14-18 (Mon-Fri) End-Quarter examinations.
- March 22 (Tue, 11:59 p.m.) Grades due.
- March 31 (Thu) Conferral of degrees, Winter Quarter.

SPRING QUARTER 2010-11

- February 6 (Sun) Axess opens for course enrollment.
- March 18 (Fri) Course enrollment deadline to receive stipend or refund check on first day of term.
- March 28 (Mon) First day of quarter; instruction begins for all students.
- March 28 (Mon, 5:00 p.m.) Preliminary Study List deadline. Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is $200.
- March 28 (Mon, 5:00 p.m.) Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- April 8 (Fri, 5:00 p.m.) Application deadline for Spring Quarter degree conferral.
- April 15 (Fri, 5:00 p.m.) Final Study List deadline. Last day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.
- May 10 (Tue, 5:00 p.m.) Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- May 20 (Fri, 5:00 p.m.) Change of grading basis deadline.
- May 20 (Fri, 5:00 p.m.) Course withdrawal deadline.
- May 27-June 2 (Fri-Thu) End-Quarter Period.
- May 30 (Mon) Memorial Day (holiday, no classes).
- May 31-June 7 (Tue-Tue) Law School examinations.
- June 1 (Wed) Last day of classes.
- June 1 (Wed) Last opportunity to arrange Incomplete in a course, at last class.
- June 1 (Wed, noon) University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.
- June 1 (Wed, 5:00 p.m.) Late application deadline for Spring Quarter degree conferral ($50 fee).
- June 2 (Thu) Day before finals, no classes.
- June 3-8 (Fri-Wed) End-Quarter examinations.
- June 9 (Thu, noon) Grades for graduating students due.
- June 11 (Sat) Senior Class Day.
- June 11 (Sat) Baccalaureate Saturday.
- June 12 (Sun) Commencement. Conferral of degrees, Spring Quarter.
- June 14 (Tue, 11:59 p.m.) Grades for non-graduating students due.

SUMMER QUARTER 2010-11

- April 10 (Sun) Axess opens for course enrollment.
- June 10 (Fri) Course enrollment deadline to receive stipend or refund check on first day of term.
- June 20 (Mon) First day of quarter; instruction begins.
- June 20 (Mon, 5:00 p.m.) Preliminary Study List deadline.
- June 20 (Mon) Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2010-11 for a full refund schedule.
- July 1 (Fri, 5:00 p.m.) Final Study List deadline. Final day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a 'W' notation will appear on the transcript.
- July 4 (Mon) Independence Day observed (holiday, no classes).
- July 22 (Fri, 5:00 p.m.) Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. SeeTuition and Refund Schedule: 2010-11 for a full refund schedule.
- July 29 (Fri, 5:00 p.m.) Change of grading basis deadline.
- July 29 (Fri, 5:00 p.m.) Course withdrawal deadline.
- July 29 (Fri, 5:00 p.m.) Application deadline for Summer Quarter degree conferral.
- August 6-11 (Sat-Thu) End-Quarter Period.
- August 11 (Thu) Last day of classes.
- August 11 (Thu) Last opportunity to arrange Incomplete in a course, at last class.
- August 11 (Thu, 5:00 p.m.) Late application deadline for Summer Quarter degree conferral ($50 fee).
- August 12-13 (Fri-Sat) End-Quarter examinations.
- August 16 (Tue, 11:59 p.m.) Grades due.
- August 26 (Fri, noon) University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.
- September 29 (Thu) Conferral of degrees, Summer Quarter.

ACADEMIC CALENDAR 2011-12

First day of classes and last day of finals

- Autumn 2011-12: September 26 and December 16
- Winter 2011-12: January 9 and March 23
- Spring 2011-12: April 2 and June 13 (Commencement June 17)
- Summer 2011-12: June 25 and August 18

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STANFORD'S MISSION

The Stanford University Founding Grant (pdf), dated November 11, 1885, outlines the founding principles of the University. The Founding Grant describes the "Nature, Object, and Purposes of the Institution" founded by Leland Stanford and Jane Lathrop Stanford in these terms:

> *Its nature, that of a university with such seminaries of learning as shall make it of the highest grade, including mechanical institutes, museums, galleries of art, laboratories, and conservatories, together with all things necessary for the study of agriculture in all its branches, and for mechanical training, and the studies and exercises directed to the cultivation and enlargement of the mind;*
>
> *Its object, to qualify its students for personal success, and direct usefulness in life;*
>
> *And its purposes, to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness.*

Each of Stanford's seven schools has its own mission statement and those can be found by following the links below:

- School of Earth Sciences Mission Statement
- Graduate School of Business Mission Statement
- School of Humanities and Sciences Mission Statement
- School of Engineering Mission Statement
- School of Medicine Mission Statement
- School of Education Mission Statement
- Stanford Law School Mission Statement

A BRIEF HISTORY OF STANFORD

On October 1, 1891, more than 400 enthusiastic young men and women were on hand for opening day ceremonies at Leland Stanford Junior University. They came from all over: many from California, some who followed professors hired from other colleges and universities, and some simply seeking adventure in the West. They came to seize a special opportunity, to be part of the pioneer class in a brand new university. They stayed to help turn an ambitious dream into a thriving reality. As a pioneer faculty member recalled, "Hope was in every heart, and the presiding spirit of freedom prompted us to dare greatly."

For Leland and Jane Stanford on that day, the University was the realization of a dream and a fitting tribute to the memory of their only son, who died of typhoid fever weeks before his 16th birthday, at an age when many young men and women were planning their college education.

From the beginning, it was clear that Stanford would be different. It was coeducational at a time when single-sex colleges were the norm. It was non-sectarian when most private colleges were still affiliated with a church. And it offered a broad, flexible program of study while most schools insisted on a rigid curriculum of classical studies. Though there were many difficulties during the first months (housing was inadequate, microscopes and books were late in arriving from the East), the first year foretold greatness. As Jane Stanford wrote in the summer of 1892, "Even our fondest hopes have been realized."

What manner of people were this man and this woman who had the intelligence, the means, the faith, and the daring to plan a major university in Pacific soil, far from the nation's center of culture?

LELAND AND JANE STANFORD

Although he was trained as a lawyer, Leland Stanford came to California in 1852 to join his five brothers in their mercantile business in the gold fields; Jane Stanford followed in 1855. They established large-scale operations in Sacramento, where Mr. Stanford became a leading figure in California business and politics. One of the "Big Four" who built the western link of the first transcontinental railroad, he was elected Governor of California and later United States Senator. One of the founders of the Republican Party in California, he was an ardent follower of Abraham Lincoln and is credited with keeping California in the Union during the Civil War.

THE CASE FOR A LIBERAL EDUCATION

Despite the enormous success they achieved in their lives, Governor and Mrs. Stanford had come from families of modest means and rose to prominence and wealth through a life of hard work. So it was natural that their first thoughts were to establish an institution where young men and women could "grapple successfully with the practicalities of life." As their thoughts matured, however, these ideas of "practical education" enlarged to the concept of producing cultured and useful citizens who were well prepared for professional success. In a statement of the case for liberal education that was remarkable for its time, Leland Stanford wrote, "I attach great importance to general literature for the enlargement of the mind and for giving business capacity. I think I have noticed that technically educated boys do not make the most successful businessmen. The imagination needs to be cultivated and developed to assure success in life. A man will never construct anything he cannot conceive."

STANFORD LANDS AND ARCHITECTURE

The campus occupies what was once Leland Stanford's Palo Alto Stock Farm and the favorite residence of the Stanford family. The Stanfords purchased an existing estate in 1876 and later acquired much of the land in the local watershed for their stock farm, orchards, and vineyards.

The name of the farm came from the tree El Palo Alto, a coast redwood (Sequoia sempervirens), that still stands near the northwest corner of the property on the edge of San Francisquito Creek. Many years ago, one of the winter floods that periodically rushed down the arroyo tore off one of its twin trunks, but half of the venerable old tree lives on, a gaunt and time-scarred monument. Named in 1769 by Spanish explorers, El Palo Alto has been the University's symbol and the centerpiece of its official seal.

The Stanfords gave their farm to the University in the Founding Grant of 1885. They personally financed the entire cost of the construction and operation of the University until 1903, when surviving founder Jane Stanford, who performed heroically in keeping the University functioning during difficult times following Leland Senior's death in 1893, turned over control to the Board of Trustees. The founding gift has been estimated at $25 million, not including the land and buildings.

The general concept for the University grounds and buildings was conceived by Frederick Law Olmsted, the designer of Central Park in New York. A brilliant young Boston architect, Charles Allerton Coolidge, further developed the concept in the style of his late mentor, Henry Hobson Richardson. The style, called Richardsonian Romanesque, is a blend of Romanesque and Mission Revival architecture. It is characterized by rectilinear sandstone

buildings joined by covered arcades formed of successive half-circle arches, the latter supported by short columns with decorated capitals.

More than one hundred years later, the University still enjoys 8,180 acres (almost 13 square miles) of grassy fields, eucalyptus groves, and rolling hills that were the Stanfords' generous legacy, as well as the Quadrangle of "long corridors with their stately pillars" at the center of campus. It is still true, as the philosopher William James said, during his stint as a visiting professor, that the climate is "so friendly . . . that every morning wakes one fresh for new amounts of work."

CURRENT PERSPECTIVES

In other ways, the University has changed tremendously on its way to recognition as one of the world's great universities. At the hub of a vital and diverse Bay Area, Stanford is less than an hour's drive or Caltrain trip south of San Francisco and just a few miles north of the Silicon Valley, an area dotted with computer and high technology firms largely spawned by the University's faculty and graduates. On campus, students and faculty enjoy new libraries, modern laboratories, sports facilities, and comfortable residences. Contemporary sculpture, as well as pieces from the Iris and B. Gerald Cantor Center for Visual Arts at Stanford University's extensive collection of sculpture by Auguste Rodin, can be found throughout the campus, providing unexpected pleasures at many turns.

The Cantor Center opened in January 1999. The center includes the historic Leland Stanford Junior Museum building, the Rodin Sculpture Garden and a new wing with spacious galleries, auditorium, cafe, and bookshop. At the Stanford University Medical Center, world-renowned for its research, teaching, and patient care, scientists and physicians are searching for answers to fundamental questions about health and disease. Ninety miles down the coast, at Stanford's Hopkins Marine Station on the Monterey Bay, scientists are working to better understand the mechanisms of evolution and ecological systems.

The University is organized into seven schools: Earth Sciences, Education, Engineering, the Graduate School of Business, Humanities and Sciences, Law, and Medicine. In addition, there are more than 30 interdisciplinary centers, programs, and research laboratories including: the Hoover Institution on War, Revolution and Peace; the Freeman Spogli Institute for International Studies; the Woods Institute for the Environment; the SLAC National Accelerator Laboratory; and the Stanford Program for Bioengineering, Biomedicine, and Biosciences (Bio-X), where faculty from many fields bring different perspectives to bear on issues and problems. Stanford's Bing Overseas Studies Program offers undergraduates in all fields remarkable opportunities for study abroad, with campuses in Australia, Beijing, Berlin, Florence, Kyoto, Madrid, Moscow, Oxford, Paris, and Santiago.

STANFORD PEOPLE

By any measure, Stanford's faculty, which numbers approximately 1,900, is one of the most distinguished in the world. It includes 16 living Nobel laureates, 4 Pulitzer Prize winners, 19 National Medal of Science winners, 135 members of the National Academy of Sciences, 251 members of the American Academy of Arts and Sciences, 88 members of the National Academy of Engineering, and 30 members of the National Academy of Education. Yet beyond their array of honors, what truly distinguishes Stanford faculty is their commitment to sharing knowledge with their students. The great majority of professors teach undergraduates both in introductory lecture classes and in small freshman, sophomore, and advanced seminars.

Enrollment in Autumn Quarter 2009 totaled 15,319, of whom 6,878 were undergraduates and 8,441 were graduate students. Like the faculty, the Stanford student body is distinguished. Approximately 18 people apply to Stanford for every student who enters the freshman class. 89 Stanford students have been named Rhodes Scholars and 76 have been named Marshall Scholars. The six-year graduation rate for freshmen who entered Stanford University full-time in 2003 was 95 percent. Stanford awarded 4,716 degrees in 2009-10, of which 1,670 were baccalaureate and 3,046 were advanced degrees.

Stanford students also shine in an array of activities outside the classroom, from student government to music, theater, and journalism. Through the Haas Center for Public Service, students participate in dozens of community service activities, such as tutoring programs for children in nearby East Palo Alto, the Hunger Project, and the Arbor Free Clinic.

In the athletic arena, Stanford students have enjoyed tremendous success as well. Stanford fields teams in 35 Division I varsity sports. Of Stanford's 97 NCAA team titles, 80 have been captured since 1980, placing Stanford at the top among the nation's most title-winning schools during that time. In 2009-10, Stanford won national championships in men's volleyball, women's tennis, and women's lightweight rowing. In 1999-2000, Stanford became the first school in Pac-10 history to win conference championships in football, men's basketball, and baseball in the same year. Athletic success has reached beyond The Farm, as well, with 48 Stanford athletes and coaches taking part in the 2008 Olympics in Beijing. Intramural and club sports are also popular; over 1,000 students take part in the club sports program, while participation in the intramural program has reached 9,000 with many active in more than one sport.

Stanford graduates can be found in an extraordinary variety of places: in space (Sally Ride, '73, Ph.D. '78, was the first American woman in space); on the news (Ted Koppel, M.A. '62, created the successful program Nightline); Broadway (David Henry Hwang, '79, received a Tony Award for his celebrated work, *M. Butterfly*); in San Francisco live theater (Carey Perloff, '80, artistic director of the American Conservatory Theater); at the helm of major corporations (Scott McNealy, '80, founded Sun Microsystems, Sergey Brin, M.S. '95, and Larry Page, M.S. '98, founded Google, and Chih-yuan (Jerry) Yang, '94, and David Filo, '90, founded Yahoo); and on the U.S. Supreme Court (two Stanford graduates, Anthony Kennedy, '58, and Stephen Breyer, '59, currently sit on the high court; Sandra Day O'Connor, '50, J.D. '52, recently retired from the high court, and William Rehnquist, '48, J.D.'52, served until his death in 2005).

LOOKING AHEAD

In her address to the Board of Trustees in July 1904, Jane Stanford said, "Let us not be afraid to outgrow old thoughts and ways, and dare to think on new lines as to the future of the work under our care." Her thoughts echo in the words of Stanford President John Hennessy, who said in his message in the 2002 Annual Report, "Our bold entrepreneurial spirit has its roots in the founders and our location in the pioneering West. In 1904, Jane Stanford defined the challenge for the young University ... Each generation at Stanford has taken this to heart and boldly launched new efforts, from the classroom to the laboratory ... We will continue to innovate and invest in the future ... The pioneering spirit that led the founders and early leaders to ‘dare to think on new lines' continues to guide us."

UNIVERSITY GOVERNANCE AND ORGANIZATION

Web site: http://www.stanford.edu/about/administration/

Stanford University is a trust with corporate powers under the laws of the State of California. The University is a tax-exempt entity under section 501(c)3 of the Internal Revenue Code. Under the provisions of the Founding Grant, the Board of Trustees (with a maximum membership of 35) is custodian of the endowment and all the properties of Stanford University. The board administers the invested funds, sets the annual budget and determines policies for operation and control of the university. Among the powers given to the trustees by the Founding Grant is the power to appoint a president. The board delegates broad authority to the president to operate the university and to the faculty on certain academic matters. The formal legal name is "The Board of Trustees of the Leland Stanford Junior University."

ACCREDITATION

Stanford University is accredited by the Accrediting Commission of Senior Colleges and Universities of the Western Association of Schools and Colleges.

THE BOARD OF TRUSTEES

Powers and Duties—The Board of Trustees is custodian of the endowment and all properties of the University. The Board administers the invested funds, sets the annual budget, and determines policies for the operation and control of the University. The powers and duties of the Board of Trustees derive from the Founding Grant, amendments, legislation, and court decrees. In addition, the Board operates under its own bylaws and a series of resolutions on major policy.

Membership—Board membership is set at 35, including the President of the University who serves ex officio and with vote. Trustees serve a five-year term and are eligible for appointment to one additional five-year term. At the conclusion of that term, a Trustee is not eligible for reelection until after a lapse of one year. Eight of the Trustees are elected or appointed in accordance with the Rules Governing the Election or Appointment of Alumni Nominated Trustees. They serve a five-year term.

Officers of the Board—The officers of the board are a chair, one or more vice chairs, a secretary, and an associate secretary. Officers are elected to one-year terms at the annual meeting in June, with the exception of the chair, who serves a two-year term. Their terms of office begin July 1.

Committees—Standing committees of the Board are Academic Policy, Planning, and Management; Alumni and External Affairs; Audit and Compliance; Development; Finance; Land and Buildings; the Medical Center; and Trusteeship. Special committees include Athletics, Compensation, Investment Responsibility, and Litigation.

Meetings—The Board generally meets five times each year.

MEMBERS OF THE BOARD OF TRUSTEES AS OF JULY 2010

- Robert M. Bass, President, Keystone Group LP, Fort Worth, TX
- William R. Brody, President, Salk Institute for Biological Studies, La Jolla, CA
- Mariann Byerwalter, Chairman, JDN Corporate Advisory, LLC, Daly City, CA
- James E. Canales, President and CEO, The James Irvine Foundation, San Francisco, CA
- James G. Coulter, Founding Partner, TPG Capital, LP, San Francisco, CA
- Lauren B. Dachs, President, S.D. Bechtel, Jr. Foundation, San Francisco, CA
- Steven A. Denning, Chairman, General Atlantic LLC, Greenwich, CT
- Bruce W. Dunlevie, General Partner, Benchmark Capital, Menlo Park, CA
- Armando Garza-Sada, Chairman, Alfa, Nuevo Leon, MX
- John A. Gunn, Chief Executive Officer, Dodge and Cox, San Francisco, CA
- Christine U. Hazy, Co-Founder and Managing Director, Sketch Foundation, Los Angeles, CA
- John L. Hennessy, President, Stanford University, Stanford, CA
- Pete Higgins, Partner, Second Avenue Partners, Seattle, WA
- Leslie P. Hume, San Francisco, CA (Chair)
- Ann H. Lamont, Managing Partner, Oak Investment Partners, Westport, CT
- Frank D. Lee, CEO, Dragonfly Sciences, Inc., Wellesley, MA
- Goodwin Liu, Professor of Law and Associate Dean, University of California, Berkeley
- Susan R. McCaw, President, COM Investments, Kirkland, WA
- Hamid R. Moghadam, Chairman and CEO, AMB Property Corporation, San Francisco, CA
- Wendy Munger, South Pasadena, CA
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- Miriam Rivera, Partner, Ulu Ventures, Palo Alto, CA
- Richard A. Sapp, Rancho Santa Fe, CA
- Kavitark Shriram, Founder, Sherpalo Ventures LLC, Menlo Park, CA
- Ronald P. Spogli, Founding Partner, Freeman Spogli & Company, Los Angeles, CA
- Isaac Stein, President, Waverley Associates, Atherton, CA
- Thomas F. Steyer, Sr. Managing Member, Farallon Capital Management, LLC, San Francisco, CA
- Vaughn C. Williams, Partner, Skadden Arps Slate Meagher & Flom, New York, NY
- Jerry Yang, Chief Yahoo and Co-Founder, Yahoo! Inc., Sunnyvale, CA
- Deborah A. Zoullas, Private Investor, Whiting Ridge LLC, New York, NY

EXECUTIVE OFFICERS

STANFORD ADMINISTRATION

- John Hennessy, *President*
- John Etchemendy, *Provost*
- David Demarest, *Vice President for Public Affairs*
- Randall S. Livingston, *Vice President for Business Affairs and Chief Financial Officer*
- William J. Madia, *Vice President, SLAC National Accelerator Laboratory*
- Robert Reidy, *Vice President for Land, Buildings and Real Estate*
- Martin Shell, *Vice President for Development*

- Howard Wolf, *Vice President for Alumni Affairs and President, Stanford Alumni Association*
- Debra Zumwalt, *Vice President and General Counsel*

CABINET

- Ann Arvin, *Vice Provost and Dean of Research*
- Persis Drell, *Director, SLAC National Accelerator Laboratory*
- Patricia Gumport, *Vice Provost for Graduate Education*
- Garth Saloner, *Dean, Graduate School of Business*
- Larry Kramer, *Dean, School of Law*
- Pamela Matson, *Dean, School of Earth Sciences*
- Philip Pizzo, *Dean, School of Medicine*
- James Plummer, *Dean, School of Engineering*
- John Raisian, *Director, Hoover Institution on War, Revolution and Peace*
- Richard Saller, *Dean, School of Humanities and Sciences*
- Deborah Stipek, *Dean, School of Education*

THE PRESIDENT

The Founding Grant prescribes that the Board of Trustees shall appoint the President of the University and that the Board shall give to the President the following powers:

- To prescribe the duties of the professors and teachers.
- To prescribe and enforce the course of study and the mode and manner of teaching.
- Such other powers as will enable the President to control the educational part of the University to such an extent that the President may justly be held responsible for the course of study therein and for the good conduct and capacity of the professors and teachers.

The President is also responsible for the management of financial and business affairs of the University, including operation of the physical plant.

The President is responsible for the safety of the campus and may take reasonable steps to protect the University including, but not limited to, barring people from campus who disrupt the normal business operations of the University or who present a threat to the safety of the University community. In extraordinary circumstances, the President may permanently discontinue students who present a threat to the health and safety of the University community.

The President appoints the following, subject to confirmation by the Board: Provost, Vice President for Business Affairs and Chief Financial Officer, Chief Executive Officer of Stanford Management Company, Vice President for Alumni Affairs and President of Stanford Alumni Association, Vice President for Development, Vice President for Public Affairs, Vice President and General Counsel, Vice President for the SLAC National Accelerator Laboratory, and Vice President for Land, Buildings, and Real Estate.

For additional information, see the Office of the President web site.

COMMITTEES AND PANELS APPOINTED BY THE PRESIDENT

University Committees are appointed by and are primarily responsible to the President. Such committees deal with matters on which the responsibility for recommendation or action is clearly diffused among different constituencies of the University. In accordance with the *Report on the Committee Structure of the University*, Academic Council members are appointed to University Committees on nomination of the Senate Committee on Committees and student members on nomination of the Associated Students of Stanford University (ASSU) Committee on Nominations. The President takes the initiative in the appointment of staff members to such committees. Although immediately responsible to the President, University Committees may be called upon to report to the Senate of the Academic Council or the ASSU. Charges to such committees are set by the President on recommendation of the Committee on Committees and others. There are five University Committees, as follows:

- Advisory Panel on Investment Responsibility and Licensing (APIR-L)
- Committee on Athletics, Physical Education, and Recreation (C-APER)
- Committee on Environmental Health and Safety (C-EH&S)
- Committee on Faculty Staff Human Resources (C-FSHR)
- Panel on Outdoor Art (P-OA)

Additionally there are eleven standing administrative panels which are appointed by the Vice Provost and Dean of Research, and which report through him/her to the President:

- Administrative Panel on Biosafety
- Administrative Panel on Human Subjects in Medical Research-01
- Administrative Panel on Human Subjects in Medical Research-03
- Administrative Panel on Human Subjects in Medical Research-04
- Administrative Panel on Human Subjects in Medical Research-05
- Administrative Panel on Human Subjects in Medical Research-06
- Administrative Panel on Human Subjects in Medical Research-07
- Administrative Panel on Human Subjects in Medical Research-08
- Administrative Panel on Human Subjects in Non-Medical Research-02
- Administrative Panel on Laboratory Animal Care
- Administrative Panel on Radiological Safety

THE PROVOST

The Provost, as the chief academic and budget officer, administers the academic program (instruction and research in schools and other academic units) and University services in support of the academic program (including budgeting and planning, land and buildings, libraries and information resources, and student affairs). In the absence or inability of the President to act, the Provost becomes the Acting President of the University. The Provost shares with the President conduct of the University's relations with other educational institutions, groups, and associations.

SCHOOLS OF THE UNIVERSITY

The program of instruction in the University is organized into seven schools: Graduate School of Business, School of Earth Sciences, School of Education, School of Engineering, School of Humanities and Sciences, Stanford Law School, School of Medicine.

The deans of the schools report to the Provost.

THE ACADEMIC COUNCIL

Web Site: http://academiccouncil.stanford.edu/

According to the Articles of Organization of the Faculty, originally adopted by the Board of Trustees in 1904 and revised in

1977, the powers and authority of the faculty are vested in the Academic Council consisting of:

1. the President of the University
2. tenure-line faculty: Assistant, Associate, and Full Professor
3. nontenure-line faculty: Associate and Full Professor followed by the parenthetical notation (Teaching), (Performance), (Applied Research), or (Clinical)
4. nontenure-line research faculty: Assistant Professor (Research), Associate Professor (Research), Professor (Research)
5. Senior Fellows in specified policy centers and institutes
6. certain specified officers of academic administration.

In the Spring of 1968, the Academic Council approved the charter for a Senate to be composed of 55 representatives elected by the Hare System of Proportional Representation and, as ex officio nonvoting members, deans of the academic schools and certain major officers of academic administration.

In the allocation of representation, each school constitutes a major constituency. The Senate may create from time to time other major constituencies as conditions warrant. Approximately one-half of the representatives are allocated to constituencies on the basis of the number of students in those constituencies and the remainder on the basis of the number of members of the Academic Council from each constituency.

COMMITTEES OF THE ACADEMIC COUNCIL

Committees of the Academic Council are created by and responsible to the Senate of the Academic Council and are appointed by the Committee on Committees of the Senate. Such committees deal with academic policy matters on which the primary responsibility for action and decision lies with the Academic Council or, by delegation, the Senate. Pursuant to the Senate's acceptance on September 25, 1969 of the *Report from the Committee on Committees on the Committee Structure of the University* and subsequent Senate action, the Senate has established seven standing Committees of the Academic Council, as follows:

- Committee on Academic Computing and Information Systems (C-ACIS)
- Committee on Graduate Studies (C-GS)
- Committee on Libraries (C-Lib)
- Committee on Research (C-Res)
- Committee on Review of Undergraduate Majors (C-RUM)
- Committee on Undergraduate Admissions and Financial Aid (C-UAFA)
- Committee on Undergraduate Standards and Policy (C-USP)

The Senate has also created a Planning and Policy Board of the Senate to consider long-range strategic issues of concern to the faculty. Information regarding charges to these committees is available from the Office of the Academic Secretary to the University.

ASSOCIATED STUDENTS OF STANFORD UNIVERSITY (ASSU)

Web Site: http://assu.stanford.edu

All registered students are members of the ASSU. They are governed by the ASSU Constitution and Bylaws, which was last revised and approved by student vote in April 2007.

Executive—The President and Vice President serve as the chief executives and representatives for the Association. The Financial Manager acts as business manager of the ASSU, CEO of Stanford Student Enterprises (SSE), and controller of the Students' Organizations Fund in which ASSU and student organization funds are deposited.

Legislative—There are two legislative bodies, an Undergraduate Senate and a Graduate Student Council, that work together to determine the Association's budgetary, financial, investment, business, and operating policies. In addition, each entity provides funding for student organizations, participates in recommending student appointments to University Committees and advocates on behalf of its constituents. Each body has 15 elected representatives and an elected chair. Both meet regularly to conduct Association business and discuss and act on issues pertinent to student life at Stanford.

ADMISSION AND FINANCIAL AID

UNDERGRADUATE ADMISSION

Stanford's undergraduate community is drawn from throughout the United States and the world. It includes students whose abilities, intellectual interests, and personal qualities allow them to benefit from and contribute to the University's wide range of teaching and research programs in the humanities, natural sciences, social sciences, and engineering. The University admits students who derive pleasure from learning for its own sake; who exhibit energy, creativity, and curiosity; and who have distinguished themselves in and out of the classroom.

Stanford welcomes a diverse community that cuts across many dimensions. The University does not use quotas of any kind in its admission process: it does not favor particular schools or types of schools, nor any geographic region, nor does it have any racial, religious, ethnic, or gender-related quotas. The University believes that a student body that is both highly qualified and diverse in terms of culture, socioeconomic status, race, ethnicity, gender, work and life experiences, skills, and interests is essential to the educational process. Applications are encouraged from those who would take the initiative and responsibility for their own education and who would provide additional dimensions to the University and its programs.

In order to preserve the residential character of the University and to maintain a favorable student-faculty ratio, Stanford has a limited undergraduate enrollment. The anticipated size of the freshman class is approximately 1,600-1,700 students who are admitted for Autumn Quarter enrollment. Approximately 20-40 transfer students, entering either the sophomore or junior class, are also typically admitted for Autumn enrollment if space allows. Each year, the University receives many more applications from qualified students than there are places available.

Stanford is committed to meeting the University-computed financial need of each admitted student, and admission decisions are made without regard to the applicant's financial status, except in the case of international students who are neither U.S. citizens nor U.S. registered permanent residents.

Application procedures, requirements, and deadlines vary from year to year. See the Undergraduate Admission web site at http://admission.stanford.edu for the most recent information and to begin an application online; or call the Office of Undergraduate Admission at (650) 723-2091.

NONMATRICULATED STUDY (UNDERGRADUATE)

Permission to enroll at Stanford as a nonmatriculated student during Autumn, Winter, and Spring quarters is not routinely approved except under extenuating circumstances. Nonmatriculated students authorized to enroll at Stanford University are not admitted to any Stanford degree program and are permitted to register for a specific period, usually one, two, or three quarters. Financial assistance from Stanford University is not available. Permission to enroll as a nonmatriculated student does not imply subsequent admission as a matriculated student.

Nonmatriculated status is a privilege and not a right. The University reserves the right, at its discretion, to withhold registration from, or require withdrawal for the program by, any student or applicant. In addition, nonmatriculated status may be revoked at the University's discretion (and after consideration of such factors as the University considers relevant in the particular case) at the end of any quarter of enrollment.

Students interested in nonmatriculated status during the Autumn, Winter, and Spring quarters should contact the Office of the University Registrar, not the Office of Undergraduate Admission. Note: newly admitted Stanford students (that is, those admitted to a Stanford degree program) are not eligible to enroll for nonmatriculated study for any quarter, except with the permission of the Vice Provost for Undergraduate Education (or his or her designee) under extenuating circumstances.

High School Nonmatriculated Students—Local high school students are eligible to be considered to attend Stanford as nonmatriculated students on a limited basis when they have exhausted all of the courses in a given discipline offered by their high school. Nonmatriculated high school students are permitted to enroll in one course per quarter and are required to pay the applicable tuition. Permission from the academic department and the University Registrar is required.

Summer Session—Students wishing to enroll as nonmatriculated students during Summer Quarter should contact the Summer Session Office for more information about the Summer Visitor Program. Admission to the Summer Visitor Program does not imply regular admission to Stanford for subsequent quarters or to one of Stanford's regular degree programs.

GRADUATE ADMISSION

MATRICULATED STUDY (GRADUATE STUDENTS)

Applicants from colleges and universities of recognized standing who hold a U.S. bachelor's degree or its equivalent are eligible to be considered for admission for graduate study. Details regarding degrees offered in specific departments are given on the Graduate Admissions web site at http://gradadmissions.stanford.edu. The number of applicants who can be admitted for work in a particular field of study at any time is limited by the facilities and programs of the school or department and by the number of matriculated students who continue their work in that field.

As with its undergraduate program, Stanford believes that a graduate student body that is both highly qualified and diverse in terms of culture, socioeconomic status, race, ethnicity, gender, work and life experience, skills, and interests is essential to the graduate educational process. It particularly welcomes applications from African Americans, Latinos, and Native Americans, as well as from others whose backgrounds and experiences would add additional dimensions to the University's educational programs.

THE COTERMINAL DEGREE PROGRAM

This program permits matriculated Stanford undergraduates to study for bachelor's and master's degrees simultaneously in the same or different departments. Application policies and procedures are established by each master's department. Applicants must have earned a minimum of 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree. This is normally the Winter Quarter prior to Spring Quarter graduation. Students who decide to apply for admission to master's programs after these deadlines are not eligible for the coterminal program and must apply through the regular graduate admission process.

APPLICATION PROCESS

Specific information regarding test requirements, other application procedures and requirements, and closing dates for filing applications and supporting credentials for admission and financial

aid are listed on the Graduate Admissions web site at http://gradadmissions.stanford.edu.

Graduate fellowship funds and assistantships are generally committed in March for the entire period comprising Autumn, Winter, and Spring quarters of the next academic year. Awards are seldom made to students who enter the University in Winter, Spring, and Summer quarters; such applicants must meet the same financial aid application requirements as those entering in Autumn Quarter.

Applications are to be submitted electronically for graduate programs in the schools of Business, Earth Sciences, Education, Engineering, Humanities and Sciences, and the Biosciences (non-M.D. programs in Medicine). Application instructions may be found at http://gradadmissions.stanford.edu.

For admission to the following programs, apply directly via the web sites below.

Business—Admission information is available for the M.B.A., Sloan Master's Program, and Ph.D. programs at http://www.gsb.stanford.edu/admissions/. All applications must be submitted electronically.

Law—Applicants for the JD degree should see the Law School Admissions web site at http://www.law.stanford.edu/program/degrees/jd/jd_application/. Applicants for LLM, JSM, JSD, and MLS degrees will find instructions at http://www.law.stanford.edu/program/degrees/advanced/application/. These applications are submitted to the Director of Admissions, School of Law, Stanford University, Stanford, CA 94305-8610. The Law School Admissions Test is required.

M.D. Program—Applicants should see the M.D. admissions web site at http://med.stanford.edu/md/admissions or, for additional information about the M.D. program, write to Stanford University School of Medicine, Office of M.D. Admissions, 251 Campus Drive, MSOB X3C01, Stanford, CA 94305-5404. The American Medical College Application Service (AMCAS) application is available at http://aamc.org. Applications and transcripts must be received by AMCAS by October 15. The Medical College Admissions Test is required.

Coterminal Master's Program—Interested Stanford undergraduates should contact directly the department in which they wish to pursue a master's degree and must adhere to the application deadlines described above.

NONMATRICULATED STUDY (GRADUATE STUDENTS)

Eligibility for consideration for nonmatriculated enrollment is restricted to two groups of applicants:

1. Stanford alumni who wish to return to Stanford to take courses that are prerequisites for Medical School admission, such as undergraduate Biology or Chemistry courses, are eligible to apply for nonmatriculated status. An application form, application fee, statement of purpose, and three letters of recommendation are required. The decision to admit or deny is made by the Director of Graduate Admissions on the basis of relevant factors, including a 3.0 GPA and positive letters of recommendation.

   Applicants who graduated from other universities are not eligible to take the prerequisites for Medical School at Stanford.
2. Individuals who hold a bachelor's degree or equivalent and wish to take courses in a specific department that allows non-degree students are eligible to apply for nonmatriculated status. An application form, application fee, statement of purpose, original transcripts, and three letters of recommendation are required. The decision to admit or deny is made by the chair of the department in which they wish to take courses and conveyed in writing to the Graduate Admissions Office. Applicants are notified of the decision by Graduate Admissions in the Office of the University Registrar.

Students who are granted nonmatriculated status are charged the 8-10 unit rate for each quarter in which they are enrolled, and may enroll for a maximum of a total of one academic year. Nonmatriculated status is a privilege and not a right; the nonmatriculated status may be revoked at the University's discretion (and after consideration of such factors as the University considers relevant in the particular case) at the end of any quarter of enrollment.

Nonmatriculated students are not permitted to enroll in certain courses, such as those in the following departments or programs: film and broadcasting courses in Art; all courses in Computer Science, Economics, Electrical Engineering, International Policy Studies, and the School of Medicine. Nonmatriculated students are expected to limit their enrollment to classes in the department in which they have been admitted. Nonmatriculated students receive academic credit for courses satisfactorily completed and may obtain an official transcript. As a general proposition, they may use University facilities and services. In classes of limited enrollment, students in degree programs have priority. Nonmatriculated students may apply for housing but have a low priority for assignment and are not guaranteed housing. No fellowships, assistantships, or Stanford loans are available for nonmatriculated students. Nonmatriculated students are not eligible for a leave of absence.

Nonmatriculated students who later apply for admission to a degree program must meet the standard admission requirements and should not anticipate special priority because of work completed as a nonmatriculated student. Students who are admitted to a degree program may apply a maximum of 15 units of nonmatriculated study toward the residency requirement for a master's degree and 30 units for the Engineer or Ph.D. degree, subject to the approval of the degree granting department.

Application forms for nonmatriculated status during the regular academic year are available from Graduate Admissions, Office of the University Registrar, 630 Serra Street, Suite 120, Stanford, CA 94305-6032. Deadlines for applying are included with the forms and are generally required two months before the start of the quarter.

Applicants interested in nonmatriculated student status for the Summer Quarter only should contact the Summer Session Office, 482 Galvez Mall, Stanford, CA 94305-6079.

POSTDOCTORAL SCHOLARS

Postdoctoral scholars are trainees in residence at Stanford University pursuing advanced studies beyond the doctoral level in preparation for an independent career. Postdoctoral scholars are appointed for a limited period of time and may participate in Stanford research projects and/or may be supported by external awards or fellowships. In all cases, their appointment at Stanford is for the purpose of advanced studies and training under the sponsorship of a Stanford faculty member.

Postdoctoral appointments require initial full-time engagement in the designated research or study and are generally restricted to those who have earned a terminal degree such as Ph.D. or J.D. within the last three years or a medical degree such as M.D., M.B.B.S., or D.D.S. within the last six years. Requests for exceptions for individuals who are beyond these limits, or have not been actively engaged in research as their primary effort, must include a written statement from the sponsoring faculty member indicating what additional training outside the primary area of effort the individual plans to receive, and the reasons for which the exception is requested. Postdoctoral scholars are appointed at Stanford for fixed terms, typically one year but that may eventually total up to four years, and are subject to a strict five-year rule (that is, that the total postdoctoral appointment period is not to exceed a total of five years of postdoctoral research experience at all institutions combined). In cases of combined training, only the years of active research at the postdoctoral level are counted for salary and other purposes. Postdoctoral scholars who begin a second postdoctoral appointment in a new field may have training extended to a maximum total of up to six years. Postdoctoral scholars may request temporary reductions in effort and pay due to temporary family or other conditions.

All postdoctoral scholars appointed at Stanford must be supported by Stanford grants and contracts, training grants, departmental or school fellowship funds, or external fellowships, or by a combination of these sources. Scholars may not be self-supporting. In addition, all postdoctoral scholars are eligible for a benefits package including medical, dental, life, and disability insurance. Postdoctoral scholars are normally appointed for 100% time.

Postdoctoral scholars must be registered at Stanford during every academic quarter of their appointment. Registration entails payment of a quarterly postdoctoral fee by the academic department or school appointing the scholar.

Prospective postdoctoral scholars should write directly to the department in which they wish to study or check for postdoctoral openings at http://postdocs.stanford.edu/prospects/index.html. For more information, see http://postdocs.stanford.edu.

VISITING RESEARCHERS

In limited instances, it is to the benefit of Stanford faculty to permit persons who have not yet obtained a Ph.D. (or its foreign equivalent) or who are not recognized experts in their fields to engage in research on the Stanford campus using Stanford research facilities. Such instances include students at other universities who are engaged in graduate-level research in a field of interest to the faculty member, a person doing a laboratory rotation as part of a larger research study or grant, or employees of companies who are conducting research which requires specialized equipment available only at Stanford.

In these instances, they may be eligible to apply to register as nonmatriculated graduate students in the visiting researcher category for one year. Invited persons must be qualified to conduct research at a level comparable to that of other Stanford graduate students, and the research must be of benefit to Stanford as well as to the visitor. Application for Admission forms for visiting researchers are submitted to Graduate Admissions, Office of the University Registrar by the department issuing the invitation.

Visiting researchers pay the Permit for Services Only (PSO) rate and may waive the University's student medical insurance plan only if they have comparable coverage with another carrier and submit proof of the comparable coverage prior to the term start date. They are not permitted to enroll in or audit any courses, but in quarters they are registered as visiting researchers they are eligible for the usual student benefits of nonmatriculated student status. However, in a few instances, visiting researchers may be invited to apply for nonmatriculated graduate non-degree student status. Once non-degree student status is granted, they must pay the regular tuition rate and will be eligible to enroll in courses. It is important to note, however, that permission to enroll in any specific class is not guaranteed in the non-degree approval process. Information on nonmatriculated non-degree student eligibility requirements and application forms can be obtained from Graduate Admissions, Office of the University Registrar.

Visiting researchers may apply for housing, but have a low priority for assignments. No Stanford fellowships, assistantships, or Stanford loans are available for visiting researchers. Stanford cannot certify visiting researchers for deferment of U.S. educational loans. Citizens of other countries who enter the United States to be visiting researchers at Stanford must have a DS-2019 Certificate (to apply for a J-1 visa) issued by the Bechtel International Center and must register each quarter, including Summer Quarter, to maintain their visa status.

See also the Research Policy Handbook, Procedures for Registering Visiting Researchers (RPH 9.7) at http://rph.stanford.edu/9-7.html.

HONORS COOPERATIVE PROGRAM

The Honors Cooperative Program (HCP) is a part-time graduate program offered by Stanford University. It allows working professionals, who may be eligible for tuition support through their employer, an opportunity to earn a graduate degree in any of the engineering programs, applied physics, statistics, or biomedical informatics, on a part-time basis.

Prospective HCP students apply to the department in which they would like to pursue a graduate degree through the normal graduate admissions process, and compete with all other applicants for admission to the program. Once admitted, HCP students arrange their part-time status and tuition payment options through the Stanford Center for Professional Development (SCPD). Courses are delivered online and broadcast locally. HCP students are also welcome to attend classes on campus, and some on-campus attendance may be required depending on the degree track.

To participate, HCP students must have the support of their employer as a participating company of the Stanford Center for Professional Development. For more information, see http://scpd.stanford.edu, or phone (650) 725-3000.

VISAS

In order to register as students, Stanford University requires that all those who are not U.S. citizens or U.S. registered permanent residents must obtain and maintain an appropriate visa status for their stay in the United States. The types of student visas sponsored by Stanford include the following:

1. Student Visa (F-1), obtained with an I-20 Certificate of Eligibility issued by Stanford University. The graduate student on an F-1 visa must enroll in a full course of study. The accompanying spouse or child enters on an F-2 visa. F-2 visa holders may not hold employment or engage in business under any circumstances. The F-2 spouse of an F-1 student may not engage in full-time study, and the F-2 child may only engage if the study is in an elementary or secondary school (kindergarten through twelfth grade). The F-2 spouse and child may engage in study that is avocational or recreational in nature.
2. Exchange Visitor Visa (J-1), obtained with a DS-2019 Certificate of Eligibility issued by Stanford University or a sponsoring agency. This visa is required for graduate students sponsored by certain agencies, foundations, and governments. In some cases, exchange visitors must leave the United States at the conclusion of their programs, may not change to non-student visa status, and may not apply for permanent residency in the United States until they have returned to their home countries for at least two years. The accompanying spouse or child of an exchange visitor enters on a J-2 visa and may, in some cases, obtain permission to work. J-2 dependents can apply for an Employment Authorization document from U.S. Citizenship and Immigration Services in order to be employed in the U.S. There is no regulatory restriction on study for J-2 dependents.

The Certificate of Eligibility (I-20/DS-2019) is issued to an admitted student after receipt of certification of adequate financial support. An F-1 student transferring from another U.S. school must obtain a new I-20 document from Stanford and complete a transfer process at the Bechtel International Center no later than 15 days after the effective date of the transfer. A J-1 student transferring from another U.S. school must obtain a new DS-2019 document from Stanford and complete a transfer process at the Bechtel International Center no later than 30 days after the effective date of the transfer.

Information on visas is sent to admitted graduate students in the *Welcome to Stanford* guide, mailed by Graduate Admissions, Office of the University Registrar. Information on visas for postdoctoral scholars and visiting researchers is available at the Bechtel International Center web site http://stanford.edu/dept/icenter.

HOLDS AND RESCISSION

By applying for admission to Stanford University academic programs, applicants certify that the information they provide in

their applications is their own work and, to the best of their knowledge, is complete and accurate. As also noted in the application materials, Stanford reserves the right to withdraw an offer of admission under certain circumstances, including: 1) if there is a significant drop in academic performance or a failure to graduate (in the applicant's current program); 2) if there has been a misrepresentation in or a violation of any of the terms of the application process; or 3) if the University learns that an applicant has engaged in behavior prior to the first day of class that indicates a serious lack of judgment or integrity. Indeed (and for example), Stanford may rescind an applicant's admission at any time, including after attendance and after degree conferral, if it determines, for example, that an individual has been admitted to Stanford on the basis of having provided false information or has withheld requested information. The University further reserves the right to require applicants to provide additional information and/or authorization for the release of information about any such matter, and to place a hold on registration and/or the conferral of a degree during the investigation into any such matter.

Similarly, Stanford University awards degrees on the basis of successful completion of all program requirements in accordance with Stanford's Honor Code requiring academic honesty and integrity. The University reserves the right to rescind any degree or honors designation (even after conferral) if the program requirements have not been so completed, and to place a hold on issuing a degree during the investigation into any such matter.

Students with unmet financial (or other university) obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released.

UNDERGRADUATE FINANCIAL AID

The University has a comprehensive need-based financial aid program for its undergraduates who meet various conditions set by federal and state governments, the University, and other outside agencies. Students are admitted without consideration of their financial circumstances, except in the case of international students.

In awarding its own funds, the University assumes that students and their parents accept the first and primary responsibility for meeting educational costs. Stanford's policy generally is to exclude undergraduates from being considered financially independent of their parents for University-administered scholarship aid unless a student is an orphan, a ward of the court, or at least 25 years of age. Spouses of married undergraduate students share in the responsibility to meet educational costs.

Stanford expects financial aid applicants to apply for and use resources from state, federal, and private funding sources, contribute from their earnings during nonenrollment periods (for example, summer), and use earnings from part-time employment during the academic year to meet educational expenses. If Stanford determines that an applicant and his or her family cannot meet these expenses, the University may offer financial aid funds to help meet these costs.

The amount of scholarship or grant funds offered to students is determined by the difference between the comprehensive cost of attendance (including tuition, fees, room, board and allowances for books, supplies, personal expenses, and travel) and the amount the student and parents can reasonably be expected to contribute toward educational costs based on family financial circumstances. Scholarships from outside sources may change the University's financial aid award. When a student receives outside scholarships, these funds reduce or eliminate the student's responsibility to contribute from job earnings. If the total in outside scholarships exceeds the student's responsibility (approximately $4,750 in most cases), the University then reduces institutional scholarship, dollar for dollar, by any additional amount.

Students are considered for University scholarship eligibility during their first four years of undergraduate enrollment. The Financial Aid Office (FAO) considers applicants for University scholarship eligibility beyond the twelfth quarter only if enrollment is essential in order to complete the minimum requirements for the first baccalaureate degree or major. Students who enroll for a fifth year in pursuit of a coterminal program, a minor, a second major, a second degree, or the B.A.S. degree are not eligible for University scholarship consideration but may apply for student loans and federal grants. Eligibility for federal student aid is limited to the equivalent of 15 quarters of full-time undergraduate enrollment, including course work taken at other colleges and universities.

For additional detailed information, refer to the FAO web site at http://financialaid.stanford.edu.

UNDERGRADUATE FINANCIAL AID APPLICATION AND AWARD NOTIFICATION PROCESS

FINANCIAL AID PRIORITY FILING DEADLINES

Web Site:
http://www.stanford.edu/dept/finaid/undergrad/apply/index.html

Prospective freshmen	Restrictive Early Action, November 15, 2010
Prospective freshmen	Regular Decision, February 15, 2011
Prospective transfers	March 15, 2011
Returning students	April 15, 2011

APPLICANT DOCUMENTS

U.S. citizens and U.S. registered permanent residents who wish to be considered for all available funding administered by Stanford should submit the following documents:

1. Free Application for Student Aid (FAFSA): file online at http://fafsa.ed.gov. Stanford's school code is 001305. Freshman applicants who are California residents must file the FAFSA and submit a GPA Verification Form to the California Student Aid Commission (CSAC) by March 2, 2011, for Cal Grant consideration.
2. CSS PROFILE application: file online at http://profileonline.collegeboard.com. Stanford's school code is 4704.
3. Copies of parents' 2010 W-2 forms. Continuing students should submit copies directly to the FAO. New applicants should submit signed copies of their parents' 2010 federal tax returns and W-2 forms to the CSS IDOC service.

U.S. citizens and U.S. registered permanent residents who wish to apply only for federal aid consideration do not need to file the CSS PROFILE; they should file the FAFSA and submit tax documents directly to the FAO.

New International students should submit the CSS PROFILE application online at http://profileonline.collegeboard.com. The Certification of Finances form available from our web site should be submitted directly to the FAO. Canadians should also submit tax documents as listed above. Continuing international students will be asked to submit the International Student Financial Aid Application and Certification of Finances directly to the FAO.

Students whose application materials are filed after the priority filing deadlines or who have not secured all external need-based funds such as Pell and Cal Grants can expect higher amounts of student responsibility in their financial aid packages.

Applicants and their parents are required to submit accurate and complete information on all application documents. The University participates in the U.S. Department of Education's Quality Assurance Program to evaluate the accuracy of aid application data. As part of this program, the FAO may request additional documentation to verify reported data. Students who fail to submit the requested documentation will have their financial aid funds withheld or canceled and their future registration placed on hold. Financial aid awards may change as a result of the verification process.

NOTIFICATION DATES

In December, the FAO notifies Restrictive Early Action applicants who apply by the November filing date of their estimated financial aid award. The FAO notifies freshman applicants who

apply by the February 15 filing date in early April. Transfer applicants who apply by the March 15 filing date are normally notified of their financial aid award within five days of their notice of admission.

The FAO sends notification of award eligibility to continuing and returning applicants early June through August 1. Applicants who file after the priority filing date may not have a financial aid award or funds secured for disbursement by the Autumn Quarter payment due date.

Financing Options—The federal PLUS loan program is available to help parents who are U.S. citizens or U.S. registered permanent residents cover all or part of the expected family contribution through a fixed-interest, long-term loan. PLUS loans are available to all parents who meet credit requirements regardless of their computed financial need. See the Financial Aid Office web site at http://financialaid.stanford.edu for details on the PLUS program. Parents should also contact their employers for information about what may be available to them as employees' benefits to help meet college costs.

GRADUATE FINANCIAL AID

Graduate students at Stanford receive funding from a variety of sources. University fellowships, research assistantships, and teaching assistantships are offered primarily to doctoral students. In some cases, master's students also may receive fellowships and assistantships. In addition, outside agencies provide fellowships to many graduate students at Stanford. Students without fellowships or assistantships, and those whose funding does not cover all of their costs, may need to use student loans, savings, other personal assets, a spouse's earnings, or parental support to meet their educational expenses.

FELLOWSHIPS AND ASSISTANTSHIPS

Fellowships, research assistantships, and teaching assistantships are important parts of the educational program for graduate students at Stanford. Schools and/or departments determine eligibility for University fellowships and assistantships on the basis of academic merit, program, and the availability of funds. Some departments admit only those students to whom they can offer support or who have guaranteed funds from outside sources. Other departments may offer admission without being able to provide fellowship or assistantship funding.

Fellowship and assistantship funding is provided so that students may focus on their studies; concurrent employment is therefore limited. Students with full assistantships are limited to eight additional hours of employment per week. Students on full fellowships may be paid for up to eight additional hours per week, or may hold a supplemental assistantship appointment up to a maximum of 25% with no additional hourly employment. International students who have Stanford assistantships may not work more than 20 hours per week, including the time required for their assistantship appointments. In Summer Quarter, graduate students who are not required to enroll full-time may be allowed additional employment.

Application procedures and deadlines for admission and University funding are described in the Guide to Graduate Admission and at http://gradadmissions.stanford.edu. Fellowships and assistantships are normally awarded to incoming students between March 15 and April 15, in accordance with the Council of Graduate Schools resolution. Acceptance of University funding obliges the student to inform the department of any additional funds received; in such cases, Stanford funding may be adjusted (see "Outside Fellowships" below). Recipients of all graduate fellowships and assistantships must enroll in courses for each quarter of their appointment. Students may make arrangements with Student Financial Services to have their assistantship salary credited directly to the University bill through a payroll deduction plan.

OUTSIDE FELLOWSHIPS

Many graduate students hold fellowships won in national competition from outside agencies such as the National Science Foundation. Information on application procedures and terms of such fellowship programs may be obtained from the applicant's current academic institution or the national office of the agency administering the program. A student who receives support from an outside source must notify his or her Stanford academic department immediately; Stanford funding may be adjusted.

STUDENT LOANS (GRADUATE STUDENTS)

Graduate students can apply for federal and private student loans through the University's Financial Aid Office (FAO). Available programs include federal Direct loans (also known as Stafford loans), federal Perkins loans, and federal graduate/professional PLUS loans. Information on these loan programs is available at http://financialaid.stanford.edu or by calling the FAO at (650) 723-3058. Students who are not U.S. citizens or U.S. registered permanent residents are not eligible for federal student loans.

Application—Students in the Schools of Business, Law, and Medicine (M.D. program) should consult their schools for loan application instructions. The following loan application requirements apply to graduate students in the Schools of Earth Sciences, Education, Engineering, Humanities and Sciences, and Medicine (Ph.D. only):

1. Free Application for Federal Student Aid (FAFSA); file online at http://fafsa.ed.gov. Stanford's school code is 001305.
2. Stanford Graduate Student Loan and Federal Work-Study Application; file online at http://financialaid.stanford.edu.

Students should complete the application process at least two months prior to the beginning of the quarter in which they need the funds. The FAO determines eligibility for student loans based on a review of FAFSA and application data, satisfactory academic progress, level of indebtedness, credit history, and availability of funds. Student loan eligibility may be affected by fellowship, assistantship, and other funding; total funding, including student loans, may not exceed the expense budget as determined by the FAO.

Emergency funds—Students may request a cash advance from the Student Services Center. Cash advances may not be used to pay University bills.

COTERMINAL STUDENT FINANCIAL AID

Coterminal students, who are concurrently pursuing bachelor's and master's degrees, may receive University fellowships and assistantships only after completing 180 units. Most private and federal graduate fellowships are awarded only to students who have received their bachelor's degrees. Stanford undergraduate scholarships and grants are reserved for students in their first four years of undergraduate study.

VETERANS' EDUCATIONAL BENEFITS

The Office of the University Registrar serves as the liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans' benefits. Stanford certifies enrollment for students in degree seeking programs. Nonmatriculated and certificate programs are not eligible. All students eligible to receive veterans' benefits while attending the University are urged to complete arrangements with the appropriate agency in advance of enrollment. Students must have their department approve their study lists as meeting graduation requirements before the Office of the University Registrar can certify the courses for Veterans Affairs.

To comply with federal regulations concerning credit for previous training (38 CFR 21.4253), Stanford University is required to evaluate all previous education and training completed elsewhere to determine what credit, if any, should be granted to students eligible to receive Veterans Affairs (VA) educational benefits. Stanford is required to complete an evaluation; credit is granted when

appropriate. Credit is evaluated toward the degree program registered with Veterans Affairs as determined by the Office of the University Registrar in conjunction with the relevant academic department(s) or program(s). All relevant policies regarding transfer credit apply. In addition, this evaluation occurs each time a student's degree program is changed.

Subject to current federal and University guidelines, students eligible for receipt of VA educational benefits have their prior education and training evaluated up to the credit limits outlined in the "Residency Policy for Graduate Students" section of this bulletin. As an exception to that policy, students in master's programs in the schools of Earth Sciences, Education, Engineering, Humanities and Sciences, Law, Medicine, and Graduate Business are allowed a maximum of 6 transfer (quarter) units.

Stanford University is required to certify only those courses that meet minimum graduation requirements. Courses not directly related to a student's degree program or courses beyond those required for a specific degree program are not certified.

Stanford participates in the Yellow Ribbon provision of the Post 9/11 GI Bill (Ch. 33). If a student qualifies for Chapter 33 benefits at the 100% level, the student will receive additional funding through the Yellow Ribbon Program. Under this program, Stanford provides an annual award of $3,000 to supplement the Chapter 33 base tuition benefit. The VA matches Stanford's Yellow Ribbon contribution, so the student receives a combined total of $6,000 in additional funds. The amount of the institutional contribution is higher (up to $7,500) for graduate students enrolling at Graduate School of Business.

TUITION, FEES, AND HOUSING

Regular quarterly tuition for the 2010-11 academic year, payable Autumn, Winter, and Spring quarters, is as follows:

Undergraduate	$12,900
Graduate 11-18 units	$12,900
Graduate 8-10 units	$8,390
Graduate Engineering 11-18 units	$13,740
Graduate Engineering 8-10 units	$8,930
Graduate School of Business, first year MBA	$17,706
Graduate School of Business, second year MBA	$17,107
School of Medicine (M.D. Program—FY 2011 and beyond)*	$14,732
School of Medicine (M.D. Program—FY 2010 and earlier)*	$15,531
Stanford Law School	$14,960

*Ph.D. students in the Biomedical Sciences and in Graduate Business are assessed the regular graduate tuition rate.

For complete tuition information, see the Registrar's tuition web site at http://studentaffairs.stanford.edu/registrar/students/tuition-fees_10-11.

Regular tuition fees apply to the undergraduate Overseas Studies and Stanford in Washington programs. For Summer Quarter tuition rates and policies, see http://studentaffairs.stanford.edu/registrar/students/summer-tuition_10-11.

A coterminal student is subject to graduate tuition assessment and adjustment policies once graduate standing is reached. Coterminal students should see the student policies and procedures for tuition assessment, as described under "Residency and Unit Requirements in Coterminal Programs" in the “Graduate Degrees” section of this bulletin.

Eligibility for registration at reduced tuition rates is described below. Tuition exceptions may also be made for illness, disability, pregnancy, new-parent relief, or other instances at the discretion of the University. No reduction in tuition charges is made after the first two weeks of the quarter.

All students are advised, before registering at less than the regular full-tuition rate, to consider the effects of that registration on their degree progress and on their eligibility for financial aid and awards, visas, deferment of student loans, and residency requirements.

The University reserves the right to change at any time, without prior notice, tuition, room fees, board fees, or other charges.

UNDERGRADUATE TUITION

During Autumn, Winter, and Spring quarters, undergraduates are expected to register at the regular full-tuition rate.

During Summer Quarter, Stanford undergraduates may register on a unit-basis (minimum 3 units). For Summer Quarter tuition rates and policies, see http://registrar.stanford.edu/students/finances/summer.htm.

The following reduced-tuition categories can be requested by matriculated undergraduate students in the final stages of their degree program:

1. *Permit to Attend for Services Only (PSO)*—Undergraduates completing honors theses, clearing incompletes, or requiring a registration status, and who meet the PSO conditions listed in the "Special Registration Statuses (Undergraduate)" section of this

Bulletin, may petition for PSO status one time only in their terminal quarter. The PSO rate is $3,900 per quarter in 2010-11

2. *13th Quarter*—Undergraduates who meet the 13th Quarter conditions listed in the "Special Registration Statuses (Undergraduate)" section of this Bulletin may petition one time only to register for a minimum of eight units. For per-unit tuition rates, see the Registrar's tuition web site at http://registrar.stanford.edu/students/finances.

3. Graduation Quarter—Undergraduates may petition to register for Graduation Quarter registration status in the quarter in which they are receiving a degree if they are not using any University resources (including housing), have completed all University requirements, and meet the Graduation Quarter conditions listed in the "Special Registration Statuses (Undergraduate)" section of this bulletin. The Graduation Quarter rate is $100 per quarter in 2010-11.

GRADUATE STUDENT TUITION

Matriculated graduate students are expected to enroll for at least eight units during the Autumn, Winter, and Spring quarters. Schools and departments may set a higher minimum. During the Autumn, Winter, and Spring quarters, matriculated graduate students in most departments may register at the reduced 8-, 9-, or 10-unit tuition rate if their enrollment plans are accepted by their departments. Students in the Stanford Law School, in the MBA program in the Graduate School of Business, or the M.D. program in the School of Medicine, should consult appropriate school officers about tuition reduction eligibility.

Graduate students who are enrolled in more than one graduate degree at Stanford, where each program charges a different tuition, are charged:

1. the tuition associated with a degree in the doctoral/professional category, if the other degree is in the master's category. Those degrees in the doctoral or professional category for tuition purposes are the Ph.D., D.M.A., J.S.D., M.D., and J.D. degrees. Those degrees in the master's category for tuition purposes are the Engineer, M.A., M.S., M.P.P., M.B.A., M.F.A., L.L.M., M.L.S., and J.S.M. degrees.
2. the higher tuition rate, if both degrees are in the same category.
3. a University-approved tuition rate if the student is in a special program for which specific tuition agreements have been approved by the Faculty Senate (e.g., all joint degree programs (JDPs) or the Master of Science in Medicine program).

Honors Cooperative students register at the per-unit rate.

During the Summer Quarter registration is not required by Stanford University and does not substitute for registration during the academic year. Students are required to be enrolled Summer Quarter if, during that quarter, they will meet any of the criteria listed in the "Enrollment Requirements" section of the "Graduate Degrees" section of this bulletin. Graduate students who do enroll Summer Quarter may reduce their enrollment to a minimum of one unit (charged on a per-unit basis, with a minimum tuition charge at the 1-3 unit rate) unless the terms of a fellowship or other financial support, or of their particular degree program, require a higher level of enrollment. TGR students who enroll in summer pay the TGR rate and must enroll in the required zero-unit course. Students in the schools of Law, Business, or the M.D. program should consult appropriate school officers regarding summer enrollment requirements. Students possessing an F1 or J1 student visa may be subject to additional course enrollment requirements in order to retain their student visas.

Tuition exceptions may also be available for students who are faculty spouses, regular Stanford employees, or full-time educators in the Bay Area.

Nonmatriculated graduate students pay the same tuition rates as matriculated students, but must register for at least 8 units. Visiting researchers pay the Permit for Services Only (PSO) rate; they may not enroll in or audit courses. Within certain restrictions, postdoctoral scholars may enroll in courses if the appropriate unit rate for tuition is paid.

The following reduced-tuition categories can be requested by matriculated graduate students in the final stages of their degree programs:

1. *Terminal Graduate Registration (TGR)*—Doctoral students, master's students, and students pursuing Engineer degrees who have completed all degree requirements other than the University oral exam and dissertation (doctoral students) or a required project or thesis (Engineer or master's students) and meet the conditions listed in the "TGR" section of this bulletin may request Terminal Graduate Registration tuition status.
   Each quarter, TGR students must enroll in the 801 (for master's and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate section for their adviser. TGR students register at a special tuition rate: $2,517 per quarter in 2010-11. TGR students may enroll in up to 3 units of course work per quarter at this tuition rate. Within certain restrictions, TGR students may enroll in additional courses at the applicable unit rate. The additional courses cannot be applied toward degree requirements since all degree requirements must be complete in order to earn TGR status.
2. *Graduate Tuition Adjustment*—Graduate students who need fewer than 8 units to complete degree requirements or to qualify for TGR status, may register for one quarter on a unit basis (3 to 7 units) to cover the deficiency. This status may be used only once during a degree program. For per-unit tuition rates, see the Registrar's tuition web site at http://registrar.stanford.edu/students/finances.
3. *Graduation Quarter*—Registration is required for the term in which a student submits a dissertation or has a degree conferred. Students who meet the conditions listed in the "Graduation Quarter" section of this bulletin are eligible to be assessed a special tuition rate of $100 for the quarter in which they are receiving a degree.

INTERNATIONAL STUDENTS

F-1 or J-1 visas are required by the U.S. Department of Homeland Security. International students must be registered as full-time students during the academic year. Summer Quarter registration is not required unless the I-20/DS-2019 notes the Summer Quarter as the start date. International graduate students comply with immigration regulations while enrolled for partial tuition if their Stanford fellowships or assistantships require part-time enrollment, if they are in TGR status, or if they are in the final quarter of a degree program. Nonmatriculated international students must register for at least 8 units.

APPLICATION FEE

Contact the Undergraduate Admission Office for information about the undergraduate application fee and the Graduate Admission section of the Office of the University Registrar for the current graduate application fee. Application fees for the School of Law, the School of Medicine, and the Graduate School of Business vary by program. Fees are payable at the time of application and are not refundable.

ASSU FEES

The Associated Students of Stanford University (ASSU) fees are established by student vote in Spring Quarter. Fees directly fund activities of student organizations and not operations of ASSU. The 2010-11 fees are:

- *Undergraduates*—$111 per quarter

- *Graduate Students*—$28 for each of Autumn and Winter quarters; $29 for Spring Quarter.

ASSU fees are assessed each term and can be waived. Waivers can be requested during the first three weeks of each quarter on the ASSU web site at http://assu.stanford.edu. Waivers granted will result in a credit to the student's University bill.

DOCUMENT FEE

Stanford charges a one-time Document Fee to all students admitted to new degree or non-degree programs. The fee is paid once only, regardless of the number of degrees a student may ultimately pursue. It covers the cost of a variety of University administrative services such as enrollment and degree certification, course drops and adds done in Axess before published deadlines, diplomas, official transcripts and their production, and credential files maintained by the Career Development Center.

The document fee for students admitted to new degree or non-degree programs in 2010-11 is $200.

CAMPUS HEALTH SERVICE FEE

All students enrolled on the main Stanford campus are required to pay the Campus Health Service Fee. The Campus Health Service Fee covers most of the services provided by Vaden Health Center, including primary care medical visits, psychological evaluation and short-term therapy at Counseling and Psychological Services (CAPS), and health and wellness programs. The services provided by Vaden Health Center are not covered by Cardinal Care or a student's private health insurance. More information and answers to questions about the fee can be found at http://vaden.stanford.edu/fees/index.

HEALTH INSURANCE

The University requires all registered students to carry medical insurance to provide coverage for services not provided by Vaden Health Center. Students are enrolled in and charged for the Stanford student health insurance plan, Cardinal Care, unless they have completed waiver procedures by the waiver deadline.

For complete information on health insurance, see http://vaden.stanford.edu/insurance/.

Those who carry medical insurance through an alternate carrier are generally eligible for waiver of the Stanford student health insurance plan. For information on waiver procedures, see http://vaden.stanford.edu/insurance/using_your_own.html#waive.

SPECIAL FEES

New Student Orientation Fee—A fee is charged to all entering undergraduates for the costs of orientation, including room and board, and for the cost of class dues to provide funds for later activities of the class.

School of Law Course Materials Fee—A fee is charged each quarter to School of Law students for supplementary course materials.

Graduate School of Business M.B.A. Course Reader Fee—A fee is charged each quarter to M.B.A. students in the Graduate School of Business to cover the cost of in-class handouts and licensing fees.

Late Study List Fees—Charges are imposed for late submission of study lists. The amount is $200

Laboratory Fee—Students in chemistry laboratory courses are charged a nonrefundable fee.

Music Practice; Athletics, Physical Education, Recreation; and Dance—Courses for which special fees are charged are indicated in the *Time Schedule*.

Dissertation Fee—Each Ph.D. and D.M.A. candidate has the option to either submit electronically or on paper. Electronic submission is free. Students who choose to submit on paper are charged a fee to cover the cost of microfilming and binding the dissertation and the cost of publishing the abstract.

International Scholar Service Fee—A one-time fee for visa authorization documents is charged to international postdoctoral and visiting scholars.

PAYMENTS

By accepting Stanford's offer of admission and enrolling in classes, each student accepts responsibility for paying all debts to the University, including tuition and fees, for which he or she is liable.

Charges and credits from offices within the University are aggregated in a student's individual account and presented on the University bill. Student Financial Services sends the University bill electronically to students monthly via Stanford ePay. Students may view their account online 24 hours a day, seven days a week, via Stanford ePay at http://axess.stanford.edu. Payments should be made online through Stanford ePay. If necessary, the bill and a payment stub may be printed from Stanford ePay.

Term fees, such as tuition, fees, room, board, and health insurance, are due and must be received by the 15th of the month. Online payments via Stanford ePay can be made up to midnight PST on the 15th of the month. Mailed payments must be postmarked by 5:00 p.m. on the 15th of the month.

After the start of the term, adding units may result in additional tuition charges. Other fees, such as room damage repair charges, petition fees, late fees, lab fees, library fees, DMCA file-sharing related fees and other miscellaneous fees, are due after they are billed.

An individual's registration as a Stanford student constitutes his or her agreement to make timely payment of all amounts due.

FORMS OF PAYMENT

Stanford's standard method of payment is electronic check (eCheck) using the online service, Stanford ePay. No fee is associated with eCheck. See http://fingate.stanford.edu/students/universbill/resources/stanford_epay.html for ePay payment instructions. If online payment is impossible, students may mail or deliver payment to the Student Services Center.

Stanford accepts the following forms of payment: Stanford ePay eCheck, personal check, cashier's check, money order, travelers checks in U.S. funds drawn on U.S. banks, cash, and wire transfer (recommended for foreign students, see http://fingate.stanford.edu/students/universbill/payment_methods.html#wire_transfer for wire transfer instructions). Stanford does not accept credit cards or postdated checks.

ACCOUNT FEES AND ACTIONS

Late Fees—The University must receive the full amount due on or before the due date indicated on the bill. If full payment is not received by the due date, a late fee of 1.0% of the amount past due may be assessed. Anticipated aid (aid that has been accepted but not disbursed and is shown on the student account) reduces the total amount due prior to late fees being applied.

Holds—Accounts that become past due more than 30 days are subject to financial holds. A financial hold blocks transcripts, diplomas, and enrollment eligibility.

Nonsufficient Funds—Checks or eCheck payments returned due to insufficient funds have already been submitted twice to the bank. A non-refundable $25.00 administrative fee is assessed. In addition, student accounts are subject to holds and late payment penalties may apply.

Delinquent Accounts—Delinquent accounts may be reported to one or more of the national credit reporting agencies. Severely delinquent accounts may be referred to a collection agency and/or placed in litigation in accordance with state and federal laws. Students with delinquent accounts may be held responsible for collection costs, attorney fees, and court costs.

MEAL PLANS

For latest information see http://dining.stanford.edu.

Stanford University's Residential Education program promotes the philosophy that living and learning are integrated and that formal teaching, informal learning, and personal support in residences are integral to a Stanford education. Meals play a key role in this mission of community building, leading, and learning. Therefore, residents of specially designated University residence halls (Branner, Crothers/ Crothers Memorial, Florence Moore, Lakeside, Manzanita, Murray, Ricker, Stern, Toyon, Wilbur, and Yost) are required to participate in a Stanford Dining meal plan. Stanford Dining is committed to excellence by providing meal plans that offer significant value, the highest quality, and maximum flexibility of dining across campus.

Stanford Dining serves 19 meals each week: breakfast, lunch and dinner, Monday through Friday, and brunch and dinner on the weekends. There are three meal plans to choose from: 19 meals/week, 14 meals/week plus Meal Plan Dollars, and 10 meals/week plus Meal Plan Dollars.

Up to 50 Meal Plan Dollars are carried over into the following quarter for those enrolled in a Stanford Dining Meal Plan during the following quarter. This includes Autumn to Winter, Winter to Spring, Spring to Summer, and Summer to Autumn quarters).

Meal plans are billed on a quarterly basis, and the cost is determined by the number of service days in each quarter. Meal Plan Dollars provided as part of the 14 meal/week and 10 meal/week plans also vary, depending on the number of days in each quarter.

Stanford meal plan rates are available at the Stanford Dining web site.

REFUNDS

Students who withdraw from the University before the end of a term may be eligible to receive refunds of portions of their tuition under certain limited circumstances.

ANNULLED REGISTRATION

Students who take a leave of absence or summer annulment from the University voluntarily before the first day of instruction may have their registrations annulled. Tuition is refunded in full. Such students are not included in University records as having registered for the term and new students do not secure any privileges for admission for any subsequent quarter as returning students. An annulment does not automatically cancel health coverage unless the annulment is granted before the first day of instruction. Financial aid recipients should be aware that a proportion of any refund is returned to the various sources of aid.

CANCELLATION OF REGISTRATION OR SUSPENSION FOR CAUSE

Students who have their registrations canceled or are suspended from the University for cause generally receive refunds on the same basis as those receiving leaves of absence unless otherwise specified. A student whose registration is canceled less than one week after the first day of instruction for an offense committed during a preceding quarter receives a full refund of tuition fees.

INSTITUTIONAL INTERRUPTION OF INSTRUCTION

It is the University's intention to avoid the necessity of taking the actions described in this paragraph. However, should the University determine that continuation of some or all academic and other campus activities is impracticable, or that their continuation involves a high degree of physical danger to persons or property, activities may be curtailed and students requested or required to leave the campus. In such an event, arrangements are made as soon as practical to offer students the opportunity to complete their courses, or substantially equivalent work, so that appropriate credit may be given. Alternatively, the University may determine that students receive refunds on the same basis as those receiving leaves of absence, or on some other appropriate basis.

LEAVES OF ABSENCE

A student in good standing who desires or is required to take a leave of absence from the University after the first day of instruction, but before the end of the first 60 percent of the quarter (term withdrawal deadline), may file a petition for a leave of absence and tuition refund with the Student Services Center. A leave of absence after the first 60 percent of the quarter (term withdrawal deadline) is only granted for approved health and emergency reasons. For more information on leaves of absence, undergraduates should see the "Leaves of Absence and Reinstatement (Undergraduate)" section of this bulletin, and graduate students should see the "Leaves of Absence and Reinstatement (Graduate)" section of this bulletin.

ROOM AND MEAL PLAN REFUNDS

Students assigned to a University residence are subject to the terms of the University Residence Agreement, and are required to live in University Housing for the full duration of their signed contract. The text of the University Residence Agreement is available at http://www.stanford.edu/dept/rde/shs/res_agree.htm.

Room refunds are made only when students move out of the residence system and graduate from or cease to be enrolled at the University. Eligibility for refunds is listed in the Residence Agreement and in the online termination form at http://onlinetoc.stanford.edu. Filing a termination of occupancy form and moving out of Student Housing does not necessarily entitle a student to a refund. Students in all-male fraternities or all-female sororities are billed directly by the fraternity or sorority, and refunds are arranged between the student and the fraternity or sorority.

A meal plan refund is based on the date when a student moves out of University residence and is approved under conditions as specified in the Residence Agreement. If a student uses the meal plan after that date, an additional daily charge incurs.

Any decision to refund prepaid room and meal plan charges or to waive liability for deferred charges is made at the sole discretion of the University. Students with questions about refunds should contact Housing Assignments for room refunds or the central office of Stanford Dining for residential meal plan refunds.

TUITION REFUND SCHEDULE

Students who take an approved leave of absence or summer annulment are eligible for a tuition refund during the first 60 percent of the quarter, until the term withdrawal deadline. Refunds are calculated on a per diem basis (including weekends and University holidays) starting the first day of instruction of each quarter. Tuition is charged on a daily basis (including weekends and holidays) through the first 60 percent of the quarter (term withdrawal deadline). After the first 60 percent of the quarter (term withdrawal deadline), students are liable for the full amount of tuition that they were charged. Health insurance charges are not refundable after the first day of instruction.

PER DIEM TUITION CHARGES FOR STUDENTS WHO TAKE A LEAVE OF ABSENCE

Quarter	*Autumn*	*Winter*	*Spring*	*Summer*
Undergraduate/ Graduate Full Tuition	$157.32	$174.32	$179.17	$238.89
Graduate 8-9-10 Unit Rate	$102.32	$113.38	$116.53	$155.37
Graduate Engr. Full Tuition	$167.56	$185.68	$190.83	$254.44
Graduate Engr. 8-9-10 Unit Rate	$108.90	$120.68	$124.03	$165.37
Last Date for Tuition Refund	Nov. 8. 2010	Feb. 17, 2011	May 11, 2011	July 23, 2011

For example: an undergraduate, who was charged the tuition rate of $12,900 for Autumn Quarter, becomes ill and informs the Student Services Center on the 10th day of the quarter that he or she wants to take a leave of absence. If the petition is approved, the student is charged for 10 days of tuition (10 days x $157.32 per day) or $1,573.20.

Separate schedules exist for students paying the medical, law, graduate business, or summer session rates. These 2010-11 schedules are available at the Registrar's tuition web page at http://studentaffairs.stanford.edu/registrar/students/tuition-fees_10-11.

Tuition refunds are calculated based on the date that the student's leave of action petition is submitted.

Students may not be entitled to any financial aid credits such as federal loans or University scholarships or grants that were previously placed on their accounts. The Financial Aid Office can confirm any amounts that may have been withdrawn from a student's account as a result of not being enrolled.

The amount refundable based on the criteria outlined above, an overpayment of fees, or financial aid awards in excess of fees is presented on the University bill in Stanford ePay. Refunds are processed routinely throughout the term. Refunds may be requested via HelpSU (http://helpsu.stanford.edu, request category Student Services, request type University Bill/Student Account), or in person or by phone at the Student Services Center.

Direct deposit is Stanford University's standard method for providing student refunds. Students are advised to maintain up-to-date direct deposit details in Axess for fast, convenient receipt of funds. Students who have not established direct deposit receive a check mailed to the mailing address as recorded in Axess. Checks for those without a mailing address are sent to the permanent home address. Checks cannot be picked up on campus as they are mailed from a Wells Fargo processing center.

Tuition payments made to the University under certain specific tax benefit programs prohibit tuition refunds to the student or donor. For more information about these programs, contact the Student Services Center.

HOUSING

University housing is available to enrolled Stanford students. Student Housing, a division of Residential and Dining Enterprises, is responsible for: managing, maintaining, and cleaning the physical plant of student residences; assigning students to housing; and operating the regional housing front desks. Information on University housing assignments, options, policies, application procedures, and deadlines may be obtained from Housing Assignments online at http://studenthousing.stanford.edu, by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 725-2810, or by email at housingassignments@lists.stanford.edu. Information regarding off-campus housing may be obtained from Community Housing at http://offcampus.stanford.edu, by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 723-3906, or by email at communityhousing@lists.stanford.edu. For other housing related information, email studenthousing@lists.stanford.edu or phone the main student housing office at (650) 725-1600.

The department of Residential Education (http://www.stanford.edu/dept/resed, 650-725-2800) and the Graduate Life Office (http://www.stanford.edu/group/glo, 650-723-1171) are responsible for planning educational programs, counseling, and crisis intervention. In addition, Residential Education is responsible for the administration of local undergraduate residence offices.

HOUSING RATES

Complete information on housing is available at http://housing.stanford.edu. Campus housing rates are generally below local area market rents.

- See undergraduate housing to apply for 2010-11 housing; rates are available at http://housing.stanford.edu/ugrad/ugrad_rates_10.htm.
- See graduate housing to apply for 2010-11 housing; rates are available at http://www.stanford.edu/dept/rde/shs/pdfs/grad_rates_10.pdf.

All rates are per student and include utilities and coinless laundry. Room rates are charged quarterly on the University Bill. Information on payment options and procedures is discussed in housing assignment information from Housing Assignments and is available in complete detail from the Student Services Center, 2nd floor of Tresidder Memorial Union, 459 Lagunita Drive, Stanford University, Stanford, CA 94305-6036.

A quarterly house dues fee for students is generally determined by the local residence staff and/or residents of the house and may be included with room and board charges on their University Bill.

Students who live in housing are automatically assessed a telecommunications fee on their University Bill that covers in-room network connections and a land-line phone with basic telephone service.

UNDERGRADUATE RESIDENCES

Approximately 95 percent of undergraduates live in University housing, not counting students studying abroad during the academic year. All freshmen and transfers are required to live in University residences for educational reasons and are automatically assigned housing following admission.

Residence assignments for continuing undergraduates are made on the basis of an annual lottery, called the Draw, and quarterly waiting lists. Undergraduates are guaranteed four years of University housing (two or three years for transfer students based on their entering class standing) if:

1. they are in compliance with the University housing agreement and University polices
2. they apply by the appropriate Draw deadlines
3. *and*, they are willing to live anywhere on campus.

Undergraduate residences include traditional residence halls, language and culture residences, crosscultural theme houses, student-managed and cooperative houses, apartments, suites, fraternities, and sororities.

GRADUATE RESIDENCES

Web Site: http://www.stanford.edu/dept/rde/shs/grad/apply_10.htm

Assignment to Graduate Residences—Over 57 percent of matriculated graduate students live in Stanford student housing. Residence assignments are made on the basis of an annual lottery and quarterly waiting lists. New matriculated students are guaranteed University housing if:

1. they are in compliance with the University housing agreement and University policies;

2. they apply by the first round application deadline for the Autumn term; and
3. they are willing to live in any residence for which they are eligible.

At Stanford University, new matriculated students are students who are in a graduate program for the first time. Students starting a second graduate degree are not considered new students and therefore are not guaranteed housing.

After the first year, continuing matriculated graduate students are given priority for housing for a specified number of years based on their academic degree program. Master's students are given one additional year of limited priority for housing. Doctoral students are given five additional years of limited priority for housing. Limited priority years are not automatically cumulative, so students do not receive additional years of limited priority for subsequent degrees. If a student completes a master's program and then moves to a doctoral program, they receive four additional limited priority years, which is the difference between the allocation for a master's and a doctoral program. Students who live in residences that are open year-round and who remain in continuous occupancy in their rooms or apartments may renew their contracts annually if they meet certain eligibility requirements. Students who live in residences that are open only during the academic year, or who want to change residences, re-enter the lottery each year. Approximately 80% of continuing student applicants are assigned housing each year.

Single graduate students may request assignment to graduate apartments and residence halls, or to spaces in six undergraduate cooperative houses.

Couples without children may request assignment to either furnished or unfurnished one-bedroom apartments. Couple housing is available to students who are married and to students who have a same-sex or opposite-sex domestic partner. At Stanford University, a domestic partnership is defined as an established, long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

One-, two-, and three-bedroom apartments (furnished and unfurnished) are provided for students with children, based on the number of dependents. Housing for students with children is available to married couples, domestic partners, and single parents who have dependent children living with them. Housing is not provided for extended families, including the parents and siblings of students, or live-in day care staff.

COMMUNITY HOUSING

Community Housing maintains computerized listings of private rooms, houses, and apartments in surrounding communities that are available to students who want to live off-campus. Students must make rental arrangements directly with landlords. Information on community housing may be obtained from Community Housing at http://offcampus.stanford.edu, by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 723-3906, or by email at communityhousing@lists.stanford.edu. During early September, temporary accommodations are available in student residence halls at a modest charge for students searching for off-campus housing for Autumn Quarter. Contact Stanford Conference Services for more information at (650) 725-1429.

TRANSFER WORK

Stanford accepts a small number of undergraduate transfer students each year. Requirements for admission are described as part of the undergraduate application process and are listed on the Registrar's web site. Stanford University has a designated adviser who coordinates support for transfer students.

The Office of the University Registrar evaluates and records the amount of transfer credit and advanced placement test credit an undergraduate can apply toward graduation requirements. Stanford awards credit based on course work completed at U.S. colleges or universities accredited by a regional accrediting association; or course work completed at international colleges or universities of recognized standing. Credit may also be awarded for certain Advanced Placement programs, International Baccalaureate Program, GCE, French Baccalaureate, and the German Abitur examinations.

See the "Advanced Placement" section of this Bulletin for information concerning Stanford's policy on credit for Advanced Placement work. Details on how to request credit for advanced placement examinations are available at the Registrar's Advanced Placement site.

UNDERGRADUATE TRANSFER WORK

Academic credit for work done elsewhere may be allowed toward a Stanford bachelor's degree under the following rules and conditions:

1. Credit may be granted for work completed at institutions in the U.S. only if the institutions are accredited.
2. Study in institutions outside the U.S., when validated by examination results, tutorial reports, or other official evidence of satisfactory work, may be credited toward a Stanford bachelor's degree, subject to the approval of the credit evaluator and the appropriate departments.
3. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.
4. Credit is allowed for work completed at institutions in the U.S. only on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.
5. Credit from another institution may be transferred for courses which are substantially equivalent to those offered at Stanford University on the undergraduate level, subject to the approval of the credit evaluator. A maximum of 20 quarter units may represent courses which do not parallel specific undergraduate courses at Stanford, again, subject to the approval of the credit evaluator as to quality and suitability.
6. Course work cannot duplicate, overlap, or regress previous work.
7. Transfer course work cannot count towards secondary school diploma and/or graduation requirements.
8. To fulfill GER requirements through transfer work, the course must match a specific Stanford course that fulfills the same GER requirement, be a minimum of three quarter units, and be taken for a letter grade.
9. The credit allowed at Stanford for one quarter's work may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.
10. Credit is allowed at Stanford for work graded 'A,' 'B,' 'C,' or 'Pass' (where 'Pass' is equivalent to a letter grade of 'C' or above), but not for work graded 'D' or below.
11. No more than 45 (90 for transfer students) quarter units of credit for work done elsewhere may be counted toward a bachelor's degree at Stanford.
12. Credit earned in extension, correspondence, and online courses is transferable only if the university offering the courses allows that credit toward its own bachelor's degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence and online study, and a maximum of 45 quarter units for the combination of extension, correspondence, and online courses.
13. Credit earned in military training and service is not transferable to Stanford, unless offered by an accredited college or university in the U.S. and evaluated as above by the credit evaluator.

GRADUATE RESIDENCY TRANSFER CREDIT

After at least one quarter of enrollment, students pursuing an Engineer, D.M.A., or Ph.D. may apply for transfer credit for graduate work done at another institution. Engineer candidates who also earned their master's at Stanford are not eligible for transfer residency credit, nor are any master's degree students.

Students enrolled at Stanford who are going to study elsewhere during their degree program should obtain prior approval of any transfer credit sought before their departure.

The following criteria are used by the department in determining whether, in its discretion, it awards transfer credit for graduate-level work done at another institution:

1. Courses should have comparable Stanford counterparts that are approved by the student's department. A maximum of 12 units of courses with no Stanford counterparts and/or research units may be granted transfer credit.
2. The student must have been enrolled at the other institution in a student category which yields graduate credit. The maximum amount of credit given for extension and nonmatriculated (non-degree) courses is 12 units. No transfer credit is given for online or correspondence work.
3. Courses must have been taken after the conferral of the bachelor's degree. The only exception is for work taken through programs structured like the Stanford coterminal bachelor's/master's program.
4. Courses must have been completed with a grade point average (GPA) of 3.0 (B) or better. Pass grades are accepted only for courses for which letter grades were not an option and for which the standard of passing is 'B' quality work.
5. Courses must have been taken at a regionally accredited institution in the U.S. or at an officially recognized institution in a foreign country. Courses taken at foreign universities must be at the level of study comparable to a U.S. graduate program.

The Application for Graduate Residency Credit is reviewed by the department and the Office of the University Registrar. For transfer credit done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.One semester unit or hour usually equals 1.5 quarter units.

UNDERGRADUATE DEGREES AND PROGRAMS

DEGREE PROGRAMS

BACHELOR OF ARTS (B.A.), BACHELOR OF SCIENCE (B.S.)

Stanford University confers the degree of Bachelor of Arts (B.A.) or the degree of Bachelor of Science (B.S.) on those candidates who have been recommended by the Committee on Undergraduate Standards and Policy (C-USP), who have applied in advance for conferral of the degree, and who have fulfilled the following requirements:

1. A minimum of 180 units of allowable University work. (As described below, units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit and credit/no credit basis cannot be counted towards the 180-unit minimum.)
2. The Writing, General Education, and Language Requirements (see below).
3. Curricular requirements of at least one major department or program and the recommendation of the department(s). (Descriptions of curricular and special degree requirements are included in each department's section of this bulletin.)
4. *Students admitted as freshmen*—A minimum of 135 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 135 units in resident work may petition for a waiver of the last quarter-in-residence requirement for up to 15 units.
5. *Students admitted as transfers*—A minimum of 90 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 90 units in resident work may petition for a waiver of the last quarter-in-residence requirement.

Stanford confers the Bachelor of Science degree on candidates who fulfill these requirements in the School of Earth Sciences, in the School of Engineering, or in the departments of Applied Physics, Biology, Chemistry, Mathematics, or Physics in the School of Humanities and Sciences. The University also awards B.S. degrees to candidates in the Program in Science, Technology, and Society; in the Program in Mathematical and Computational Science; in the Program in Symbolic Systems; and, when appropriate, in the Program for Individually Designed Majors. Candidates who fulfill these requirements in other schools or departments receive the Bachelor of Arts degree.

Students who complete the requirements for two or more majors, which ordinarily would lead to the same degree (B.A. or B.S.), should review "The Major" section of this bulletin to ensure that they have an understanding of the requirements for multiple or secondary majors.

BACHELOR OF ARTS AND SCIENCE (B.A.S.)

The University confers the degree of Bachelor of Arts and Science (B.A.S.) on candidates who have completed, with no overlapping courses, the curricular requirements of two majors which ordinarily would lead to different bachelor's degrees (that is, a Bachelor of Arts degree and a Bachelor of Science). These students must have applied in advance for graduation with the B.A.S. degree instead of the B.A. or B.S. degree, been recommended by the Committee on Undergraduate Standards and Policy (C-USP), and have fulfilled requirements 1, 2, and 4/5 above in addition to the requirements for multiple majors.

Students who cannot meet the requirements for both majors without overlapping courses are not eligible for the B.A.S., but may apply to have a secondary major recorded on their transcripts. (See "The Major" in the "Undergraduate Degrees and Programs" section of this bulletin.)

DUAL BACHELOR'S DEGREES (CONCURRENT B.A. AND B.S.)

A Stanford undergraduate may work concurrently toward both a B.A. and a B.S. degree. To qualify for both degrees, a student must complete:

1. A minimum of 225 units of University work. Units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit and credit/no credit basis cannot be counted towards the 225 minimum.
2. The requirements of each major without applying any course towards the requirements of more than one major, according to "Multiple Majors" section of this bulletin. The Major-Minor and Multiple Major Course Approval Form is required for graduation for students with dual degrees.
3. The Writing, General Education, and Language requirements.
4. The curricular requirements of two majors (one of which leads to a Bachelor of Arts degree and the other to a Bachelor of Science degree).
5. *Students admitted as freshmen*—A minimum of 180 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 180 units in resident work may petition for a waiver of the last quarter-in-residence requirement for up to 15 units.
6. *Students admitted as transfers*—A minimum of 135 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 135 units in resident work may petition for a waiver of the last quarter-in-residence requirement.

A student interested in dual bachelor's degrees should declare them in Axess no later than two quarters in advance of completing the program.

Students who do not meet the higher unit and residence requirements of the dual degree option may be eligible instead for the B.A.S. degree as described above.

SECOND BACHELOR'S DEGREE

Stanford does not award a second Bachelor of Arts degree to an individual who already holds a Bachelor of Arts, nor a Bachelor of Science degree to an individual who already holds a Bachelor of Science degree. However, the holder of a Bachelor of Arts degree from Stanford may apply to the C-USP Subcommittee on Academic Standing for admission to candidacy for a Bachelor of Science degree, and the holder of a Bachelor of Science degree from Stanford may apply for candidacy for a Bachelor of Arts degree. The C-USP Subcommittee on Academic Standing determines whether the application for a second degree may be approved and/or the conditions a student must meet in order to be allowed to earn a second degree. A recommendation of the major department for the second bachelor's degree must accompany the application.

Generally, a holder of a B.A. or B.S. degree may not apply for the Bachelor of Arts and Sciences degree, although a student may submit a petition for exception. The Office of the Vice Provost for Undergraduate Education, Sweet Hall, reviews these petitions. A student approved for this program may register as an undergraduate and is subject to the current rules and regulations affecting undergraduates. Requirements for a second Stanford bachelor's degree are the same as those described above for dual bachelor's degrees.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

The coterminal degree program allows undergraduates to study for a master's degree while completing their bachelor's degree(s) in the same or a different department. Undergraduates with strong academic records may apply for admission to a coterminal master's program upon completion of 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. Full-time enrollment during Summer Quarters, as well as allowable undergraduate transfer credit, are also counted towards quarters of undergraduate study. Students who wish to apply for a master's program after these deadlines must apply through the regular graduate admissions process.

To apply for admission to a coterminal master's program, students must submit to the prospective graduate department the following: coterminal application, statement of purpose, preliminary program proposal, two letters of recommendation from Stanford professors, and a current Stanford transcript. Graduate Record Examination (GRE) scores or other requirements may be specified by the prospective department.

For coterminal students, the quarter following completion of 12 full-tuition undergraduate quarters is identified as the first graduate quarter for tuition assessment. Beginning with this quarter, coterminal students are subject to graduate student policies and procedures (including those described in the "Graduate Degrees" section of this bulletin) in addition to undergraduate minimum progress standards. These policies include continuous registration or leaves of absence for quarters not enrolled and minimal progress guidelines.

In the first graduate quarter, a coterminal student is assigned an adviser in the master's department for assistance in planning a program of study to meet the requirements for the master's degree. The plan is outlined on the Program Proposal for a Master's Degree, which is approved by the master's department by the end of the first graduate quarter. Authorizations for master's programs expire three calendar years from the first graduate quarter. An extension requires review of academic performance by the department.

The specific University residency, unit requirement, and additional policies for a bachelor's/master's program are described under Coterminal Programs Residency Requirement in the "Graduate Degrees" section of this bulletin. For University application forms, see
http://studentaffairs.stanford.edu/registrar/publications#Coterm.

Conferral of each degree is applied for separately by the deadlines given in the Academic Calendar at http://studentaffairs.stanford.edu/registrar/academic-calendar. The master's degree must be conferred simultaneously with, or after, the bachelor's degree.

DEGREE REQUIREMENTS

A LIBERAL EDUCATION

As do all major universities, Stanford provides the means for its undergraduates to acquire a liberal education, an education that broadens the student's knowledge and awareness in each of the major areas of human knowledge, that significantly deepens understanding of one or two of these areas, and that prepares him or her for a lifetime of continual learning and application of knowledge to career and personal life.

The undergraduate curriculum at Stanford allows considerable flexibility. It permits each student to plan an individual program of study that takes into account personal educational goals consistent with particular interests, prior experience, and future aims. All programs of study should achieve some balance between depth of knowledge acquired in specialization and breadth of knowledge acquired through exploration. Guidance as to the limits within which that balance ought to be struck is provided by the University's General Education Requirements and by the requirements set for major fields of study.

These educational goals are achieved through study in individual courses that bring together groups of students examining a topic or subject under the supervision of scholars. Courses are assigned credit units. To earn a bachelor's degree, the student must complete at least 180 allowable units and, in so doing, also complete the Writing Requirement, the General Education Requirements, the Language Requirement, and the requirements of a major.

The purpose of the Writing Requirement is to promote effective communication by ensuring that every undergraduate can write clear and effective English prose. Words are the vehicles for thought, and clear thinking requires facility in writing and speech.

The Language Requirement ensures that every student gains a basic familiarity with a foreign language. Foreign language study extends the student's range of knowledge and expression in significant ways, providing access to materials and cultures that otherwise would be out of reach.

The General Education Requirements provide guidance toward the attainment of breadth and stipulate that a significant share of a student's work must lie outside an area of specialization. These requirements ensure that every student is exposed to different ideas and different ways of thinking. They enable the student to approach and to understand the important ways of knowing how to assess their strengths and limitations, their uniqueness, and, no less important, what they have in common with others.

Depth, the intensive study of one subject or area, is provided through specialization in a major field. The major relates more specifically to a student's personal goals and interests than do the general requirements outlined above. Stanford's curriculum provides a wide range of standard majors through its discipline-oriented departments, a number of interdisciplinary majors in addition to department offerings, and the opportunity for students to design their own major programs.

Elective courses, which are not taken to satisfy requirements, play a special role in tailoring the student's program to individual needs. For most students, such courses form a large portion of the work offered for a degree. Within the limitations of requirements, students may freely choose any course for which previous studies have prepared them.

Following are more detailed descriptions of these various requirements and the rationales upon which they are based.

GENERAL EDUCATION REQUIREMENTS

PURPOSE

The General Education Requirements are an integral part of undergraduate education at Stanford. Their purpose is: 1) to introduce students to a broad range of fields and areas of study within the humanities, social sciences, natural sciences, applied sciences, and technology; and 2) to help students prepare to become responsible members of society. Whereas the concentration of courses in the major is expected to provide depth, the General Education Requirements have the complementary purpose of providing breadth to a student's undergraduate program. The requirements are also intended to introduce students to the major social, historical, cultural, and intellectual forces that shape the contemporary world.

Fulfillment of the General Education Requirements in itself does not provide a student with an adequately broad education any more than acquiring the necessary number of units in the major qualifies the student as a specialist in the field. The major and the General Education Requirements are meant to serve as the nucleus around which the student is expected to build a coherent course of study by drawing on the options available among the required and elective courses.

Information regarding courses that have been certified to fulfill the General Education Requirements, and regarding a student's status in meeting these requirements, is available at the Student Services Center. Course planning and advising questions related to

the General Education Requirements should be directed to Undergraduate Advising and Research.

It is the responsibility of each student to ensure that he or she has fulfilled the requirements by checking in Axess. This should be done at least two quarters before graduation.

Students should be very careful to note which set of General Education Requirements apply to them. The date of matriculation at Stanford determines which requirements apply to an individual student.

During Autumn Quarter 2004-05, the Academic Senate approved modifications to undergraduate General Education Requirements that became effective Autumn Quarter 2005-06 for all matriculated undergraduates who entered Stanford in Autumn Quarter 2004-05 or later.

The purpose of these modifications was 1) to give students a fuller and more articulate understanding of the purposes of the requirements and of a liberal arts education that these requirements embody; 2) to make a place in the curriculum for ethical reasoning to help make students aware of how pervasive ethical reasoning and value judgments are throughout the curriculum, and 3) to provide some greater freedom of choice by reducing the GERs by one course.

AREA REQUIREMENTS

The following structure for General Education Requirements became effective with the 2005-06 entering freshman and transfer class:

Introduction to the Humanities—one quarter introductory courses followed by two quarter thematic sequences.

Introduction to the Humanities builds an intellectual foundation in the study of human thought, values, beliefs, creativity, and culture. Courses introduce students to methods of inquiry in the humanities: interdisciplinary methods in Autumn Quarter and discipline-based methods in Winter and Spring quarters.

Disciplinary Breadth—requirement satisfied by completing five courses of which one course must be taken in each subject area.

Disciplinary Breadth gives students educational breadth by providing experience in the areas of Engineering and Applied Sciences, Humanities, Mathematics, Natural Sciences, and the Social Sciences.

Education for Citizenship—requirement satisfied by completing two courses in different subject areas; or completing two Disciplinary Breadth courses which also satisfy different Education for Citizenship subject areas.

Education for Citizenship provides students with some of the skills and knowledge that are necessary for citizenship in contemporary national cultures and participation in the global cultures of the 21st century. Education for Citizenship is divided into four subject areas: Ethical Reasoning, the Global Community, American Cultures, and Gender Studies.

Ethical Reasoning—Courses introduce students to the pervasiveness, complexity, and diversity of normative concepts and judgments in human lives, discuss skeptical concerns that arise about normative practices, review ways in which people have engaged in ethical reflection, and consider ethical problems in light of diverse ethical perspectives.

The Global Community—Courses address the problems of the emerging global situation. They may compare several societies in time and space or deal in depth with a single society, either contemporary or historical, outside the U.S. Challenges of note: economic globalization and technology transfer; migration and immigration; economic development, health; environmental exploitation and preservation; ethnic and cultural identity; and international forms of justice and mediation.

American Cultures—Courses address topics pertaining to the history, significance, and consequences of racial, ethnic, or religious diversity in the culture and society of the U.S. Challenges of note: equity in education; employment and health; parity in legal and social forms of justice; preserving identity and freedom within and across communities.

Gender Studies—Courses address gender conceptions, roles, and relations, and sexual identity in a contemporary or historical context; they critically examine interpretations of gender differences and relations between men and women. Challenge of note: changing sexual and physiological realities in contemporary and historical perspective.

Courses certified as meeting the General Education Requirements must be taken for a letter grade and a minimum of 3 units of credit. A single course may be certified as fulfilling only one subject area within the General Education Requirements; the one exception is that a course may be certified to fulfill an Education for Citizenship subject area in addition to a Disciplinary Breadth subject area.

Courses that have been certified as meeting the requirements are identified throughout this bulletin with the notational symbols listed below. A comprehensive list of certified courses also appears in the *Time Schedule of Classes* for that quarter.

Introduction to the Humanities
- IHUM-1 (formerly GER:1a): first-quarter course
- IHUM-2 (formerly GER:1b): second-quarter course
- IHUM-3 (formerly GER:1c): third-quarter course

Disciplinary Breadth
- DB-EngrAppSci (formerly GER:2b): Engineering and Applied Sciences
- DB-Hum (formerly GER:3a): Humanities
- DB-Math (formerly GER:2c): Mathematics
- DB-NatSci (formerly GER:2a): Natural Sciences
- DB-SocSci (formerly GER:3b): Social Sciences

Education for Citizenship
- EC-AmerCul (formerly GER:4b): American Cultures
- EC-GlobalCom (formerly GER:4a): Global Community
- EC-Gender (formerly GER:4c):Gender Studies
- EC-EthicReas (GER:4d): Ethical Reasoning

Students who matriculated Autumn Quarter 2004-05 or later are subject to the revised General Education Requirements effective Autumn Quarter 2005-06. Students who matriculated Autumn Quarter 2003-04 or earlier remain on the old General Education Requirements, but may elect to change to the new system. Students interested in electing the revised GER system should contact the Student Services Center. No further changes are allowed once a student has elected to move to the new system.

CREDIT TRANSFER

Students may propose that work taken at another college or university be accepted in fulfillment of a General Education Requirement. In such cases, the Office of the University Registrar's Degree Progress section determines, after appropriate faculty consultation, whether the work is comparable to any of the specifically certified courses or course sequences.

LANGUAGE REQUIREMENT

To fulfill the Language Requirement, undergraduates are required to complete one year of college-level study or the equivalent in a foreign language. Students may fulfill the requirement in any one of the following ways:

1. Complete three quarters of a first-year, 4-5 units language course at Stanford or the equivalent at another recognized post-secondary institution subject to current University transfer credit policies. Language courses at Stanford may be taken with the credit/no credit grading basis to fulfill the requirement.

2. Score 4 or 5 on the Language Advanced Placement (AP) test in one of the following languages: Chinese, French, German, Japanese, Latin, or Spanish. Advanced Placement (AP) tests in foreign literature do not fulfill the requirement.

3. Achieve a satisfactory score on the SAT II Subject Tests in the following languages taken prior to college matriculation:

Chinese	630	Italian	630
French	640	Japanese	620
German	630	Korean	630
Latin	630	Hebrew	540
Spanish	630	•	

4. Take a diagnostic test in a particular language which either:
   a. Places them out of the requirement, *or*
   b. Diagnoses them as needing one, two, or three additional quarters of college-level study. In this case, the requirement can then be fulfilled either by passing the required number of quarters of college-level language study at Stanford or the equivalent elsewhere, or by retaking the diagnostic test at a later date and placing out of the requirement.

Written placements are offered online throughout the summer in Chinese, French, German, Italian, Japanese, Russian, Spanish, and Spanish for home background speakers.

For a full description of Language Center offerings, see the "Language Center" section of this bulletin under the school of Humanities and Sciences.

WRITING AND RHETORIC REQUIREMENT

All instructors at Stanford University expect students to express themselves effectively in writing and speech. The Writing and Rhetoric requirement helps students meet those high expectations.

All candidates for the bachelor's degree, regardless of the date of matriculation, must satisfy the Writing and Rhetoric requirement. Transfer students are individually reviewed at the time of matriculation by the Office of the University Registrar's Degree Progress section and, if necessary, the Program in Writing and Rhetoric (PWR) as to their status with regard to the requirement.

The current Writing and Rhetoric requirement, effective beginning 2003, includes courses at three levels. The first two levels are described in more detail below. Writing-intensive courses that fulfill the third level, the Writing in the Major (WIM) requirement, are designated under individual department listings.

All undergraduates must satisfy the first-level Writing and Rhetoric requirement (WR 1) in one of three ways:

1. PWR 1: a course emphasizing writing and research-based argument.
2. SLE: writing instruction in connection with the Structured Liberal Education program.
3. Transfer credit approved by the Office of the University Registrar's Degree Progress section for this purpose.

All undergraduates must satisfy the second-level Writing and Rhetoric Requirement (WR 2) in one of four ways:

1. PWR 2, a course emphasizing writing, research, and oral presentation of research.
2. SLE: writing and oral presentation instruction in connection with the Structured Liberal Education program.
3. A course offered through a department or program certified as meeting the WR 2 requirement by the Writing and Rhetoric Governance Board. These courses are designated as Write-2.
4. Transfer credit approved by the Office of the University Registrar for this purpose.

A complete listing of PWR 1 courses is available each quarter on the UAL web site at http://ual.stanford.edu/AP/univ_req/PWR/Courses, and at the PWR office in Sweet Hall, Third Floor. Complete listings of PWR 2 and Write-2 courses are available to students on the UAL web site the quarter before they are scheduled to complete the WR 2 requirement.

For a full description of the Program in Writing and Rhetoric (PWR), see the "Writing and Rhetoric" section of this bulletin under the Vice Provost of Undergraduate Education.

Students who matriculated prior to Autumn 2003 should consult previous issues of the *Stanford Bulletin* or the PWR office to determine what requirements apply.

CREDIT

ADVANCED PLACEMENT

Stanford University allows up to 45 units of external credit toward graduation including work completed in high school as part of the College Entrance Examination Board (CEEB) Advanced Placement curriculum. The awarding of such credit is based on CEEB Advanced Placement test scores and is subject to University and department approval.

The faculty of a given department determine whether any credit toward the 180-unit requirement can be based on achievement in the CEEB Advanced Placement Program in their discipline. Stanford departments electing to accept the Advanced Placement (AP) credit are bound by these University policies:

1. Credit is usually granted for an AP score of 4 or 5. Usually, 10 quarter units are awarded (but occasionally fewer than 10). No more than 10 quarter units may be given for performance in a single examination.
2. Whether credit is to be given for an AP score of 3 is a matter for departmental discretion; up to 10 units may be awarded.
3. No credit may be authorized for an AP score lower than 3.

Performance on an AP exam can indicate the appropriate placement for continuing course work in that subject at Stanford. If students enroll in courses at Stanford for which they received equivalent AP credit, the duplicating AP credit will be removed. The chart below shows the current AP credit and placement policies.

A maximum of 45 quarter units of Advanced Placement (AP), transfer credit, and/or other external credit (such as International Baccalaureate) may be applied toward the undergraduate degree. More than 45 units of AP, transfer, and other external credit may appear on the Stanford University transcript; however, only 45 units can be applied to the minimum units required for the undergraduate degree. Stanford University policies on AP and other external credit are subject to review and change on an annual basis. Subjects not listed on this chart are not eligible for AP credit at Stanford University.

Further information is available from the Student Services Center or at http://studentaffairs.stanford.edu/registrar/students/ap.

AP SCORES AND PLACEMENT

Test Subject	*Score*	*Placement*	*Quarter Units*
Calculus AB (or AB subscore)	5	MATH 51	10
	4	MATH 42	5
Calculus BC	4, 5	MATH 51	10
	3	MATH 42	5
Chemistry	5	CHEM 33 or above	4
Chinese (Language and Culture)[1]	5	Take placement exam if continuing in this language	10
Computer Science A	4,5	CS 106B or 106X	5
Computer Science AB	4,5	CS 106B, 106X, or 107	5
French (Language)[1]	5	Take placement exam if continuing in this language	10
German (Language)[1]	5	Take placement exam if continuing in this language	10
Japanese (Language and Culture)[1]	5	Take placement exam if continuing in this language	10
Latin (Literature or Virgil)[1]	4,5	Take placement exam if continuing in this language	10
Physics B	5	PHYSICS 25	8
	4	PHYSICS 23 and 25	4
Physics C			
Mechanics only	4,5	PHYSICS 43 and 45 *or* PHYSICS 23 and 25	4
	3	PHYSICS 41, 43, and 45 *or* PHYSICS 23 and 25	4
E&M only	4,5	PHYSICS 41 and 45 *or* PHYSICS 21 and 25	5
	3	PHYSICS 41, 43, and 45 *or* PHYSICS 21 and 25	4
Both Parts	4,5	PHYSICS 45 *or* PHYSICS 25	9
	3	PHYSICS 41, 43, and 45 *or* PHYSICS 25	8
Spanish (Language)[1]	5	Take placement exam if continuing in this language	10

1 A score of 4 or 5 on this test fulfills the Language Requirement. A score of 5 is required to receive 10 units of credit.

Stanford University awards advanced placement credit for certain International Baccalaureate and international advanced placement subject examinations. The international test subjects must match the content of the College Entrance Examination Board (CEEB) Advanced Placement test subjects that receive advanced placement credit.

ACTIVITY COURSES

For undergraduates, a maximum of 8 units of credit earned in activity courses, regardless of the offering department or if accepted as transfer units, count towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. All activity courses are offered on a satisfactory/no credit basis.

COURSES TAKEN ON SATISFACTORY/NO CREDIT OR CREDIT/NO CREDIT BASIS

A maximum of 36 units of credit (including activity courses) taken at Stanford or its overseas campuses for a "CR" or "S" grade may be applied towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. The maximum for transfer students is 27 units.

Departments may also limit the number of satisfactory or credit courses accepted towards the requirements for a major. Satisfactory/Credit courses applied towards a minor may be similarly limited. Courses not letter-graded are not accepted in fulfillment of the General Education Requirements. Writing in the Major courses are usually offered letter grade only. In those instances where the course is offered for a letter grade or CR/NC, the course must be taken for a letter grade to fulfill the Writing in the Major requirement.

INTERNSHIP GUIDELINES

Undergraduate internships should not by themselves carry any credit. However, an individual student may arrange with a faculty member for a research or other academic project to be based on the internship. Arrangements between students and faculty regarding credit are expected to be made well in advance of the internship. Credit should be arranged within departmental rules for directed reading or independent study and should meet the usual department standards. No transfer credit is awarded for internships.

UNDERGRADUATE TRANSFER WORK

Academic credit for work done elsewhere may be allowed toward a Stanford bachelor's degree under the following rules and conditions:

1. Credit may be granted for work completed at institutions in the U.S. only if the institutions are accredited.
2. Study in institutions outside the U.S., when validated by examination results, tutorial reports, or other official evidence of satisfactory work, may be credited toward a Stanford bachelor's degree, subject to the approval of the credit evaluator and the appropriate departments.
3. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.
4. Credit is allowed for work completed at institutions in the U.S. only on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.
5. Credit from another institution may be transferred for courses which are substantially equivalent to those offered at Stanford University on the undergraduate level, subject to the approval of the credit evaluator. A maximum of 20 quarter units may represent courses which do not parallel specific undergraduate courses at Stanford, again, subject to the approval of the credit evaluator as to quality and suitability.
6. Course work cannot duplicate, overlap, or regress previous work.
7. Transfer course work cannot count towards secondary school diploma and/or graduation requirements.
8. To fulfill GER requirements through transfer work, the course must match a specific Stanford course that fulfills the same GER requirement, be a minimum of three quarter units, and be taken for a letter grade.
9. The credit allowed at Stanford for one quarter's work may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.
10. Credit is allowed at Stanford for work graded 'A,' 'B,' 'C,' or 'Pass' (where 'Pass' is equivalent to a letter grade of 'C' or above), but not for work graded 'D' or below.
11. No more than 45 (90 for transfer students) quarter units of credit for work done elsewhere may be counted toward a bachelor's degree at Stanford.
12. Credit earned in extension, correspondence, and online courses is transferable only if the university offering the courses allows that credit toward its own bachelor's degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence and online study, and a maximum of 45 quarter units for the combination of extension, correspondence, and online courses.
13. Credit earned in military training and service is not transferable to Stanford, unless offered by an accredited college or

university in the U.S. and evaluated as above by the credit evaluator.

LAST UNITS OUT OF RESIDENCE

Students may petition to complete their final 15 units out of residence to complete their degree requirements. The final 15 units of transfer credit must meet the criteria in the undergraduate "Transfer Work" section of this bulletin. Students must submit the Request for Last Units Out of Residence Petition to determine eligibility and to request pre-approval of the transfer work. A registration status is required to graduate. Students should select either the Graduation Quarter or the Permit for Services Only special registration status on the Last Units Out of Residence petition. Refer to the Special Registration Status section of the bulletin for a description of theses statuses. An application to graduate should be submitted through Axess.

CONCURRENT ENROLLMENT

Students may enroll concurrently at Stanford and at another college or university. The following policies apply to concurrent enrollment:

1. Students may not exceed 20 quarter units between both schools. This is the same unit maximum for undergraduates at Stanford. (One semester credit or hour generally equals 1.5 quarter units.)
2. Satisfactory academic progress is determined only by Stanford courses and units. Transfer work completed at other institutions is not considered in this calculation.
3. Students are expected to submit a Request for Transfer Credit Evaluation for pre-approval of transfer credit prior to enrolling in the transfer institution.

THE MAJOR

The primary purpose of the major is to encourage each student to explore a subject area in considerable depth. This in-depth study complements the breadth of study promoted by the General Education Requirements and, in many cases, by a student's choice of electives. Work in depth permits practice in critical analysis and the solving of problems. Because of its depth, such study also provides a sense of how knowledge grows and is shaped by time and circumstances.

The structure of a major should be a coherent reflection of the logic of the discipline it represents. Ideally, the student should be introduced to the subject area through a course providing a general overview, and upper-division courses should build upon lower-division courses. The course of study should, if feasible, give the student the opportunity and responsibility of doing original, creative work in the major subject. Benefits of the major program are greatest when it includes a culminating and synthesizing experience such as a senior seminar, an undergraduate thesis, or a senior project.

REQUIREMENTS

Undergraduates must select a major by the end of their sophomore year. All undergraduate major programs listed in this bulletin, except for certain honors degree programs that require application and admission in advance, are open to all students. Students may use Axess to declare, drop, or exchange a major at any time. In some departments or programs, though, a late change could easily result in extending the period of undergraduate study. Students who have applied to graduate, or who wish to declare an individually designed major, and coterminal students must use printed forms to select or change a major. Students requiring assistance should contact the Student Services Center. For academic advising regarding majors, students should consult the Undergraduate Academic Life Office (UAL).

Check individual department or program listings in this bulletin for the undergraduate degrees offered and for specific major requirements. If an area of study has no baccalaureate degree, that discipline is not available as a regular undergraduate major.

Faculty set the minimum requirements for the major in each department. These requirements usually allow latitude for tailoring a major program to a student's specific educational goals. The responsibility for developing a major program within department or program requirements lies ultimately with the individual student working in consultation with the major adviser.

LIMITS OF THE MAJOR

In order to achieve the values of study in depth, a well-structured major should constitute at least one-third of a student's program (55-65 units). To ensure the values of breadth, a major should comprise no more than two-thirds of a student's program (115-125 units); and, to avoid intellectual parochialism, a major program should not require a student to take more than about one-third of his or her courses from within a single department.

Major requirements in cognate subjects essential to the structure of a given major should be counted as part of the major program in applying these guidelines. Department or school requirements designed to provide extra disciplinary breadth should not be counted.

For a limited number of qualified students, many departments and programs offer special programs leading to degrees with honors. A student may apply to the major department or program for acceptance into the honors program. Demands on the student may vary, but all honors programs encourage creative, independent work at an advanced level in addition to the major requirements.

The guidelines set forth here are deliberately general; implementation must take into account the specific needs of a student's program and the nature of the discipline or disciplines involved. The exercise of responsibility in achieving the desired educational balance belongs first with the student, who, after all, has the strongest interest in the value of his or her education. It belongs secondarily to departments and major programs, which must set the requirements of competence in the many majors offered.

MULTIPLE MAJORS

Although most students declare only one major, a student may formally declare more than one major within a single bachelor's degree (B.A., B.S., or B.A.S.) program. The student may do that either at the time of initial major declaration or, as may be more advisable given the planning required to complete more than one major, by amending the original declaration. The student's major departments or programs have access routinely to all information pertinent to that student's academic record (for example, course and grade information), and each is expected to provide advising and other assistance. Students may pick up appropriate information regarding major declarations from the Student Services Center. To be awarded a bachelor's degree with multiple majors, the student must fulfill the following requirements:

1. Formally declare all majors through Axess to the Office of the University Registrar.
2. Satisfy the requirements of each major without applying any course towards the requirements of more than one major or any minor unless:
   a. overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language);
   b. overlapping courses enable the student to meet school requirements (for example, for two majors within the School of Engineering). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Students pursuing multiple majors must complete a multiple major program form indicating which courses they plan to apply toward each major and any minor(s). Departments must certify that the plan of study meets all requirements for the majors and any minor(s) without unallowable overlaps in course work; the School of Engineering Dean's office certifies this information in any case involving an Engineering major or minor. To facilitate advance planning, multiple major program forms are available at any time from the Registrar's forms web site. The Major-Minor and Multiple

UNDERGRADUATE MAJOR UNIT REQUIREMENTS

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
School of Earth Sciences					
Earth Systems	64-102	24	94-126	internship, senior seminar	EARTHSYS 260
Energy Resources Engineering	83-90	34	119-126	-	ENERGY 199
Geological & Environmental Sciences	20-36	54-67	74-103	advanced summer field experience	GES 150
Engr. Geol. & Hydrogeology	44-47	45-55	71-102	-	-
Geophysics	43-45	15	min. 58	-	GEOPHYS 185
School of Engineering					
Aeronautics and Astronautics	56-58	39	95-97	-	AA 190
Architectural Design	40	60	100	-	CEE 100
Atmosphere/Energy	50	51-53	101-103	-	STS 110
Bioengineering	51	46-50	98-100	-	BIO 44X
Biomechanical Engineering	42-63	49-64	103-116	-	BIO 44X
Biomedical Computation	51-65	47-56	109-114	Two quarters guided research	ENGR 199W, CS 191W, 272
Chemical Engineering	min. 70	50	min. 120	-	CHEMENG 185A
Civil Engineering	min. 57	min. 59	min. 116	-	CEE 100
Computer Systems Engineering	40-47	42-67	104112	senior project	CS 181, 191W,194,294W
Computer Science	min. 29	min. 32	96-106	senior project	CS 181, 191W,194,294W
Electrical Engineering	45	68	113	-	ENGR 102E and EE 108A
Engineering Physics	min. 45	min. 48	min. 93	at least 50 units in Engineering Fundamentals and Depths must be engineering units-	EE 108A and ENGR 102E, ME 203 and ENGR 102M, MATSCI 161, 164, PHYSICS 107
Environmental Engineering	min. 57	min. 59	min. 116	-	CEE 100
Individually Designed Major	41	40	90-107	-	see adviser
Management Science and Engineering	46-79	45-60	96-134	senior project	MS&E 152W,193W,197
Materials Science and Engineering	min. 53	min. 50	min 103	-	MATSCI 161, 164
Mechanical Engineering	61-65	45	106-110	-	ENGR 102M, ME 103D, and ME 203
Product Design	58-59	48	106-107	-	ENGR 102M, ME 103D, and ME 203
School of Humanities and Sciences					
African and African American Studies	50	10	60	AAAS thesis seminar	AFRICAAM 105
American Studies	20-25	35-40	60	-	AMSTUD 160
Anthropology	15	50	65	foreign language 1st qtr. at 2nd-year level	ANTHRO 90A, ANTHRO 90B, ANTHRO 90C
Archaeology	45	20	65	ARCHLGY 103	-
Art	-	-	-	ARTHIST 1	-
Art History	-	61	61	library orientation, junior seminar	-
Film and Media Studies	8	65	65	library orientation, senior seminar	FILMSTUD 101
Studio Art	-	65	65	library orientation, advanced seminar	-
Asian American Studies	55	5	60	CSRE senior seminar	See CSRE
Biology	min . 41	min. 47	90-105	fields of study have different unit ranges	BIO 44X,44Y,145; BIOHOPK 44Y,175H
Chemistry	34	52	86	-	CHEM 134
Chicana/o Studies	55	5	60	CSRE senior seminar	See CSRE
Classics	-	-	60-65	majors seminar (CLASSGEN 175 or CLASSGEN 176)-	CLASSGEN 175 or CLASSGEN 176

Communication	5	min. 60	65	-	COMM 120
Comparative Literature	-	min. 40	65	Gateway course: 101 Core: 121, 122, 123 Capstone course: 199 3 electives in COMPLIT	COMPLIT 101
Comparative Studies in Race & Ethnicity	55	5	60	CSRE senior seminar	CSRE 200X
Drama	-	60	60	-	DRAMA 101H DRAMA 160
East Asian Languages	-	-	-	-	-
Chinese	0-16	28-44	min. 44	-	CHINGEN 133
Japanese	0-20	24-44	min. 44	-	JAPANGEN 138
East Asian Studies	75	1	76	Capstone course; overseas studies in E. Asian country 1 quarter; senior essay	CHINGEN 133; JAPANGEN 138
Economics	-	80	80	-	ECON 101
English	-	70	70	-	ENGLISH 160
w/ Creative Writing	-	70	70	dept. approval	-
w/ Interdisciplinary Emphasis	20	55	75	dept. approval and interdisciplinary paper	-
w/ Interdepartmental Emphasis	16-20	50	66-70	20 units in foreign lang. lit.; dept. approval	-
w/ Philosophy	20-35	49-60	69-95	-	-
Feminist Studies	45	18 core	63	focus statement; practicum	FEMST 153
French and Italian	-	-	-	-	-
French	max. 24	32 above #100	56 above #100	-	FRENLIT 130,131,132,133
French and English Literatures	max. 24	32 above #100	56 above #100	4 Eng. Lit. courses	-
French and Italian Literatures	max. 24	32 above #100	56 above #100	4 Ital. Lit. courses	-
French and Philosophy	min. 21	32 above #100	65	Gateway course; Capstone	-
Italian	max. 28	32 above #100	60 above #100	-	ITALLANG 127,128,129
Italian and English Literatures	max. 28	32 above #100	60 above #100	4 Eng. Lit. courses	-
Italian and French Literatures	max. 28	32 above #100	60 above #100	4 Fr. Lit. courses	-
Italian and Philosophy	min. 21	32 above #100	65	Gateway course; Capstone	-
German Studies	0-25	35-60	60	3 above #130	GERLIT 127,137
German and Philosophy	min. 21	min. 39	65	Gateway course; Capstone	-
History	-	63-65	63-65	3 from #200-298	HISTORY 209S
Human Biology	min. 10	min. 39	min. 87	Internship	HUMBIO 4B
Iberian and Latin American Cultures	max. 30	30	60	Core courses	ILAC 120, ILAC 159
International Relations	55-70	0-10	70	2 yr. foreign lang; Overseas studies 1 qtr.	HISTORY 102; POLISCI 110C,D,247R; INTNLREL 140A,C, 163
Jewish Studies (Individually Designed)	75-77	-	75-77	-	See CSRE
Linguistics	-	50	50	foreign lang. at 6th-quarter level, junior research paper	LINGUIST 150
Mathematical & Computational Science	-	-	73-78	-	MATH 109,110,120, STATS 166
Mathematics	up to 15 units	49	64	-	MATH 109,110,120,171
Music	-	67	66-76	piano-proficiency and ear-training exam	2 from: MUSIC 140-149, 190H, 251
Native American Studies	55	5	60	CSRE senior seminar	See CSRE
Philosophy	-	55	55	course in 194 series	PHIL 80
Philosophy and Literature	min. 15	min. 47	65	Gateway course; 194	-
Philosophy and	-	60	60	3 seminars; 20 units in	PHIL 80 or RELIGST

Religious Studies				each dept. + 20 advanced units from both depts.	290
Physics	18-21	56-61	77-79	-	PHYSICS 107
Political Science	0-10	60-70	70	-	POLISCI 110D,120C, 124R, 132S, 224T, 243R
Psychology	10	60	70	-	PSYCH 55,70,138/238
Public Policy	59	28	87	min. 15 concentration units; senior seminar	PUBLPOL 106
Religious Studies	-	60	60	introductory course, majors' seminar, senior essay or honors thesis, senior colloquium	RELIGST 290
Science, Technology, & Society (B.A.)	37	32	69	min. 15 units in technical literacy min. 20 units in concentration	STS 110; CS 181; COMM 120; HISTORY 140A; MS&E 193W
Science, Technology, & Society (B.S.)	50	32	82	min. 50 units in technical depth	STS 110; CS 181; COMM 120; HISTORY 140A; MS&E 193W
Slavic Languages and Literatures	-	-	-	-	SLAVLIT 146
Russian Language & Literature	0-10	46-56	56	1st- and 2nd- year Russian	-
Russian Language, Culture, & History	12-20	36-39	56	1st- and 2nd- year Russian	-
Russian Literature & Philosophy	21	40	67	Gateway course; Capstone	-
Sociology	-	45-60	60	-	SOC 200, 202
Symbolic Systems	66-81	4	70-85	-	PHIL 80
Urban Studies	41	min. 32	73	25 units in concentration; capstone courses	URBANST 203

Major Course Approval Form is required for graduation for students with multiple majors or a minor. The form should besubmitted to the Student Services Center by the first day of the quarter of intended graduation.

If the pursuit of multiple majors unduly delays an undergraduate's progress through Stanford, the University reserves the right to limit a student to a single major.

When students cannot meet the requirements of multiple majors without overlaps, the secondary major, may be relevant.

SECONDARY MAJOR

In some cases, students may complete course requirements for more than one major, but they may not meet the requirements outlined for the multiple major option. For example, the student may develop a course plan in which courses requisite for one major overlap with requirements for another. In these cases, the student may declare a secondary major which results in the transcript bearing an annotation that the course requirements for that major have also been met. Secondary majors are not listed on the diploma.

UNDERGRADUATE MINOR

Students completing a bachelor's degree may elect to complete one or more minors in addition to the major. Minors must be officially declared by students no later than the deadline for their application(s) to graduate, according to declaration procedures developed and monitored by the Registrar. Earlier deadlines for declaration of the minor may be set by the offering school or department. Satisfactory completion of declared minors is noted on the student's transcript after degree conferral.

A minor is a coherent program of study defined by the department or degree program. It may be a limited version of a major concentration or a specialized subset of a field. A minor consists of no fewer than six courses of 3 or more units to a maximum of 36 units of letter-graded work, except where letter grades are not offered. Departments and degree programs establish the structure and requirements of each minor in accordance with the policy above and within specific guidelines developed by the deans of schools. Programs which do not offer undergraduate degrees may also make proposals to their cognizant deans to establish a minor. Requirements for each minor are described in the individual department or program listings in this bulletin.

Students may not overlap (double-count) courses for completing major and minor requirements, unless:

1. Overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language), *or*
2. Overlapping courses enable the student to meet school requirements (for example, for a major within the School of Engineering and a minor). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Undergraduates use Axess to declare or drop a minor. The Major-Minor and Multiple Major Course Approval Form is required for graduation for students with a minor.

Students with questions about declaring minors or double-counting courses towards combinations of majors and/or minors should consult with the departments or programs involved or the Student Services Center. For academic advising regarding minors, students should consult the Undergraduate Advising and Research Office (UAR).

BACCALAUREATE HONORS

With Distinction—In recognition of high scholastic attainment, the University, upon recommendation of a major department or program, awards the Bachelor's Degree with Distinction. Distinction is awarded to 15% of the graduating class based on cumulative grade point averages. Distinction is calculated at the end of the Winter Quarter for each graduating class.

Students are also urged to consider the departmental honors programs that may give depth to their major study and to consider, as well, how the interdisciplinary honors programs might contribute to the quality of their undergraduate education.

Departmental Honors Programs—In recognition of successful completion of special advanced work, departments may recommend their students for honors in the major. Departmental honors programs demand independent creative work at an advanced level

in addition to major requirements. If approved for departmental honors, the student should declare the Honors degree through Axess.

Interdisciplinary Honors Programs—In recognition of successful completion of honors program requirements, the following interdisciplinary programs can recommend students majoring in any field for honors in their program:

- Democracy, Development, and the Rule of Law
- Education
- Environmental Science, Technology, and Policy
- Ethics in Society
- Feminist Studies
- International Security Studies
- Latin American Studies
- Science, Technology, and Society

The interdisciplinary honors programs are designed to complement study in a department major. The requirements for these honors programs are described in the department sections of this bulletin. If approved for interdisciplinary honors, the student should submit the Declaration or Change of Undergraduate Major, Minor, Honors, or Degree Program form to the Student Services Center.

Foreign Language Proficiency—The notation "proficiency in (language)" appears on the official transcripts of those students whose levels of achievement are found by procedures established by the Language Center to be roughly equivalent to knowledge an excellent student can be expected to demonstrate late in the third quarter of the third year of study in that language.

SPECIAL REGISTRATION STATUSES (UNDERGRADUATE)

The following reduced-tuition categories can be requested by undergraduates in the final stages of their degree program:

Permit to Attend for Services Only (PSO)—Undergraduates in their terminal quarter who are completing honors theses, clearing incomplete grades, or have completed all requirements and are requiring a registration status to utilize university resources, may petition one time only for PSO status. PSO does not permit any course enrollment. Students should apply to graduate in their PSO quarter. The deadline for the completed PSO petition is the Preliminary Study List deadline of the applicable quarter.

13th Quarter—Undergraduates who have completed at least twelve full-time quarters may petition to register for 13th Quarter registration status at a reduced tuition rate for their final quarter, but must register for at least eight units. Undergraduate dual degree students must complete at least fifteen full-time quarters before petitioning for reduced tuition in their final quarter. Undergraduates should apply to graduate through Axess if applying for the 13th-quarter special registration status.

Graduation Quarter—Undergraduates may petition one time only for Graduation Quarter in their terminal quarter only if:

1. filing a Request for Last Units Out of Residence in order to complete up to 15 final units at another institution; or
2. returning from a discontinued status and filing a Request to Return and Register in Undergraduate Study (http://ual.stanford.edu/pdf/returning_return_register.pdf) in order to confer their degree; or
3. if all degree requirements have been completed and student requires a registration status to graduate, but will not be using University resources or housing.

Undergraduates may be eligible for Graduation Quarter status in these three situations only if the student has completed all graduation requirements and will not be utilizing University resources, including housing. The deadline for the completed Graduation Quarter petition is the Preliminary Study List deadline of the applicable quarter.

MINIMUM PROGRESS FOR UNDERGRADUATES

Undergraduates are expected to finish their degree requirements in a timely fashion. In addition to maintaining academic standing obligations, students are expected to take courses to progress towards a Bachelor of Arts or a Bachelor of Science. If after 12 quarters, an undergraduate is not on track to complete degree requirements and graduate within the next two quarters, the University may impose requirements with deadlines on a student's course of study. Further, if a student fails to meet those imposed requirements and/or has not after 18 quarters completed all degree requirements, the University may discontinue the student for failure to progress.

CONFERRAL OF DEGREES

Upon recommendation to the Senate of the Academic Council by the faculty of the relevant departments or schools and the Committee on Undergraduate Standards and Policy, degrees are awarded four times each year, at the conclusion of Autumn, Winter, Spring, and Summer quarters. All diplomas, however, are prepared and distributed after degree conferral in accordance to the distribution dates listed on the Registrar's Office web site at http://studentaffairs.stanford.edu/registrar/students/diplomas.

Students must apply for conferral of an undergraduate or graduate degree by filing an Application to Graduate by the deadline for each term. The deadlines are published in the Academic Calendar. A separate application must be filed for each degree program and for each conferral term. Applications are filed through Axess, the online service which allows students to update their administrative/academic records.

Requests for conferral are reviewed by the Office of the University Registrar and the student's department, to verify completion of degree requirements. Registration is required in the conferral term. Students with unmet financial or other University obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released. An academic record where no other degree objective is being pursued is permanently frozen after the final degree conferral, and all subsequent grade change requests will be denied.

Students are typically expected to apply to graduate during the term in which they expect to be awarded a degree. The University, however, reserves the right to confer a degree on a student who has completed all of the requirements for a degree even though the student has not applied to graduate; such an individual would then be subject to the University's usual rules and restrictions regarding future enrollment or registration.

Students who wish to withdraw a request for conferral or make changes to the Application to Graduate should notify the Student Services Center in writing through the Withdrawal of Application to Graduate Form or other appropriate form. Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate in a subsequent term.

Stanford University awards no honorary degrees.

GRADUATE DEGREES

GENERAL REQUIREMENTS

For each Stanford advanced degree, there is an approved course of study which meets University and department requirements. The University's general requirements, applicable to all graduate degrees at Stanford, are described below. University requirements pertaining to only a subset of advanced degrees are described in the "Degree-Specific Requirements" section.

See the "Graduate Programs" section of each department's listing for specific department degree requirements. Additional information on professional school programs is available in the bulletins of the Graduate School of Business, the School of Law, and the School of Medicine.

ENROLLMENT REQUIREMENTS

Graduate students must enroll in courses for all terms of each academic year (Autumn, Winter, and Spring quarters) from the admission term until conferral of the degree. The only exception to this requirement occurs when the student is granted an official leave of absence. Failure to enroll in courses for a term during the academic year without taking a leave of absence results in denial of further enrollment privileges unless and until reinstatement to the degree program is granted and the reinstatement fee paid. Registration in Summer Quarter is not required and does not substitute for registration during the academic year. Students possessing an F-1 or J-1 student visa may be subject to additional course enrollment requirements in order to retain their student visas.

In addition to the above requirement for continuous registration during the academic year, graduate students are required by the University to be registered:

1. In each term during which any official department or University requirement is fulfilled, including qualifying exams or the University oral exam. The period between the last day of final exams of one term and the day prior to the first day of the following term is considered an extension of the earlier term.
2. In any term in which a University dissertation/thesis is submitted or at the end of which a graduate degree is conferred.
3. Normally, in any term in which the student receives financial support from the University.
4. In any term for which the student needs to use University facilities.
5. For international students, in any term of the academic year (summer may be excluded) for which they have nonimmigrant status (i.e., a J-1 or F-1 visa).

Individual students may also find themselves subject to the registration requirements of other agencies (for example, external funding sources such as federal financial aid). Course work and research are expected to be done on campus unless the department gives prior approval for study in absentia.

LEAVES OF ABSENCE AND REINSTATEMENT (GRADUATE)

Graduate students who do not meet the requirement for continuous registration during the academic year must obtain an approved leave of absence, in advance, for the term(s) they will not be registered. The leave of absence must be reviewed for approval by the chair or director of graduate studies of the student's major department and, if the student is in the United States on a foreign student visa, by the Bechtel International Center. The granting of a leave of absence is at the discretion of the department and subject to review by the Office of the University Registrar. The University may condition its approval of a petition for leave of absence on the student's meeting such requirements as the University deems appropriate in the individual case for the student to be eligible to return such as, in the case of a leave for medical reasons, proof of treatment or an interview with a provider at Vaden Health Center or Counseling and Psychological Services).

New graduate students and approved coterminal students may not take a leave of absence during their first quarter. Coterminal students are required to register their first graduate quarter. However, new Stanford students may request a deferment from the department.

Leaves of absence are granted for a maximum of one calendar year, or four quarters. Leaves requested for a longer period are approved only in exceptional circumstances (for example, mandatory military service). An extension of leave, for a maximum of one year or four quarters, is approved only in unusual circumstances. Extension requests must be made before the expiration of the original leave of absence. Leaves of absence for graduate students may not exceed a cumulative total of two years (eight quarters including summer quarters).

An involuntary leave of absence can be imposed in circumstances in which a student:

- presents a substantial risk of harm to self or others or is failing to carry out substantial self-care obligations; or
- significantly disrupts the educational or other activities of the University community; or
- is unable to participate meaningfully in educational activities; or
- requires a level of care from the University community that exceeds the resources and staffing that the University can reasonably be expected to provide for the student's well-being.

Students whose circumstances warrant a review under the Involuntary Leave of Absence Policy, will be apprised, in writing, of University concerns and will be provided an opportunity to respond to concerns in writing or in person or via telephone before a review committee convened by the Dean of Student Life. Students placed on involuntary leave of absence can appeal an unfavorable decision to the Vice Provost for Student Affairs. The University can condition a student's return to registered student status on such requirements as the University deems appropriate in the individual case (such as, in the case of a leave for medical reasons, proof of treatment of an interview with a provider at Vaden or CAPS or its designee). The Involuntary Leave of Absence Policy is available on the Dean of Student Life's web site.

Students on leave of absence are not registered at Stanford and, therefore, do not have the rights and privileges of registered students. They cannot fulfill any official department or University requirements during the leave period.

Students on leave may complete course work for which an 'Incomplete' grade was awarded in a prior term and are expected to comply with the maximum one-year time limit for resolving incompletes; a leave of absence does not stop the clock on the time limit for resolving incompletes.

When a student is granted (or placed on) a leave of absence after the beginning of the term, courses in which the student was enrolled after the drop deadline appear on the student's transcript and show the symbol 'W' (Withdraw).

Students who fail to be either enrolled by the final study list deadline or approved for a leave of absence by the start of a term are required to apply for reinstatement through the Graduate Admissions office before they can return to the same degree program. The decision to approve or deny reinstatement is made by the student's department or program. Departments are not obliged to approve reinstatements of students. Reinstatement decisions are made at the discretion of the department or the program and may be based on the applicant's academic status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, and the ability of the department to support the student both academically and financially, as well as any other factors or considerations regarded as relevant by the department or program.

Reinstatement information is available from the Graduate Admissions office. A fee is required. Reinstatement applications must

be submitted prior to the first day of the term for which re-enrollment is requested if the student is registering for courses.

CHILDBIRTH ACCOMMODATION POLICY

Women graduate students, including students in professional schools, anticipating or experiencing a birth are eligible for an academic accommodation period of up to two consecutive academic quarters (in total) before and after the birth, during which the student may postpone course assignments, examinations, and other academic requirements. During this period, they are eligible for full-time enrollment and retain access to Stanford facilities, Cardinal Care, and Stanford housing. Such students are granted an automatic one quarter extension of University and departmental requirements and academic milestones, with the possibility of up to three quarters by petition under unusual circumstances. Women graduate students supported by fellowships, teaching assistantships, and/or research assistantships are excused from regular TA or RA duties for a period of six weeks during which they continue to receive support. Students do not receive a stipend or salary if none was received previously, but are eligible for the academic accommodation period and the one quarter extension of academic milestones. For more information and a complete statement of the policy, see http://stanford.edu/group/gap/5-9.

RESIDENCY POLICY FOR GRADUATE STUDENTS

Each type of graduate degree offered at Stanford (for example, Master of Science, Doctor of Philosophy) has a residency requirement based on the number of academic units required for the degree. These residency requirements and the maximum allowable transfer units for each degree type are listed below.

The unit requirements for degrees can represent solely course work required for the degree or a combination of course work, research, and a thesis or dissertation. Academic departments and schools offering degrees may establish unit requirements that are higher than the minimum University residency requirement, but they may not have a residency requirement that is lower than the University standard. In addition to the University's residency requirement based on a minimum number of units for each degree, the School of Medicine and the Graduate School of Business may establish residency requirements based on the number of quarters of full-time registration in which students are enrolled to earn a degree. However, in no case may a student earn fewer units than the University minimum for each degree. All residency requirements are published in the *Stanford Bulletin.* Students should consult the *Stanford Bulletin* or their academic department to determine if their degree program has residency requirements that exceed the minimum.

Students eligible for Veterans Affairs educational benefits should refer to "Veterans' Educational Benefits" in the "Admissions and Financial Aid" section of this bulletin.

It is Stanford University's general policy that units are applicable toward only one degree. Units may not normally be duplicated or double-counted toward the residency requirement for more than one degree. Exceptions to this general policy for specified combinations of degree types, known as Joint Degree Programs, may be approved by agreement of the Faculty Senate and the deans of the schools affected, with review by the Committee on Graduate Studies. See the "Joint Degree Programs" section of this bulletin for additional information.

Only completed course units are counted toward the residency requirement. Courses with missing, incomplete, in progress, or failing grades do not count toward the residency requirement. Courses from which a student has formally withdrawn do not count toward the residency requirement.

Terminal Graduate Registration (TGR) is available to graduate students who have met all of the conditions listed in the "TGR" section of this bulletin.

This policy is effective for students who enter graduate programs beginning in the Autumn Quarter of the 2001-02 academic year. For information about the residency policy in effect for students who entered prior to Autumn Quarter 2001, see the *Stanford Bulletin* 2000-01.

UNIVERSITY MINIMUM RESIDENCY REQUIREMENTS FOR GRADUATE DEGREES

Degree Type[1]	*Minimum # of Units*	*Maximum Allowable External Transfer Units*
M.A., M.S., M.F.A., M.L.A.	45	0[4]
Engineer[2]	90	45
M.B.A., M.P.P.[3]	90	0[4]
Ph.D., D.M.A.[5]	135	45
M.D.	235	90
J.D.[6,7]	109	45
M.L.S., L.L.M., J.S.M.[7]	35	0[4]
J.S.D.[7]	44	0[4]

1. The University has authorized the granting of the M.A.T., Ed.S. and Ed.D degrees, but they are not being offered.
2. Up to 45 units completed at Stanford toward a M.A. or M.S. degree or accepted as transfer credit in an Engineering discipline may be used toward the 90 unit residency requirement for the Engineer degree. At least 45 units of work at Stanford are necessary to complete the 90 residency units for the Engineer degree.
3. Enrollment in the M.P.P. program is limited to candidates who have earlier been accepted to another Stanford graduate degree program.
4. Students eligible for Veterans Affairs educational benefits should refer to the Veterans Benefits section of "Admissions and Financial Aid" in this bulletin.
5. Up to 45 units completed at Stanford toward a M.A. or M.S. degree or accepted as transfer credit may be used toward the 135 unit residency requirement for the Ph.D. or D.M.A. degree. At least 90 units of work at Stanford are necessary to complete the 135 residency units for the Ph.D. or D.M.A. degree.
6. The Academic Senate approved these residency requirements on February 4, 2010, effective for the 2009-10 academic year.
7. J.D. students entering prior to the Autumn Quarter 2009-10 must take the equivalent of 86 semester units.

COTERMINAL PROGRAMS RESIDENCY REQUIREMENT

The University minimum requirements for the coterminal bachelor's/master's program are 180 units for the bachelor's degree plus 45 (or higher departmental requirement, as determined by each graduate department) unduplicated units for the master's degree. The requirements for the coterminal program with dual undergraduate degrees are 225 units for the two bachelor's degrees, and 45 units for the master's degree. For the 45-unit University minimum for the master's degree, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students (typically at least at the 200 level). Department requirements may be higher. Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

Tuition Rate for Graduate Engineering—The tuition rate for graduate Engineering is higher than for undergraduate programs. Students enrolled in a coterminal program in the School of Engineering begin to pay the higher graduate Engineering tuition rate after 12 full-tuition undergraduate quarters.

Coterminal students in the School of Engineering, with two undergraduate degrees, are assessed the graduate Engineering tuition rate in the quarter after they have been enrolled for 15 full-tuition quarters.

Engineering coterminal students would also start paying the graduate Engineering tuition rate if any undergraduate degree is conferred or if they are granted any graduate aid. Once charged under the graduate Engineering tuition schedule, the tuition will not revert thereafter to the undergraduate rate.

For additional information on the coterminal bachelor's/master's program, see Coterminal Bachelor's and Master's Degrees in the "Undergraduate Degrees and Programs" section of this bulletin.

GRADUATE RESIDENCY TRANSFER CREDIT

After at least one quarter of enrollment, students pursuing an Engineer, D.M.A., or Ph.D. may apply for transfer credit for graduate work done at another institution. Engineer candidates who also earned their master's at Stanford are not eligible for transfer residency credit, nor are any master's degree students.

Students enrolled at Stanford who are going to study elsewhere during their degree program should obtain prior approval of any transfer credit sought before their departure.

The following criteria are used by the department in determining whether, in its discretion, it awards transfer credit for graduate-level work done at another institution:

1. Courses should have comparable Stanford counterparts that are approved by the student's department. A maximum of 12 units of courses with no Stanford counterparts and/or research units may be granted transfer credit.
2. The student must have been enrolled at the other institution in a student category which yields graduate credit. The maximum amount of credit given for extension and nonmatriculated (non-degree) courses is 12 units. No transfer credit is given for online or correspondence work.
3. Courses must have been taken after the conferral of the bachelor's degree. The only exception is for work taken through programs structured like the Stanford coterminal bachelor's/master's program.
4. Courses must have been completed with a grade point average (GPA) of 3.0 (B) or better. Pass grades are accepted only for courses for which letter grades were not an option and for which the standard of passing is 'B' quality work.
5. Courses must have been taken at a regionally accredited institution in the U.S. or at an officially recognized institution in a foreign country. Courses taken at foreign universities must be at the level of study comparable to a U.S. graduate program.

The Application for Graduate Residency Credit is reviewed by the department and the Office of the University Registrar. For transfer credit done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.One semester unit or hour usually equals 1.5 quarter units.

JOINT DEGREE PROGRAMS

A Joint Degree Program (JDP) is a specified combination of degree programs or degree types in which a student is enrolled in two graduate degree programs concurrently. JDPs are developed and proposed by the relevant academic units with agreement of the deans of the schools affected.

An approved JDP includes a set of agreements between the participating programs and schools about matters such as admissions, advising, curricula, and tuition. In a JDP, a specified number of units may be double-counted toward the minimum University residency requirements for both degrees, reducing the total number of residency units required to complete both degrees. Application deadlines for each program or degree apply. Students must be admitted to the JDP no later than the study list deadline of the term prior to the term of expected degree conferral. In a JDP, both degrees are conferred concurrently since the units required for each degree are linked to the completion of both degrees. The sole exception is the J.D. degree which may be awarded prior to the second degree.

The following Joint Degree Programs, permitting students to complete requirements for two degrees with a reduced number of total residency units, are offered:

- *Juris Doctor with a Master of Arts* in Economics, Education, History, Public Policy, or the Division of International Comparative and Area Studies: African Studies, East Asian Studies, International Policy Studies, Latin American Studies, and Russian, East European and Eurasian Studies (J.D./M.A.)
- *Juris Doctor with a Master of Science* in Bioengineering, Electrical Engineering, Computer Science, Health Research and Policy, Interdisciplinary Program in Environment & Resources, or Management Science and Engineering (J.D./M.S.)
- *Juris Doctor with a Master in Public Policy* (J.D./M.P.P)
- *Juris Doctor with a Doctor of Philosophy* in Bioengineering, Economics, History, Interdisciplinary Program in Environment and Resources, Management Science and Engineering, Philosophy, Political Science, Psychology, or Sociology (J.D./Ph.D.)
- *Juris Doctor with a Master of Business Administration* (J.D./M.B.A.)
- *Master of Business Administration with a Master of Arts* in Education (M.B.A./M.A.)
- *Master of Business Administration with a Master of Science* in Interdisciplinary Program in Environment and Resources (M.B.A./M.S.)
- *Master of Business Administration with a Master of Public Policy* (M.B.A./M.P.P.)
- *Master of Arts in International Policy Studies with a Master in Public Policy* (M.A./M.P.P.)
- *Master of Science* in *Management Science and Engineering with a Master in Public Policy* (M.S../M.P.P.)
- *Doctor of Philosophy* in Economics, Education, Psychology, or Sociology *with a Master in Public Policy* (Ph.D./M.P.P.)

Specific requirements for the joint degree programs are available from the participating departments and schools and at http://registrar.stanford.edu/students/academics/jdp.htm.

Creation of additional Joint Degree Programs that are combinations of J.D./M.A., J.D./M.S., and Ph.D./M.P.P. degrees have been authorized by the Faculty Senate. New JDPs from among these combinations may double-count up to 45 units towards residency requirements. JDPs from these combinations are proposed by the coordinating programs and schools. Once approvals from the chairs of the programs and deans of the relevant schools are obtained, approval on behalf of the Committee on Graduate Studies is granted by the Office of the Vice Provost for Graduate Education, and final approval is granted by the Office of the University Registrar. JDPs combining other degree types or programs may be proposed, but require review by the Faculty Senate Committee on Graduate Studies and must be approved by the Faculty Senate.

GRADUATE UNITS REQUIREMENTS

The University's expectation is that the units counted towards all graduate degrees are primarily in graduate courses. All units must be in courses at or above the 100 level and at least 50 percent of those must be courses designated primarily for graduate students (typically at least the 200 level). Units earned in courses below the 100 level may not be counted towards the minimum unit requirement for the master's degree. Department specifications for the level of course work accepted for a particular master's degree program may be higher than the University's specifications.

MINIMUM PROGRESS REQUIREMENTS FOR GRADUATE STUDENTS

The academic requirements for graduate students include completion of University, department, and program requirements, such as admission to candidacy, successful completion of qualifying exams, and so on in a timely and satisfactory manner. Graduate students must also meet the following standards of minimum progress as indicated by units and grades. (These standards apply to all advanced degree programs except the School of Business Ph.D., and the M.B.A., J.D., L.L.M., J.S.M., J.S.D., M.D., and M.L.A., which follow guidelines issued by the respective schools and are described in their respective school bulletins.)

Graduate students enrolled for 11 or more units must pass at least 8 units per term by the end of each term. Those registered for fewer than 11 units must pass at least 6 units per term by the end of each term, unless other requirements are specified in a particular case or for a particular program.

In addition, graduate students must maintain a 3.0 (B) grade point average overall in courses applicable to the degree.

Department requirements for minimum progress that set a higher standard for units to be completed, or a higher or lower standard for grade point average to be maintained, take precedence over the University policy; any such different standards must be published in the *Stanford Bulletin*.

Students identified as not meeting the requirements for minimum progress and timely and satisfactory completion of requirements are reviewed by their departments to determine whether the problem lies with administrative matters such as reporting of grades or with academic performance. Students have the opportunity to explain any special circumstances. Approval for continuation in the degree program is contingent on agreement by the student and department to a suitable plan to maintain appropriate progress in subsequent quarters. Dismissal of graduate students is addressed in separate guidelines.

Graduate students who have been granted Terminal Graduate Registration (TGR) status must enroll each term in the TGR course (801 for master's and Engineer programs or 802 for doctoral programs) in their department in the section appropriate for the adviser. An 'N' grade signifying satisfactory progress must be received each quarter to maintain registration privileges. An 'N-' grade indicates unsatisfactory progress. The first 'N-' grade constitutes a warning. A second consecutive 'N-' grade normally causes the department to deny the student further registration until a written plan for completion of degree requirements has been approved by the department. Subsequent 'N-' grades are grounds for dismissal from the program.

GUIDELINES FOR DISMISSAL OF GRADUATE STUDENTS FOR ACADEMIC REASONS

Admission to graduate programs at Stanford is highly selective. It is anticipated that every admitted student will be able to fulfill the requirements for the advanced degree. This document provides guidelines to be used in the unusual circumstance that a department must consider dismissal of a graduate student for academic reasons. These guidelines apply to all advanced degree programs except those in the schools of Law and Business, the STEP program in the School of Education, and the M.D. program in the School of Medicine, which follow guidelines issued by the respective schools.

The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the University, department, and program requirements for the degree, and fulfillment of minimum progress requirements. The guidelines that follow specify procedures for dismissal of graduate students who are not meeting these conditions. In such cases, a departmental committee (hereafter "the committee"), whether the department's committee of the faculty or other committee authorized to act on the department's behalf such as the departmental graduate studies committee, will:

1. Where possible and as early as possible, warn the student, in writing, of the situation and deficiency. A detailed explanation of the reason for the warning should be provided.
2. Consider extenuating circumstances communicated by the student.
3. Decide the question of dismissal by majority vote of the committee (with at least three faculty members participating in the committee's deliberation), and communicate the decision to the student in writing.
4. Place a summary of department discussions, votes, and decisions in the student's file.
5. Provide students the opportunity to examine their department files, if requested.
6. Provide students with information on their rights to appeal under the Student Academic Grievance Procedure. See the "Student Academic Grievance Procedure" section of this bulletin.

Careful records of department decisions safeguard the rights of both students and faculty.

ADDITIONAL SPECIFICS FOR DEGREES WITH CANDIDACY

Before Candidacy—The committee may vote to dismiss a student who is not making minimum progress or completing requirements in a timely and satisfactory way before review for admission to candidacy. Before considering dismissal, the committee should communicate with the student (which may include a meeting with the student) concerning his or her academic performance and how to correct deficiencies, where such deficiencies are deemed correctable.

At the Review for Candidacy—In a review for admission to candidacy, if the committee votes not to recommend the student for admission to candidacy, the vote results in the dismissal of the student from the program. The department chair, or Director of Graduate Studies, or the student's adviser shall communicate the department's decision to the student in writing and orally. The student may submit a written request for reconsideration. The committee shall respond in writing to the request for reconsideration; it may decline to reconsider its decision.

During Candidacy—When a student admitted to candidacy is not making minimum progress or not completing University, department, or program requirements in a timely and satisfactory manner, the student's adviser, the Director of Graduate Studies, or department chair, and other relevant faculty should meet with the student. A written summary of these discussions shall be sent to the student and the adviser and added to the student's department file. The summary should specify the student's academic deficiencies, the steps necessary to correct them (if deemed correctable), and the period of time that is allowed for their correction (normally one academic quarter). At the end of the warning period, the committee should review the student's progress and notify the student of its proposed actions. If the student has corrected the deficiencies, he or she should be notified in writing that the warning has been lifted.

If the deficiencies are not deemed correctable by the committee (for example, the failure of a required course or examination, or a pattern of unsatisfactory performance) or if, at the end of the warning period, the student has not in the view of the committee corrected the deficiencies, the committee may initiate proceedings for dismissal. The student shall be notified, in writing, that the case of dismissal will be considered at an impending committee meeting. The student has the right to be invited to attend a portion of the scheduled meeting to present his or her own case; a student may also make this case to the committee in writing.

After full discussion at the committee meeting, the committee, without the student present, shall review the case and vote on the issue of dismissal. The student shall be sent a written summary of

the discussion, including the committee's decision and the reasons for it. The student may submit a written request for reconsideration. The committee's response to the request for reconsideration shall be made in writing; it may decline to reconsider its decision.

TERMINAL GRADUATE REGISTRATION (TGR)

Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the University oral exam and dissertation, completed 135 units or 10.5 quarters of residency (if under the old residency policy), and submitted a Doctoral Dissertation Reading Committee form, may request Terminal Graduate Registration status to complete their dissertations. Students pursuing Engineer degrees may apply for TGR status after admission to candidacy, completion of all required courses, and completion of 90 units or six quarters of residency (if under the old residency policy). Students enrolled in master's programs with a required project or thesis may apply for TGR status upon completion of all required courses and completion of 45 units. Students with more than one active graduate degree program must be TGR-eligible in all programs in order to apply for TGR status.

The TGR Final Registration status may also be granted for one quarter only to a graduate student who is returning after reinstatement, working on incompletes in his or her final quarter, or registering for one final term after all requirements are completed when Graduation Quarter is not applicable. TGR requirements above apply. Doctoral students under the term-based residency policy need nine quarters of residency to qualify for TGR Final Registration Status.

Each quarter, TGR students must enroll in the 801 (for master's and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate section for their adviser. TGR students register at a special tuition rate: $2,517 per quarter in 2010-11. TGR students may enroll in up to 3 units of course work per quarter at this tuition rate. Within certain restrictions, TGR students may enroll in additional courses at the applicable unit rate. The additional courses cannot be applied toward degree requirements since all degree requirements must be complete in order to earn TGR status. See the "Minimum Progress Requirements for Graduate Students" of this bulletin for information about satisfactory progress requirements for TGR students.

GRADUATE TUITION ADJUSTMENT

Graduate students who need only 3 to 7 remaining units to complete degree requirements or to qualify for TGR status, may register for one quarter on a unit basis (3 to 7 units) to cover the deficiency. This status may be used only once during a degree program.

GRADUATION QUARTER

Registration is required for the term in which a student submits a dissertation or has a degree conferred. Students who meet all the following conditions are eligible to be assessed a special tuition rate for the quarter in which they are receiving a degree:

1. All course work, degree requirements, oral exams, and residency requirements for all graduate degree programs, including joint degree programs, have been completed prior to the start of the requested Graduation Quarter. .
2. A graduate or professional student must have been enrolled or have been on an approved leave of absence in the term immediately preceding the term chosen as the graduation quarter. Summer term enrollment is optional for students on graduation quarter in the Autumn term provided that they have been enrolled the prior Spring term.
3. The student has formally applied to graduate in Axess.
4. The student has only to submit the dissertation, project, or master's thesis by the deadline for submission in the term designated as the graduation quarter.
5. The student has filed all necessary forms regarding graduation quarter before the first day of the term chosen as graduation quarter.

Students on graduation quarter are registered at Stanford and, therefore, have the rights and privileges of registered students. Graduation Quarter status may be used only once during a degree program. There is a tuition rate of $100 for the graduation quarter.

CONFERRAL OF DEGREES

Upon recommendation to the Senate of the Academic Council by the faculty of the relevant departments or schools and the Committee on Graduate Studies, degrees are awarded four times each year, at the conclusion of Autumn, Winter, Spring, and Summer terms. All diplomas, however, are prepared and distributed after degree conferral in accordance to the distribution dates listed on the Registrar's Office web site at http://registrar.stanford.edu/students/records/diplomas.htm.

Students must apply for conferral of a graduate degree by filing an Application to Graduate in Axess by the deadline for each term. The deadlines are available in the Academic Calendar. A separate application must be filed for each degree program and for each conferral term.

Requests for conferral are reviewed by the Office of the University Registrar and the student's department to verify completion of degree requirements. Students must be registered in the term of degree conferral. Students with unmet financial obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released by the Office of Student Financial Services. An academic record where no other degree objective is being pursued is permanently frozen after the final degree conferral, and all subsequent grade change requests will be denied.

Students are typically expected to apply to graduate during the term in which they expect to be awarded a degree. The University, however, reserves the right to confer a degree on a student who has completed all of the requirements for a degree even though the student has not applied to graduate; such an individual would then be subject to the University's usual rules and restrictions regarding future enrollment or registration.

Students who wish to withdraw a request for conferral or make changes to the Application to Graduate should submit the Withdrawal of Application to Graduate form to the Student Services Center. Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate in a subsequent term.

Stanford University awards no honorary degrees.

CHANGES OF DEGREE PROGRAMS

Graduate students are admitted to Stanford for a specific degree program. Students who have attended Stanford for at least one term and who are currently enrolled may submit a Graduate Program Authorization Petition to make one of the following changes: (1) change to a new degree program in the same department; (2) change to a new degree program in a different department; (3) add a new degree program in the same or a different department to be pursued with the existing program. Coterminal students must have the bachelor's degree conferred before adding a second advanced degree program. Summer term enrollment is optional for students beginning a new degree program in the Autumn term provided that they have been enrolled the prior Spring term.

It is important that the attempt to add or change degree programs be made while enrolled. Otherwise, a new Application for Graduate Admission must be submitted and an application fee paid. The Graduate Program Authorization Petition is submitted electronically through Axess to the department in which admission is requested. If applying for a higher degree program, students may also be required to submit other application materials such as GRE Subject Test scores, a statement of purpose, or new letters of recommendation. Decisions on the petitions are made by the pro-

grams or departments to which they are directed, and are at the discretion of those programs or departments.

International students changing departments or degree programs must also obtain the approval of the Foreign Student Adviser at the Bechtel International Center. If the requested change lengthens their stay, they also are required to submit verification of sufficient funding to complete the new degree program.

Students who wish to terminate study in a graduate program should submit a properly endorsed Request to Permanently Withdraw from Degree Program form to the Student Services Center. To return to graduate study thereafter, the student is required to apply for reinstatement (if returning to the same degree program) or admission (if applying to a different program). Both applications require payment of a fee.

DEGREE-SPECIFIC REQUIREMENTS

MASTER OF ARTS AND MASTER OF SCIENCE

In addition to completing the general requirements for advanced degrees and the specified program requirements, candidates for the degree of Master of Arts (M.A.) or Master of Science (M.S.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.

MASTER'S PROGRAM PROPOSAL

Students pursuing an M.A., M.F.A., M.S., or M.P.P. degree are required to submit an acceptable program proposal to their department during the first quarter of enrollment. Coterminal students must submit the proposal during the first quarter after admission to the coterminal program. The program proposal establishes a student's individual program of study to meet University and department degree requirements. Students must amend the proposal formally if their plans for meeting degree requirements change.

In reviewing the program proposal or any subsequent amendment to it, the department confirms that the course of study proposed by the student fulfills all department course requirements (for example, requirements specifying total number of units, course levels, particular courses, sequences, or substitutes). The department confirms that all other department requirements (for example, required projects, foreign language proficiency, or qualifying exams) are listed on the form and that all general University requirements (minimum units, residency, and so on) for the master's degree will be met through the proposed program of study. Students who fail to submit an acceptable proposal may be dismissed.

TIME LIMIT FOR COMPLETION OF THE MASTER'S DEGREE

All requirements for a master's degree must be completed within three years after the student's first term of enrollment in the master's program (five years for Honors Cooperative students). Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing.

The time limit is not automatically extended by a student's leave of absence. All requests for extension, whether prompted by a leave or some other circumstance, must be filed by the student before the conclusion of the program's time limit. Departments are not obliged to grant an extension. The maximum extension is one additional year. Extensions require review of academic progress and any other factors regarded as relevant by the department, and approval by the department; such approval is at the department's discretion.

MASTER IN PUBLIC POLICY

The degree of Master in Public Policy (M.P.P.) is a two-year program leading to a professional degree. Enrollment in the M.P.P. program is limited to candidates who have earlier been accepted to another Stanford graduate degree program. In addition to completing the general requirements for advanced degrees and the program requirements specified in the "Public Policy" section of this bulletin, candidates for the degree of Master of Public Policy (M.P.P.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.

MASTER OF BUSINESS ADMINISTRATION

The degree of Master of Business Administration (M.B.A.) is conferred on candidates who have satisfied the requirements established by the faculty of the Graduate School of Business and the general requirements for advanced degrees. Full particulars concerning the school requirements are found on the M.B.A. program web site of the Graduate School of Business. The M.B.A. must be completed within the time limit for completion of the master's degree.

MASTER OF FINE ARTS

In addition to completing the general requirements for advanced degrees and the program requirements specified in the "Art and Art History" section of this bulletin, candidates for the degree of Master of Fine Arts (M.F.A.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.

MASTER OF LIBERAL ARTS

The Master of Liberal Arts (M.L.A.) program is a part-time interdisciplinary master's program in the liberal arts for returning adult students. In addition to completing the general requirements for advanced degrees, candidates for the degree of Master of Liberal Arts (M.L.A.) must complete their degrees within five years, an exception to the rule specified above.

ENGINEER

In addition to completing the general requirements for advanced degrees and the requirements specified by their department, candidates for the degree of Engineer must be admitted to candidacy and must complete a thesis per the specifications below.

CANDIDACY

The Application for Candidacy for Degree of Engineer is an agreement between the student and the department on a specific program of study to fulfill degree requirements. Students must apply for candidacy by the end of the second quarter of the program. Honors Cooperative students must apply by the end of the fourth quarter of the program. Candidacy is valid for five calendar years.

THESIS

A University thesis is required for the Engineer degree. Students have the option of submitting the thesis electronically or via the paper process. Standards for professional presentation of the thesis have been established by the Committee on Graduate Studies. Directions for preparation of the thesis for electronic or paper submission are available at the Office of the University Registrar dissertation/thesis web site at http://studentaffairs.stanford.edu/registrar/students/dissertation-thesis.

The deadline for submission of theses for degree conferral in each term is specified by the University academic calendar. if submitting via the paper process, three copies of the thesis, bearing the approval of the adviser under whose supervision it was pre-

pared, must be submitted to the Office of the University Registrar before the quarterly deadline listed on the University academic calendar. A fee is charged for binding copies of the paper thesis. If submitting via the electronic process the signed thesis signature page and title page must be submitted to the Student Services Center and one final copy of the thesis must be uploaded, and approved by the Final Reader, on or before the quarterly deadline indicated in the University's academic calendar. There is no fee charged for the electronic submission process.

Students must be registered or on graduation quarter in the term in which they submit the thesis; see "Graduation Quarter" section of this bulletin for additional information. At the time the thesis is submitted, an Application to Graduate must be on file, all department requirements must be complete, and candidacy must be valid through the term of degree conferral.

MASTER OF LEGAL STUDIES

Admission to study for the Master of Legal Studies degree (M.L.S.), a nonprofessional degree, is granted to students who hold the Doctor of Philosophy (Ph.D.) or other nonlaw doctoral degree, or who have been admitted to a nonlaw doctoral program and have completed a program of study amounting to 45 quarter units toward the doctorate, and who meet an admission standard equivalent to that required of candidates for the Doctor of Jurisprudence degree.

The M.L.S. degree is conferred upon candidates who, in not fewer than two academic terms in residence and in not more than two consecutive academic years, successfully complete at least three first-year courses in the first Autumn term plus an additional 24 units of Law School work, including at least one course or seminar requiring a research paper. All work shall conform to the rules and regulations of the University and the Stanford Law School.

MASTER OF LAWS

The degree of Master of Laws (L.L.M.) is conferred upon candidates who have completed one academic year (35 quarter units) in residence in accordance with the rules of the University and the Stanford Law School. The degree is designed for foreign graduate students trained in law and is available only to students with a primary law degree earned outside the United States. The L.L.M. program offers students a choice of two areas of specialization: Corporate Governance and Practice, or Law, Science, and Technology.

MASTER OF THE SCIENCE OF LAW

The degree of Master of the Science of Law (J.S.M.) is conferred upon candidates who have completed one academic year (35 quarter units) with distinction in accordance with the rules of the University and the Stanford Law School

The degree is primarily designed for those qualified students who hold a J.D. or its equivalent and who are at the Stanford Law School for independent reasons (for example, as teaching fellows) and who wish to combine work toward the degree with their primary academic activities. Specially qualified lawyers, public officials, academics, and other professionals who have worked outside the United States may apply for the degree through the Stanford Program in International Legal Studies (SPILS). Additional information concerning requirements may be found at http://www.law.stanford.edu/program/degrees/advanced.

DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence (J.D.) is conferred on candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the Stanford Law School over not less than three academic years and who otherwise have satisfied the requirements of the University and the Stanford Law School.

DOCTOR OF THE SCIENCE OF LAW

The degree of the Doctor of the Science of Law (J.S.D.) is conferred upon candidates who hold a J.D. or its equivalent, who complete one academic year in residence, and who, as a result of independent legal research, present a dissertation that is, in the opinion of the faculty of the Stanford Law School a contribution to knowledge. Such work and dissertation must conform to the rules of the Stanford Law School and the University for the dissertation and the University Oral Examination, as described in the "Doctor of Philosophy" section of this bulletin.

Candidacy is limited to students of exceptional distinction and promise. Full particulars concerning requirements may be found at http://www.law.stanford.edu/program/degrees/advanced.

DOCTOR OF MUSICAL ARTS

The degree of Doctor of Musical Arts (D.M.A.) is conferred on candidates who have satisfied the general requirements for advanced degrees, the program requirements specified in the “Music” section of this bulletin, and the candidacy requirement as described in the “Doctor of Philosophy” section.

DOCTOR OF MEDICINE

Candidates for the degree of Doctor of Medicine (M.D.) must satisfactorily complete the required curriculum in medicine. The requirements for the M.D. degree are detailed online at http://med.stanford.edu/md.

DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy (Ph.D.) is conferred on candidates who have demonstrated to the satisfaction of their department or school substantial scholarship, high attainment in a particular field of knowledge, and the ability to do independent investigation and present the results of such research. They must satisfy the general requirements for advanced degrees, the program requirements specified by their departments, and the doctoral requirements described below. The option for a Ph.D. minor is also described below, though it is not a Ph.D. requirement.

CANDIDACY

Admission to a doctoral degree program is preliminary to, and distinct from, admission to candidacy. Admission to candidacy for the doctoral degree is a judgment by the faculty of the student’s potential to successfully complete the requirements of the degree program. Students are expected to complete department qualifying procedures and apply for candidacy by the end of their second year in the Ph.D. program. Honors Cooperative students must apply by the end of their fourth year.

The Application for Candidacy specifies a departmentally approved program of study to fulfill degree requirements, including required course work, language requirements, teaching requirements, dissertation (final project and public lecture-demonstration for D.M.A.), and University oral examination (for Ph.D.). At least 3 units of work must be taken with each of four Stanford faculty members. To reiterate, however, a student will only advance to candidacy if, in addition to the student's fulfilling departmental prerequisites, the faculty makes the judgment that the student has the potential to successfully complete the requirements of the degree program.

If the Ph.D. student is pursuing a minor, approval by the department awarding the minor is also required on the Application for Candidacy.

TIME LIMIT FOR COMPLETION OF A DEGREE WITH CANDIDACY

All requirements for the degree must be completed before candidacy expires. Candidacy is valid for five years unless terminated by the department (for example, for unsatisfactory progress). The time limit is not automatically extended by a student’s leave of absence. All requests for extension, whether prompted by a leave

or some other circumstance, must be filed by the student before the conclusion of the program's time limit. Departments are not obligated to grant an extension. Students may receive a maximum of one additional year of candidacy per extension. Extensions require review by the department of a dissertation progress report, a timetable for completion of the dissertation, any other factors regarded as relevant by the department, and approval by the department; such approval is at the department's discretion.

TEACHING AND RESEARCH REQUIREMENTS

A number of departments require their students to teach (serving as a teaching assistant) or assist a faculty member in research (serving as a research assistant) for one or more quarters as part of their doctoral programs. Detailed information is included in the department sections of this bulletin.

FOREIGN LANGUAGE REQUIREMENT

Some departments require a reading knowledge of one or more foreign languages as indicated in department sections of this bulletin. Fulfillment of language requirements must be endorsed by the chair of the major department.

UNIVERSITY ORAL EXAMINATION

Passing a University oral examination is a requirement of the Ph.D. and J.S.D. degrees. The purpose of the examination is to test the candidate's command of the field of study and to confirm fitness for scholarly pursuits. Departments determine when, after admission to candidacy, the oral examination is taken and whether the exam will be a test of knowledge of the field, a review of a dissertation proposal, or a defense of the dissertation. The chairperson of a Stanford oral examination is appointed for this examination only, to represent the interests of the University for a fair and rigorous process.

Students must be registered in the term in which the University oral examination is taken. The period between the last day of final exams of one term and the day prior to the first day of the following term is considered an extension of the earlier term. Candidacy must also be valid.

The University Oral Examination Committee consists of at least five Stanford faculty members: four examiners and the committee chair from another department. All members are normally on the Stanford Academic Council, and the chair must be a member. Emeritus faculty are also eligible to serve as examiners or chair of the committee. (A petition for appointment of an examining committee member who is not on the Academic Council may be approved by the chair of the department if that person contributes an area of expertise that is not readily available from the faculty.) The chair of the examining committee may not have a full or joint appointment in the adviser's or student's department, but may have a courtesy appointment in the department. The chair can be from the same department as any other member(s) of the examination committee and can be from the student's minor department provided that the student's adviser does not have a full or joint appointment in the minor department.

For Interdisciplinary Degree Programs (IDPs), the chair of the examining committee may not have a full or joint appointment in the primary adviser's major department and must have independence from the student and adviser.

The University Oral Examination form must be submitted to the department graduate studies administrator at least two weeks prior to the proposed examination date. The examination is conducted according to the major department's adopted practice, but it should not exceed three hours in length, and it must include a period of private questioning by the examining committee.

Responsibility for monitoring appointment of the oral examination chair rests with the candidate's major department. Although the department cannot require the candidate to approach faculty members to serve as chair, many departments invite students and their advisers to participate in the process of selecting and contacting potential chairs.

The candidate passes the examination if the examining committee casts four favorable votes out of five or six, five favorable votes out of seven, or six favorable votes out of eight. Five members present and voting constitute a quorum. If the committee votes to fail a student, the committee chair sends within five days a written evaluation of the candidate's performance to the major department and the student. Within 30 days and after review of the examining committee's evaluation and recommendation, the chair of the student's major department must send the student a written statement indicating the final action of the department.

DISSERTATION

An approved doctoral dissertation is required for the Ph.D. and J.S.D. degrees. The doctoral dissertation must be an original contribution to scholarship or scientific knowledge and must exemplify the highest standards of the discipline. If it is judged to meet this standard, the dissertation is approved for the school or department by the doctoral dissertation reading committee. Each member of the reading committee signs the signature page of the dissertation to certify that the work is of acceptable scope and quality. One reading committee member reads the dissertation in its final form and certifies on the Certificate of Final Reading that department and University specifications have been met.

Dissertations must be in English. Approval for writing the dissertation in another language is normally granted only in cases where the other language or literature in that language is also the subject of the discipline. Such approval is routinely granted for dissertations in the Division of Literatures, Cultures, and Languages, in accordance with the policy of the individual department. Dissertations written in another language must include an extended summary in English.

Students have the option of submitting the dissertation electronically or via the paper process. Directions for preparation of the dissertation for electronic or paper submission are available at the Office of the University Registrar dissertation web site at http://studentaffairs.stanford.edu/registrar/students/dissertation-thesis. If submitting via the paper process, the signed dissertation copies and accompanying documents must be submitted to the Office of the University Registrar on or before the quarterly deadline indicated in the University's academic calendar. A fee is charged for the microfilming and binding of the paper dissertation copies. If submitting via the electronic process the signed dissertation signature page and title page must be submitted to the Student Services Center and one final copy of the dissertation must be uploaded, and approved by the Final Reader, on or before the quarterly deadline indicated in the University's academic calendar. There is no fee charged for the electronic submission process.

Students must either be registered or on graduation quarter in the term they submit the dissertation; see "Graduation Quarter" in the "Graduate Degrees" section of this Bulletin for additional information. At the time the dissertation is submitted, an Application to Graduate must be on file, all department requirements must be complete, and candidacy must be valid through the term of degree conferral.

DOCTORAL DISSERTATION READING COMMITTEE

The doctoral dissertation reading committee consists of the principal dissertation adviser and two other readers. At least one member must be from the student's major department. Normally, all members are on the Stanford Academic Council. The student's department chair may, in some cases, approve the appointment of a reader who is not on the Academic Council, if that person is particularly well qualified to consult on the dissertation topic and holds a Ph.D. or equivalent foreign degree. Former Stanford Academic Council members, emeritus professors, and non-Academic Council members may thus on occasion serve on a reading committee. If they are to serve as the principal dissertation adviser, however, the appointment of a co-adviser who is currently on the Academic Council is required. A non-Academic Council member (including emeritus professors and former Academic Council

members) may replace only one of three required members of dissertation reading committees.

The reading committee, as proposed by the student and agreed to by the prospective members, is endorsed by the chair of the major department on the Doctoral Dissertation Reading Committee form. This form must be submitted before approval of Terminal Graduate Registration (TGR) status or before scheduling a University oral examination that is a defense of the dissertation. The reading committee may be appointed earlier, according to the department timetable for doctoral programs. All subsequent changes to the reading committee must be approved by the chair of the major department. The reading committee must conform to University regulations at the time of degree conferral. Exceptions allowing two non-Academic Council members on the dissertation reading committee when a member of the committee becomes emeritus may be granted by the department chair through the Petition for Doctoral Committee Members.

PH.D. MINOR

Students pursuing a Ph.D. may pursue a minor in another department or program to complement their Ph.D. program. This option is not available to students pursuing other graduate degrees. Ph.D. candidates cannot pursue a minor in their own major department or program. In rare cases, a Ph.D. student may complete the requirements for more than one minor. In that case, 20 unduplicated units must be completed for each minor.

Only departments that offer a Ph.D. may offer a minor, and those departments are not required to do so. The minor should represent a program of graduate quality and depth, including core requirements and electives or examinations. The department offering the minor establishes the core and examination requirements. Elective courses are planned by the students in conjunction with their minor and Ph.D. departments.

The minimum University requirement for a Ph.D. minor is 20 units of course work at the graduate level (courses numbered 200 and above). If a minor department chooses to require those pursuing the minor to pass the Ph.D. qualifying or field examinations, the 20-unit minimum can be reduced. All of the course work for a minor must be done at Stanford.

Units taken for the minor can be counted as part of the overall requirement for the Ph.D. of 135 units of graduate course work done at Stanford. Courses used for a minor may not be used also to meet the requirements for a master's degree.

A Ph.D. minor form outlining a program of study must be approved by the major and minor departments. This form is submitted at the time of admission to candidacy and specifies whether representation from the minor department on the University oral examination committee is required.

ADVISING AND CREDENTIALS

ADVISING

By the start of their first term, students should be paired by the department with faculty advisers who assist them in planning a program of study to meet degree requirements. The department should also ensure that doctoral students are informed in a timely fashion about procedures for selecting a dissertation adviser, reading committee members, and orals committee members. Departments should make every effort to assist doctoral students who are not admitted to candidacy in finding an appropriate adviser.

Students are obliged to follow department procedures for identifying advisers and committee members for their dissertation reading and orals examinations.

Occasionally, a student's research may diverge from the area of competence of the adviser, or irreconcilable differences may occur between the student and the faculty adviser. In such cases, the student or the faculty adviser may request a change in assignment. If the department decides to grant the request, every reasonable effort must be made to pair the student with another suitable adviser. This may entail some modification of the student's research project.

In the rare case where a student's dissertation research on an approved project is in an advanced stage and the dissertation adviser is no longer available, every reasonable effort must be made to appoint a new adviser, usually from the student's reading committee. This may also require that a new member be added to the reading committee before the draft dissertation is evaluated, to keep the reconstituted committee in compliance with the University requirements for its composition.

TEACHING CREDENTIALS

Stanford University is accredited by the California Commission on Teacher Credentialing and the National Council for Accreditation of Teacher Education and is authorized to recommend candidates for credentials. The University offers a complete training program for both Single (Secondary) and Multiple Subject (Elementary) teaching credentials. Upon completion of a Stanford approved program, the credentials allow teachers to serve in California public schools.

Current Stanford undergraduates wishing to complete the requirements for a teaching credential should apply to the coterminal program at the School of Education. All other applicants should apply directly to the Stanford Teacher Education Program (STEP) at the School of Education.

ACADEMIC POLICIES AND STATEMENTS

COMPLIANCE WITH UNIVERSITY POLICIES/REGISTRATION HOLDS

Registration as a student constitutes a commitment by the student to abide by University policies, rules, requirements, and regulations, including (but not limited to) those concerning registration, academic performance, student conduct, health and safety, housing, use of the libraries and computing resources, operation of vehicles on campus, University facilities, and the payment of fees and assessments. Some of these are set forth in this bulletin while others are available in relevant University offices.

Students should take responsibility for informing themselves of applicable University policies, rules, requirements, and regulations. A collection is available on the Stanford University policy web site at http://www.stanford.edu/about/administration/policy. Many are also set forth in the *Research Policy Handbook* and the *Graduate Academic Policies and Procedures Handbook (the GAP handbook).*

The University reserves the right to withhold registration privileges or to cancel the registration of any student: who is not in compliance with its policies, rules, requirements, or regulations; or for reasons pertaining to academic performance, health and wellness, qualification to be a student, behavioral conduct, or the safety of the University community.

NOTIFICATION/OBLIGATION TO READ EMAIL

For many University communications, email to a student's Stanford email account is the official form of notification to the student, and emails sent by University officials to such email addresses will be presumed to have been received and read by the student. Emails and forms delivered through a SUNet account by a student to the University may likewise constitute a formal communication, with the use of this password-protected account constituting the student's electronic signature.

REGISTRATION AND STUDY LISTS

The preliminary study list deadline is the first day of classes of each quarter during the academic year. As early as possible, but no later than this deadline, students (including those with TGR status) must submit to the Office of the University Registrar via Axess, a study list to enroll officially in classes for the quarter. Students are expected to be enrolled "at status" by the preliminary study list deadline; meaning that students must be enrolled in sufficient units to meet requirements for their status, whether full-time, or on approved special registration status. Students who enroll in more units than their anticipated tuition charge covers will be charged the additional tuition. They may not enroll in courses for zero units unless those courses, like TGR, are defined as zero-unit courses. Undergraduates are subject to academic load limits described in the "Amount of Work" section of this bulletin. Students will be charged a $200 late study list fee for submitting their study lists after the quarterly deadline.

The University reserves the right to withhold registration from, and to cancel the advance registration or registration of, any student having unmet obligations to the University.

STUDY LIST CHANGES

Students may add courses or units to their study lists through the end of the third week of classes. (Individual faculty may choose to close their classes to new enrollments at an earlier date.) Courses or units may be added only if the revised program remains within the normal load limits.

Courses or units may be dropped by students through the end of the third week of classes, without any record of the course remaining on the student's transcript. No drops are permitted after this point.

A student may withdraw from a course after the final study list deadline through the end of the eighth week of each quarter. In this case, a grade notation of 'W' (withdraw) is automatically recorded on the student's transcript for that course. Students who do not officially withdraw from a class by the end of the eighth week are assigned the appropriate grade or notation by the instructor to reflect the work completed.

Through the end of the eighth week of classes, students may choose the grading option of their choice in courses where an option is offered.

If the instructor allows a student to take an 'I' (incomplete) in the course, the student must make the appropriate arrangements for that with the instructor by the last day of classes.

The deadlines described above follow the same pattern each quarter but, due to the varying lengths of Stanford's quarters, they may not always fall in exactly the week specified. Students should consult the University's academic calendar for the deadline dates each term. Other deadlines may apply in Law, Graduate School of Business, Medicine, and Summer Session.

REPEATED COURSES

Students may not enroll in courses for credit for which they received either Advanced Placement or transfer credit.

Some Stanford courses may be repeated for credit; they are specially noted in this bulletin. Most courses may not be repeated for credit. Under the general University grading system, when a course which may not be repeated for credit is retaken by a student, the following special rules apply:

1. A student may retake any course on his or her transcript, regardless of grade earned, and have the original grade, for completed courses only, replaced by the notation 'RP' (repeated course). When retaking a course, the student must enroll in it for the same number of units originally taken. When the grade for the second enrollment in the course has been reported, the units and grade points for the second course count in the cumulative grade point average in place of the grade and units for the first enrollment in the course. Because the notation 'RP' can only replace grades for completed courses, the notation 'W' cannot be replaced by the notation 'RP' in any case.
2. A student may not retake the same course for a third time unless he or she received a 'NC' (no credit) or 'NP' (not passed) when it was taken and completed the second time. A student must file a petition for approval to take the course for a third time with the Office of the Vice Provost for Undergraduate Education. When a student completes a course for the third time, grades and units for both the second and third completions count in the cumulative grade point average. The notation 'W' is not counted toward the three-retake maximum.

AMOUNT OF WORK

The usual amount of work for undergraduate students is 15 units per quarter; 180 units (225 for dual degree students) are required for graduation. Registration for fewer than 12 units is rarely permitted and may cause the undergraduate to be ineligible for certification as a full-time student. The maximum is 20 units (21 if the program includes a 1-unit activity course). Requests for exception to the maximum may be considered for compelling reasons, the approval of which may include conditions or restrictions. A past superior academic performance is not considered to be sufficient justification for exceeding the maximum. Petitions for pro-

grams of fewer than 12 or more than 20 units must be submitted to the Office of the Vice Provost for Undergraduate Education, Sweet Hall, first floor. For additional information regarding satisfactory academic progress, refer to the "Academic Standing" section of this bulletin.

Matriculated graduate students are expected to enroll for at least eight units during the academic year; schools and departments may set a higher minimum. Petitions for programs of fewer than 8 must be signed by the student's department and submitted for consideration to the Office of the University Registrar. Graduate students are normally expected to enroll in no more than 24 units; registration for more than 24 units must be approved by the department. Under certain circumstances, graduate students may register on a part-time basis. See the "Tuition, Fees, and Housing" section of this bulletin.

UNIT OF CREDIT

Every unit for which credit is given is understood to represent approximately three hours of actual work per week for the average student. Thus, in lecture or discussion work, for 1 unit of credit, one hour per week may be allotted to the lecture or discussion and two hours for preparation or subsequent reading and study. Where the time is wholly occupied with studio, field, or laboratory work, or in the classroom work of conversation classes, three full hours per week through one quarter are expected of the student for each unit of credit; but, where such work is supplemented by systematic outside reading or experiment under the direction of the instructor, a reduction may be made in the actual studio, field, laboratory, or classroom time as seems just to the department.

AUDITING

No person shall attend any class unless he or she is a fully registered student enrolled in the course or meets the criteria for auditors. Auditors are not permitted in courses that involve direct participation such as language or laboratory science courses, field work, art courses with studio work, or other types of individualized instruction. Auditors are expected to be observers rather than active participants in the courses they attend, unless the instructors request attendance on a different basis. Stanford does not confer credit for auditing, nor is a permanent record kept of courses audited. Students who have been suspended are not permitted to audit.

Auditors may not join classes for the first time after the University's final study list deadline. Auditors are not eligible for other University services or privileges including housing, health insurance (Cardinal Care), Vaden clinical services, and the University health plan. The University Registrar reviews for approval any other services or privileges that may be sought.

In all cases of auditing, the instructor's prior consent and the Office of the University Registrar's prior approval are required. Further information is available from the Office of the University Registrar.

RELIGIOUS HOLIDAYS

Students planning not to attend class or take an exam because of a religious observance are expected to convey this information to instructors in advance. The Office for Religious Life makes available to faculty, staff, and students a list of significant religious observances at the beginning of each academic year. For further information, contact the Deans for Religious Life at (650) 723-1762 or see http://religiouslife.stanford.edu.

LEAVES OF ABSENCE AND REINSTATEMENT (UNDERGRADUATE)

Undergraduates are admitted to Stanford University with the expectation that they will complete their degree programs in a reasonable amount of time, usually within four years. Students have the option of taking a leave of absence for up to one year upon filing a petition to do so with the Office of the University Registrar and receiving approval. The leave may be extended for up to one additional year provided the student files (before the end of the initial one-year leave) a petition for the leave extension with the Office of the University Registrar and receives approval. The University may condition its approval of a petition for leave of absence on the student's meeting such requirements as the University deems appropriate in the individual case for the student to be eligible to return (such as, in the case of a leave for medical reasons, proof of treatment or an interview with a provider at Vaden or CAPS). Leaves of absence for undergraduates may not exceed a cumulative total of two years (eight quarters including Summer Quarters). Undergraduates who take an approved leave of absence while in good standing may enroll in the University for the subsequent quarter with the privileges of a returning student.

Students who wish to withdraw from the current quarter, or from a quarter for which they have registered in advance and do not wish to attend, must file a leave of absence petition with the Office of the University Registrar. Information on tuition refunds is available in the "Refunds" section of this bulletin.

An involuntary leave of absence can be imposed in circumstances in which a student:

- presents a substantial risk of harm to self or others or is failing to carry out substantial self-care obligations; or
- significantly disrupts the educational or other activities of the University community; or
- is unable to participate meaningfully in educational activities; or
- requires a level of care from the University community that exceeds the resources and staffing that the University can reasonably be expected to provide for the student's well-being.

Students whose circumstances warrant a review under the Involuntary Leave of Absence Policy, will be apprised, in writing, of University concerns and will be provided an opportunity to respond to concerns in writing or in person or via telephone before a review committee convened by the Dean of Student Life. Students placed on involuntary leave of absence can appeal an unfavorable decision to the Vice Provost for Student Affairs. The University can condition a student's return to registered student status on such requirements as the University deems appropriate in the individual case (such as, in the case of a leave for medical reasons, proof of treatment of an interview with a provider at Vaden or CAPS or its designee). The Involuntary Leave of Absence Policy is available on the Dean of Student Life's web site.

Students on leave of absence are not registered at Stanford and, therefore, do not have the rights and privileges of registered students. They cannot fulfill any official department or University requirements during the leave period.

When a student is granted or placed on a leave of absence after the beginning of the term, courses in which the student was enrolled after the final study list deadline appear on the student's transcript and show the symbol 'W' (withdraw). For additional information regarding satisfactory academic progress, refer to the "Academic Standing" section of this bulletin.

Students who have exceeded their eight quarters of approved leave, or who fail to submit a Leave of Absence petition by the published deadline and otherwise do not submit a study list, must apply for reinstatement. The University is not obliged to approve reinstatements of students. Applications for reinstatement are reviewed by the Vice Provost for Undergraduate Education and are subject to the approval of the Faculty Senate Committee on Undergraduate Standards and Policy or its designees. The Committee or its designees may determine whether the application for reinstatement will be approved or not, and/or the conditions a student must meet in order to be reinstated. Reinstatement decisions may be based on the applicant's status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, as well as any other factors or considerations regarded as relevant to the Vice Provost for Undergraduate Education or the Committee.

Applications for reinstatement must be submitted to the Office of the Vice Provost for Undergraduate Education six to eight weeks prior to the start of the term in which the student seeks to enroll in classes. Petition information and instructions may be obtained by contacting the Office of the Vice Provost for Undergraduate Education, Sweet Hall, first floor.

Leaves of absence for and reinstatements of graduate students are addressed in the "Graduate Degrees" section of this bulletin.

RECORDS

TRANSCRIPTS

Transcripts of Stanford records are issued by the Office of the University Registrar upon the student's request when submitted in writing or via the online Axess system. There is no charge for official transcripts. The courses taken in one quarter do not appear on any student's transcript until after the final study list deadline. The University reserves the right to withhold transcripts or records of students with unmet obligations to the University.

CERTIFICATION OF ENROLLMENT OR DEGREES

The Office of the University Registrar can provide oral or written confirmation of registration, enrollment, or degree status. The printed certification can be used whenever enrollment or degree verification is required for car insurance, loan deferments, medical coverage, scholarship purposes, and so on. Using Axess, students are able to print an official certification at no charge. Certification of full- or part-time enrollment cannot be provided until after the study list is filed.

Degrees are conferred quarterly, but diplomas are issued in accordance to the distribution dates listed on the Registrar's Office web site at http://studentaffairs.stanford.edu/registrar/students/obtain-diploma. After conferral, the degree awarded to a student can be verified by contacting the Office of the University Registrar for an official transcript, a certification form, or the National Student Clearinghouse. Requests for transcripts must be made by the student in writing or through Axess.

Full-time enrollment for undergraduates is considered to be enrollment in a minimum of 12 units of course work per quarter at Stanford. Work necessary to complete units from previous quarters does not count toward the 12 units necessary for full-time status in the current quarter. Enrollment in 8 to 11 units is considered half-time enrollment. Enrollment in 1 to 7 units is considered less-than-half-time, or part-time enrollment. During Summer Quarter, all graduate students who hold appointments as research or teaching assistants are considered to be enrolled on at least a half-time basis.

All undergraduates validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification.

Stanford uses the following definitions (in units) to certify the enrollment status of graduate and professional students each quarter:

	Graduate	*Business (M.B.A., Sloan)*	*Law*	*Medicine (M.D.)*
Full time:	8 or more	11 or more	9 or more	9 or more
Half time:	6 or 7	6-10	6-8	6-8
Part time:	5 or fewer	5 or fewer	5 or fewer	5 or fewer

TGR students enrolled in a course numbered 801 or 802 are certified as full time.

As a general proposition, only information classified by the University as directory information (see the "Directory Information" section of this bulletin) can be confirmed to inquirers other than the student.

PRIVACY OF STUDENTS RECORDS

NOTIFICATION OF RIGHTS UNDER FERPA

The Family Educational Rights and Privacy Act of 1974 (FERPA) affords students certain rights with respect to their education records. They are:

1. The right to inspect and review the student's education records within 45 days of the date the University receives a request for access.
   The student should submit to the Registrar, Dean, chair of the department, or other appropriate University official, a written request that identifies the record(s) the student wishes to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights under FERPA.
   A student may ask the University to amend the record that he or she believes is inaccurate or misleading. The student should write the University official responsible for the record (with a copy to the University Registrar), clearly identify the part of the records he or she wants changed, and specify why it should be changed.
   If the University decides not to amend the record as requested by the student, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment.
   Additional information regarding the hearing procedures is provided to the student when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.
   FERPA contains various exceptions to the general rule that the University should not disclose education records without seeking the prior written consent of the student. The following circumstances are representative of those in which education records (and information drawn from education records) may be disclosed without the student's prior written consent:
   a. Upon request, the University may release Directory Information (see the "Directory Information" section of this bulletin).
   b. School officials who have a legitimate educational interest in a student's education record may be permitted to review it. A school official is: a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student or volunteer serving on an official committee (or representing a recognized student group), such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her responsibility to Stanford or to the student.
   c. The University discloses education records without consent to officials of another school, in which a student seeks or intends to enroll, upon request of officials at that other school.
   d. The University may choose to disclose education records (and information drawn from education records) to either

supporting parent(s) or guardian(s) where the student is claimed as a dependent under the Internal Revenue Code.

e. The University may inform persons including either parent(s) or guardian(s) when disclosure of the information is necessary to protect the health or safety of the student or other persons.

f. For students under the age of 21, the University may notify either parent(s) or guardian(s) of a violation of any law or policy relating to the use of alcohol or controlled substances.

g. The University must provide records in response to lawfully issued subpoenas, or as otherwise compelled by legal process.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA.

The name and address of the office that administers FERPA is: Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202-4605.

SHARING INFORMATION WITH PARENTS

Students are encouraged to maintain an ongoing, open dialogue with parents throughout their careers at Stanford about academic progress and personal development. Most student difficulties are resolved at Stanford without involving parents. The University does recognize, however, that there are some exceptional situations where parental involvement may be appropriate to assist a student through a difficult circumstance. Under those circumstances, Stanford may (but is not required to) choose to disclose information to parents if permitted by law.

Under the Family Educational Rights and Privacy Act (FERPA), Stanford is permitted to disclose information drawn from education records to parents if one or more parent claims the student as a dependent for federal tax purposes. Some laws, especially those relating to medical and mental health care, prohibit the disclosure of information without the student's consent, even where the student is a tax dependent.

DIRECTORY INFORMATION

The University regards the following items of information as "directory information," that is, information that the University may make available to any person upon specific request (and without student consent):

- Name*
- Date of birth
- Place of birth
- Directory addresses and telephone numbers
- Email addresses
- SUNet ID (as opposed to Stanford Student ID Number)*
- Mailing addresses
- Campus office address (for graduate students)
- Secondary or permanent mailing addresses
- Residence assignment and room or apartment number
- Specific quarters or semesters of registration at Stanford
- Stanford degree(s) awarded and date(s)
- Major(s), minor(s), and field(s)
- University degree honors
- Student theses and dissertations*
- Participation in officially recognized sports or activities*
- Weight and height of members of athletic teams*
- Institution attended immediately prior to Stanford
- ID card photographs

For more information, see Stanford's FERPA web page at http://studentaffairs.stanford.edu/registrar/students/ferpa.

Students may prohibit the release of any of the items listed above (except those with an '*') by designating which items should not be released on the Privacy function of Axess. Students may prohibit the release of all directory information listed above after an appointment with the Office of the University Registrar to discuss the ramifications of this action. Student theses and dissertations can be restricted through the publishing options and embargo settings students select during submission.

Students, faculty, and others with questions regarding student records should contact the Office of the University Registrar.

CONSENT TO USE OF PHOTOGRAPHIC IMAGES

Registration as a student and attendance at or participation in classes and other campus and University activities constitutes an agreement by the student to the University's use and distribution (both now and in the future) of the student's image or voice in photographs, video or audio capture, or electronic reproductions of such classes and other campus and University activities.

If any student in a class where such photographing or recording is to take place does not wish to have his or her image or voice so used, the student should raise the matter in advance with the instructor.

STANFORD UNIVERSITY ID NUMBER

The Stanford University ID Number is assigned to each student's academic record for unique identification. It is printed on the Stanford University ID card and on documents distributed by the Office of the University Registrar and other administrative offices. It is a violation of University policy to use another's Stanford University ID Number to misrepresent yourself in any way; such use can result in loss of student privileges or other disciplinary action.

SUNET ID

The SUNet ID provides access to the Stanford University Network (SUNet) and its services, and identifies authorized users of these services. Each member of the Stanford electronic community creates a unique SUNet ID and SUNet ID password for him/herself. SUNet IDs provide:

- Axess services
- Email service
- Storage space within Stanford's distributed file system
- Usenet newsgroups
- World wide web services, including serving of personal web pages on the Leland system and access to Stanford Web Resources

The SUNet ID together with SUNet ID password may serve in place of a signature on electronic forms. The SUNet ID password must remain confidential. It is a violation of University policy to use another's SUNet ID or SUNet ID password to misrepresent yourself in any way; such use can result in loss of student privileges or other disciplinary action.

IDENTIFICATION CARDS

The ID card serves as an identification card, an electronic key, and a debit card, allowing cardholders to use services for which they have privileges, to enter certain facilities, and to make purchases.

ID cards are available to registered students, faculty, academic staff, and regular staff. Students obtain their ID cards at the Student Services Center, Tresidder Union, 459 Lagunita Drive, 2nd Floor (650) 498-CARD). Faculty and staff obtain ID cards at George Forsythe Hall, 275 Panama Street, Room 190 (650-498-CARD).

Courtesy ID cards are available for spouses and domestic partners of the Stanford professoriate, academic staff, regular staff, and students. These cards may be obtained from the Stanford Card ID Office at Forsythe Hall. The spouse/partner courtesy ID card enables use of some campus services during terms for which the student is registered.

Visiting Scholars who are on campus for a minimum of one quarter and contribute to Stanford's mission by teaching or col-

laborating on Stanford research also receive ID cards and campus privileges during their stay on campus. These cards may be obtained from the Stanford Card ID Office at Forsythe Hall.

Library access and borrowing privileges are reserved for the Stanford professoriate, academic staff, regular staff, students, and others closely associated with the University with a need for such access.

ID cards bear a photograph of the cardholder. This photograph is maintained in an online database and, as stated in the "Directory Information" section of this bulletin, is available for classroom, student residence, and other use upon specific request and without student consent unless the student has designated that the photograph not be released. Photographs can be designated as private using the Privacy function of Axess.

For more information, see http://campuscard.stanford.edu. For the complete policy on Stanford Identification Cards, see the Administrative Guide, 28-4 (pdf).

EXAMINATIONS

MIDTERMS

Classes that give midterm examinations outside of regular class hours must:

1. announce the date and time during the first week of the academic quarter, and
2. provide reasonable alternative times to those students for whom these announced times are not convenient.

According to Honor Code interpretations and applications, different examinations may be given at these alternative times.

END-QUARTER POLICY STATEMENT

The End-Quarter Period is a time of reduced social and extracurricular activity preceding final examinations. Its purpose is to permit students to concentrate on academic work and to prepare for final examinations.

In Autumn, Winter, and Spring quarters, End-Quarter starts seven full days (to begin at 12:01 a.m.) prior to the first day of final exams. In Spring Quarter, final examinations begin on Friday; no classes are held on Thursday, the day before. In Summer Quarter, this consists of the weekend and the four class days preceding the final examinations, which take place on Friday and Saturday of the eighth week. (See the *Time Schedule* for dates.)

During the End-Quarter Period, classes are regularly scheduled and assignments made; this regular class time is used by instructors in whatever way seems best suited to the completion and summation of course material. Instructors should neither make extraordinary assignments nor announce additional course meetings in order to "catch up" in course presentations that have fallen behind. They are free, however, and even encouraged to conduct optional review sessions and to suggest other activities that might seem appropriate for students preparing for final examinations.

No graded homework assignments, mandatory quizzes, or examinations should be given during the End-Quarter Period except:

1. In classes where graded homework assignments or quizzes are routine parts of the instruction process.
2. In classes with laboratories where the final examination will not test the laboratory component. In such a case, the laboratory session(s) during the End-Quarter Period may be used to examine students on that aspect of the course.

Major papers or projects about which the student has had reasonable notice may be called due in the End-Quarter Period.

Take-home final examinations, given in place of the officially scheduled in-class examination, may be distributed in the End-Quarter Period. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course. Such a policy respects the principle that students' final examinations are to be scheduled over a period of several days.

End-quarter examinations may not be held during this period. This policy preserves the instruction time for courses and protects the students' opportunities for extensive review and synthesis of their courses.

During the End-Quarter Period, no musical, dramatic, or athletic events involving compulsory student participation may be scheduled, unless approved as exceptions by the Committee on Undergraduate Standards and Policy (C-USP), nor may routine committee meetings be scheduled (such as those of the ASSU, the Senate of the Academic Council, or the committees of the President of the University) when such meetings normally would involve student participation.

Note—Students who believe that there are faculty who are violating End-Quarter policy should contact the Office of the University Registrar.

END-QUARTER EXAMINATIONS

Examinations are part of the process of education at the same time that they are a means to measure the student's performance in course work. Their structure, content, frequency, and length are to be determined in accordance with the nature of the course and the material presented in it, subject only to the limitations contained herein.

Great flexibility is available regarding the types of examinations that an instructor may choose to employ. Examinations, including final examinations, may be, for example, in-class essay examinations, take-home essay examinations, objective examinations, oral examinations, or appropriate substitutes such as papers or projects. Instructors may use any type of examination, paper, or project, or any combination thereof, guided only by the appropriateness of the types of examinations, papers, or projects for the material upon which the student is being examined.

When the final examination is an in-class examination, the following regulations apply:

1. A three-hour period is reserved during examination week for the final examination in each course of more than 2 units. This examination period must be available for students, but not necessarily in its entirety, if an in-class examination is given. In courses with extraordinary meeting times, such that ambiguity might exist as regards the period reserved for the final examination, the schedule should be clarified and students informed no later than the end of the second week of the quarter.
2. Examinations in 1- or 2-unit courses must be completed by the end of the last class meeting before the End-Quarter Period, except in Summer Quarter when examinations must be completed during the last regularly scheduled class session.

When the final examination or its appropriate substitute is not an in-class examination (for example, when an instructor chooses to employ a take-home examination, paper, or project in lieu of an in-class examination), the following regulations apply:

1. The schedule and format of the final examination or its appropriate substitute are made known not later than the end of the second week of the quarter and, if changed subsequently, may be only an option of the plan originally announced by the instructor.
2. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course.

In submitting official Study Lists, students commit to all course requirements, including the examination procedures chosen and announced by the course instructor. In choosing courses, students should take cognizance of the official schedule of final examinations announced on the Registrar's web site at http://studentaffairs.stanford.edu/registrar/final-exams. Students anticipating conflicts in final examination schedules should seek to resolve these with the instructors involved before the Preliminary Study List deadline at the beginning of the quarter. If accommodation cannot be made at that time, the student should revise his or her Study List before the Final Study List deadline at the end of the

third week of the quarter in order to be able to meet the required final examination.

If unforeseen circumstances prevent the student from sitting for the regularly scheduled examination, instructors should make alternative arrangements on an individual basis. Such unforeseen circumstances include illness, personal emergency, or the student's required participation in special events (for example, athletic championships) approved as exceptions by the Committee on Undergraduate Standards and Policy (C-USP). Inquiries regarding these circumstances may be directed to the Office of the Vice Provost for Undergraduate Education, Sweet Hall.

STATEMENT CONCERNING EARLY EXAMINATIONS

Students are reminded that taking final examinations earlier than the scheduled time is a privilege, not a right. They should request this privilege only in the event of extraordinary circumstances.

Since the final examination schedule for each quarter is published annually on the Registrar's web site at the time of course selection and enrollment, students are expected to make their academic plans in light of known personal circumstances that may make certain examination times difficult for them.

In general, faculty members are discouraged from giving final examinations earlier than the published and announced times. If faculty nevertheless decide to administer early examinations, either the questions should be completely different from those on the regularly scheduled examination or the early examination should be administered in a highly controlled setting. An example of such a setting would be a campus seminar room where the examination questions would be collected along with students' work and students would be reminded of their Honor Code obligations not to share information about the examination contents. Giving students easy opportunities to abuse the integrity of an examination is unfair to honest students and inconsistent with the spirit of the Honor Code.

Academic fields differ in the degree to which early examination requests present dilemmas for faculty. If, for example, an examination format consists of a small number of essay questions, where students would be greatly advantaged by knowing the question topics, faculty should be especially reluctant to allow early examinations unless they are willing to offer totally different examinations or a different kind of academic task, for example, a final paper in lieu of an examination.

GRADING SYSTEMS

GENERAL UNIVERSITY GRADING SYSTEMS

The general University grading system is applicable to all of Stanford University except the Graduate School of Business, the School of Law, and M.D. students in the School of Medicine. Note that the GPA (grade point average) and rank in class are not computed under the general University grading system. Stanford does use an internal-only GPA which is based on units completed up to the time of conferral of the first bachelor's degree. This information is used for internal purposes only (including academic standing) and is not displayed on the official transcript which is sent outside the University. Most courses are graded according to the general University grading system. However, courses offered through Law, Business, and Medicine are graded according to those schools' grading systems, even in cases where students in other programs are enrolled in their classes. Note also that, as to graduate students, there may be departmental requirements as to grades that must be maintained for purposes of minimum academic progress.

DEFINITION AND EXPLANATION OF GRADING SYSTEMS

All grades/notations for courses taken in 1995-96 or later are to be visible on student transcripts. Effective Summer Quarter 2008-09, the notation * was changed to GNR (Grade Not Reported).

A (+,-)	Excellent
B (+,-)	Good
C (+,-)	Satisfactory
D (+,-)	Minimal pass
	Plus (+) and minus (-) may be used as modifiers with the above letter grades
NP	Not Passed
NC	No Credit (unsatisfactory performance, 'D+' or below equivalent, in a class taken on a satisfactory/no credit basis)
CR	Credit (student-elected satisfactory; A, B, or C equivalent)
S	No-option Satisfactory; A, B, or C equivalent
L	Pass, letter grade to be reported
W	Withdraw
N	Continuing course
I	Incomplete
RP	Repeated Course
*	No grade reported (effective through Spring 2008-09).
GNR	Grade not reported (effective beginning Autumn Quarter 2009-10).

EXPLANATION

NC	The notation 'NC' represents unsatisfactory performance in courses taken on a satisfactory/no credit basis. Performance is equivalent to letter grade 'D+' or below.
NP	The notation 'NP' is used by instructors in courses taken for a letter grade that are not passed.
CR	In a course for which some students receive letter grades, the 'CR' represents performance that is satisfactory or better when the student has elected the 'CR' grading option.
S	For an activity course or a course in which the instructor elects to grade students only on a satisfactory/no credit basis, the 'S' represents performance that is satisfactory or better. For such a course, no letter grades may be assigned for satisfactorily completed work. It should be noted that the Registrar is unable to record course grades submitted when the instructor has not observed the required distinction between 'S' and 'CR.' The 'satisfactory' options are intended to relieve the pressure on students for achievement in grades. The 'satisfactory' options in no way imply fewer or different course work requirements than those required of students who elect evaluation with a letter grade. A department may limit the number of 'satisfactory' courses to count for a major program. No more than 36 units of Stanford course work (including activity courses) in which a 'CR' or 'S' was awarded can be applied toward the 180 (225 if dual degrees are being pursued) units required for a bachelor's degree. Transfer students are limited to 27 'CR' or 'S' units applied to the 180/225 minimum.
L	The 'L' is a temporary notation that represents creditable completion of a course for which the student will receive a permanent letter grade before the start of the next quarter. The 'L' is given when the instructor needs additional time to determine the specific grade to be recorded, but it is not appropriate if additional work is expected to be submitted by the student. A student receives unit credit for work graded 'L.'
N	The 'N' indicates satisfactory progress in a course that has not yet reached completion. Continuation courses need not continue at the same number of units, but the grade for all quarters of such a course must be the same.

N- The 'N-' grade indicates unsatisfactory progress in a continuing course. The first 'N-' grade constitutes a warning. The adviser, department chair, and student should discuss the deficiencies and agree on the steps necessary to correct them. A second consecutive 'N-' will normally cause the department to deny the student further registration until a written plan for the completion of the degree requirements has been submitted by the student and accepted by the department. Subsequent 'N-' grades are grounds for dismissal from the program.

I The 'I' is restricted to cases in which the student has satisfactorily completed a substantial part of the course work. No credit will be given until the course is completed and a passing grade received. When a final grade is received, all reference to the initial 'I' is removed.

'I' grades must be changed to a permanent notation or grade within a maximum of one year. If an incomplete grade is not cleared at the end of one year, it is changed automatically by the Office of the University Registrar to an 'NP' (not passed) or 'NC' (no credit) as appropriate for the grading method of the course. Students must request an incomplete grade by the last class meeting. Faculty may determine whether to grant the request or not. Faculty are free to determine the conditions under which the incomplete is made up, including setting a deadline of less than one year.

RP The notation 'RP' (meaning Repeated Course) replaces the original grade recorded for a course when a student retakes a course. (See the "Repeated Courses" section of this bulletin.)

W The notation 'W' (meaning Withdraw) is recorded when a student withdraws from a course.

* The '*' symbol appears when no grade has been reported to the Registrar for courses taken prior to 2001-02. The '*' symbol remains on the transcript until a grade has been reported (effective through Spring 2008-09).

GNR The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported. (Effective beginning Autumn Quarter 2009-10.)

REPORTING OF GRADES

All grades should be reported within 96 hours after the time and day reserved for the final examination, and in no case later than noon of the fourth day (including weekends) after the last day of the final examination period.

In the case of degree candidates in Spring Quarter, final grades should be reported by noon of the day following the end of the final examination period.

REVISION OF END-QUARTER GRADES

When duly filed with the Office of the University Registrar, end-quarter grades are final and not subject to change by reason of a revision of judgment on the instructor's part; nor are grades to be revised on the basis of a second trial (for example, a new examination or additional work undertaken or completed after the end of the quarter). Changes may be made at any time to correct an actual error in computation or transcription, or where some part of the student's work has been unintentionally overlooked; that is, if the new grade is the one that would have been entered on the original report had there been no mistake in computing and had all the pertinent data been before the instructor, the change is a proper one.

If a student questions an end-quarter grade based on the grading of part of a specific piece of work (for example, part of a test) on the basis of one of the allowable factors mentioned in the preceding paragraph (for example, an error in computation or transcription, or work unintentionally overlooked, but not matters of judgment as mentioned below), the instructor may review the entire piece of work in question (for example, the entire test) for the purpose of determining whether the end-quarter grade was a proper one. In general, changing an end-quarter grade is permitted on the basis of the allowable factors already mentioned whether an error is discovered by the student or the instructor; however, changing a grade is not permitted by reason of revision of judgment on the part of the instructor.

In the event that a student disputes an end-quarter grade, the established grievance procedure should be followed (see the "Student Academic Grievance Procedure" section of this bulletin).

GRADUATE SCHOOL OF BUSINESS GRADES

All courses offered by the Graduate School of Business are graded according to the following five-level scheme:

H Honors. Work that is of truly superior quality.

HP High Pass. A passing performance, and one that falls approximately in the upper quarter of passing grades.

P Pass. A passing performance that falls in the center of the distribution of all passing grades.

LP Low Pass. A passing performance that falls approximately in the lower quarter of passing grades.

U Unsatisfactory. A failing performance. Work that does not satisfy the basic requirements of the course and is deficient in significant ways.

GNR The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported (effective Autumn Quarter 2009-10).

GSB courses may receive grades of "+" (Pass) for courses taken on a Pass-Fail basis, with "U" denoting a failing grade, "I" for Incomplete, and "N" for a continuing grade. The grade of N is recorded in a course that spans more than a single quarter, where the grade in an earlier quarter will be determined only later, after the entire course sequence is complete..

Prior to 2009-10, an asterisk (*) notation was placed when no grade was reported.

STANFORD LAW SCHOOL GRADES

Effective Autumn Quarter 2009-10, units earned in the Stanford Law School are quarter units. Units earned in the Stanford Law School prior to 2009-10 were semester units. The following grading system became effective in Autumn Semester 2008-09. J.D. students who graduated in 2009 remained on the prior grading system but all other students shifted to the new grading system. For more information, see http://law.stanford.edu/experience/studentlife/SLS_Student_Handbook.pdf.

H Honors (exceptional work, significantly superior to the average performance at the school)

P Pass (representing successful mastery of the course material)

R Restricted credit (representing work that is unsatisfactory)

F Fail (representing work that does not show minimally adequate mastery of the material)

MP Mandatory pass (representing P or better work)

N Continuing course

I Incomplete

* No grade reported

GNR Grade not reported (effective Autumn Quarter 2009-10).

The grading systems employed at the Stanford Law School September 2001 through Spring 2009 were as follows. Under the numerical system (with letter equivalents), the range of satisfactory grades ran from 4.3 to 2.5 as outlined in the following distribution. Below the grade of 2.5 was one level of restricted credit (2.2) and one level of failure (2.1). The number grades with letter equivalents were as follows:

4.3–4.2	A+	3.4–3.2	B+	2.2	Restricted Credit
4.1–3.9	A	3.1–2.9	B	2.1	Failure
3.8–3.5	A-	2.8–2.5	B-		

On this old system, students could elect to take a limited number of courses on a credit/restricted credit/no credit system (K/RK/NK). 'K' was awarded for work that was comparable to numerical grades 4.3 to 2.5, 'RK' for Restricted Credit-level work (2.2), and 'NK' for Failure-level work (2.1). A limited number of courses were offered on a mandatory credit (KM)/no credit (NK) basis.

'N' is a temporary notation used in a continuing course; it is replaced with a final grade upon completion of the course series.

SCHOOL OF MEDICINE GRADES

In general, the following grades are used in reporting on the performance of students in the M.D. program:

Pass (+)	Indicates that the student has demonstrated to the satisfaction of the department or teaching group responsible for the course that the student has mastered the material taught in the course.
Fail (-)	Indicates that the student has not demonstrated to the satisfaction of the department or teaching group responsible for the course that the student has mastered the material taught in the course.
Incomplete (I)	Indicates that extenuating medical or personal circumstances have prevented the student from completing the course requirements. This grade is given when requested by the student with the prior approval of an Advising Dean in the School of Medicine.
Continuing (N)	Indicates that the course has not concluded and the student is continuing the course.
Exempt (Ex)	Indicates a course that is exempted by examination. No units are awarded.
GNR	The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported (effective Autumn Quarter 2009-10).

In general, a 'Fail' grade can be cleared by repeating and passing the particular course or by other arrangement prescribed by the department or teaching group. An 'Incomplete' grade can be made up in a manner specified by the department or teaching group within a reasonable time; if the deficiency is not made up within the specified time, the 'Incomplete' grade becomes a 'Fail' grade. The opportunity to clear a 'Fail' grade or an 'Incomplete' grade cannot be extended to individuals who are not registered or eligible to register as students in the M.D. program. For more specific information, see http://med.stanford.edu/md/curriculum/assessment-grading.html.

ACADEMIC STANDING

Undergraduates matriculating in or after Autumn 1999 are required to adhere to the following academic standards.

Undergraduates must maintain a minimum 2.0 cumulative GPA and a quantitative unit requirement for good academic standing. In addition, a minimum 2.0 cumulative GPA is required for conferral of a baccalaureate degree.

Undergraduates normally are expected to plan their academic programs so that they can complete 180 units in four years (twelve quarters), including the requirements for a major and the General Education, Writing and Rhetoric, and Language Requirements. Satisfactory academic progress is, on average, 45 units per academic year for four years leading to at least 180 units, a cumulative grade point average of at least 2.0, and a baccalaureate degree.

While undergraduates are expected to register for a minimum of 12 units, they are required to complete at least 9 units each quarter (by the end of the final exam period) and at least 36 units in their most recent three quarters of Stanford enrollment (by the end of the third final exam period). In addition, students are expected to maintain a cumulative grade point average of at least 2.0. Transfer work completed at other institutions is not considered in this calculation.

A student earning fewer than 9 units per quarter or fewer than 36 units in three quarters, or earning less than a 2.0 cumulative grade point average, is placed on probation. Additionally, a student may be placed directly on provisional registration or suspended without first being placed on probation if the student has had a prior probation status. Students on probation or provisional registration status are required to complete a minimum of 12 units of new course work per quarter (by the end of the final quarter examination period for each quarter) for each quarter for three consecutive quarters, and achieve and maintain a cumulative grade point average of at least 2.0 to attain good academic standing. (A Stanford Summer Session quarter counts toward the three consecutive quarter requirement if 11 or more units are completed). The C-USP Subcommittee on Academic Standing may stipulate otherwise by acting upon a petition for fewer units.

Full-time enrollment is considered to be enrollment in a minimum of 12 units of course work per quarter at Stanford. Under extenuating circumstances, students may petition to the C-USP Subcommittee on Academic Standing to take fewer units. Work necessary to complete units from previous quarters does not count toward the 12 units necessary for full-time enrollment in the current quarter. All students registering for fewer than 12 units should consider the effects of that registration on their degree progress, visas, deferment of student loans, residency requirements, and their eligibility for financial aid and awards.

All undergraduates validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification and athletic participation.

Units are granted for courses completed with grades 'A,' 'B,' 'C,' 'D,' 'Satisfactory' ('CR' or 'S'), and 'L.' Courses graded 'N' are counted provisionally as units completed, provided the student enrolls in the continuing segment of that course the following quarter. When the course is completed, the student receives the units for which he or she enrolled. No units are granted for a course in which the student receives an 'I' or an '*' ('GNR' replaces the '*' effective Autumn Quarter 2009-10) until the course is completed satisfactorily and the final grade reported. No units are granted for a course in which the student receives a 'W'. (See the "Grading Systems" section of this bulletin).

Students who receive all 'W's as the result of a Leave of Absence are subject to Academic Standing policies.

The C-USP Subcommittee on Academic Standing in its discretion is empowered to place conditions on students on probation or provisional registration in regard to enrollment and participation in programs and activities. In addition, students on probation or provisional registration require approval in advance from Undergraduate Advising and Research, Residential Education, and the Overseas Studies Program office or Stanford in Washington Program office in order to participate in Stanford's Overseas Studies Program or Stanford in Washington.

Academic performance of a student participating in a coterminal program, and whose undergraduate degree or degrees have not yet been conferred, is reviewed on a case-by-case basis in conjunction with the graduate department or program in which the student is enrolled.

UNDERGRADUATES MATRICULATING PRIOR TO AUTUMN 1999

Note: Undergraduates matriculating prior to Autumn 1999 are required to adhere to the academic standards described above but are exempt from the minimum 2.0 cumulative GPA requirement for academic standing purposes. However, departments can elect to require a minimum GPA for course work applicable to the major and the minor. Refer to departmental literature for specific requirements.

PROBATION

A student who fails to complete at least 36 units of work in his or her most recent three quarters of enrollment at the University (by the end of the third final exam period), or who fails to complete by the end of the final examination period at least 9 quarter units of work in his or her most recent quarter of enrollment at the University, or who has a cumulative grade point average of less than 2.0, shall be placed on probation (warning status).

A student shall be removed from probation after three consecutive subsequent quarters of enrollment at the University if, in each quarter, he or she completes a minimum of 12 units of new course work by the end of the final examination period and achieves and maintains a cumulative grade point average of at least 2.0. A student may also be removed from probation at the discretion of the C-USP Subcommittee on Academic Standing or its designees as a result of a review of individual records.

PROVISIONAL REGISTRATION

A student who, while on probation, fails in any quarter of registration to complete a minimum of 12 units of new course work by the end of the final examination period or fails to achieve and maintain a cumulative grade point average of at least 2.0, shall be placed on provisional registration status. In addition, and on occasion, a student may also be placed directly on provisional registration without first being placed on probation if the student has had a prior probation status.

A student shall be removed from provisional registration after three consecutive subsequent quarters of enrollment at the University if, in each quarter, he or she completes a minimum of 12 units of new course work by the end of the final examination period and achieves and maintains a cumulative grade point average of at least 2.0. A student may also be removed from provisional registration at the discretion of the C-USP Subcommittee on Academic Standing or its designees as a result of a review of individual records.

SUSPENSION

A student who, while on provisional registration, fails to complete a minimum of 12 units of new course work by the end of the final examination period, or who fails to achieve and maintain a cumulative grade point average of at least 2.0, shall be suspended. In addition, and on occasion, a student may also be suspended directly from probation; or may be suspended without first being placed on probation or provisional registration if the student has had a prior probation status.

While students suspended for the first time are suspended for one year, students suspended a subsequent time may be suspended for up to three years.

Students suspended for one year are not eligible to enroll for four quarters (including Summer Quarter) following the quarter in which the suspension was issued. Students suspended for up to three years are not eligible to enroll for up to twelve quarters (including Summer Quarter) following the quarter in which the suspension was issued.

Appeal of Suspension—Students who have been suspended, and who believe they have a compelling reason to appeal their suspension, without a break in enrollment, are required to submit a Petition to Appeal Academic Suspension. Otherwise, students are expected to complete their academic suspension in full.

RETURNING FROM SUSPENSION

Students are required to submit a properly endorsed application for reinstatement to request reenrollment after the suspension period has been completed. Instructions including deadlines for requesting provisional registration should be obtained from the Office of the Vice Provost for Undergraduate Education, Sweet Hall. The C-USP Subcommittee on Academic Standing, or those designated by the subcommittee, acts upon all requests concerning academic standing, including requests for reinstatement after academic suspension. The subcommittee or its designees may determine whether the application for reinstatement will be approved or not, and/or the conditions a student must meet in order to be reinstated. Reinstatement decisions may be based on activities while away from campus, the perceived potential for successful completion of the program, as well as any other factors or considerations regarded as relevant to the Vice Provost for Undergraduate Education or the subcommittee or its designees.

Questions concerning academic standing or the petitioning process should be directed to the Office of the Vice Provost for Undergraduate Education, Sweet Hall.

Students returning from suspension should also contact appropriate campus offices, such as Housing and Financial Aid, regarding their deadlines and procedures.

NOTIFICATION (ACADEMIC STANDING)

Written notification that a student is on probation, provisional registration, or suspension is sent to the student and to the student's academic adviser as soon as possible after the close of the quarter. Students also receive written notification of the outcome of their application for reinstatement. Current student status, such as whether a student is enrolled or not, is considered Directory Information for FERPA purposes at Stanford, and Stanford may provide either parent(s) or guardian(s) written notification of a change in student status. Provided that a student consents, or the student is a dependent for income tax purposes, Stanford may also provide either parent(s) or guardian(s) written notification that the student is on probation, provisional registration, suspension, leave of absence, or voluntary withdrawal.

STUDENT ACADEMIC GRIEVANCE PROCEDURE

The following policy is subject to periodic review and modificatoin.

1. Coverage
   a. Any Stanford undergraduate or graduate student who believes that he or she has been subjected to an improper decision on an academic matter is entitled to file a grievance to obtain an independent review of the allegedly improper decision, followed by corrective action if appropriate. A grievance is a complaint in writing made to an administrative officer of the University concerning an academic decision, made by a person or group of persons acting in an official University capacity, that directly and adversely affects the student as an individual in his or her academic capacity.
   b. This grievance procedure applies only in those cases involving a perceived academic impropriety arising from a decision taken by: (1) an individual instructor or researcher; (2) a school, department, or program; (3) a committee charged to administer academic policies of a particular school, department, or program; or (4) the University Registrar, the Vice Provost for Undergraduate Education, the C-USP Subcommittee on Academic Standing, or a Senate committee or subcommittee charged to administer academic policies of the Senate of the Academic Council. This procedure does not apply to: (1) complaints expressing dissatisfaction with a University policy of general application challenged on the grounds that the policy is unfair or inadvisable; (2) individual school, department, or program academic policies, as long as those policies are not inconsistent with general University policy; (3) matters proceeding through the Office of Judicial Affairs; or (4) involuntary leave decisions.
   c. Individuals should be aware that the University Ombuds Office is available to all Stanford students, faculty, and staff to discuss and advise on any matter of University concern and frequently helps expedite resolution of such

matters. Although it has no decision-making authority, the University Ombuds Office has wide powers of inquiry, including into student complaints against instructors.

2. Grievance and Appeal Procedures
   a. *Informal Attempts at Resolution:* the student first should discuss the matter, orally or in writing, with the individual(s) most directly responsible. If no resolution results, the student should then consult with the individual at the next administrative level, for example, the chair or director of the relevant department or program, or, for those cases in which there is none, with the school dean. At this stage, the department chair or program director, if any, may inform the dean that the consultation is taking place and may solicit his or her advice on how to ensure that adequate steps are taken to achieve a fair result. Efforts should be made to resolve the issues at an informal level without the complaint escalating to the status of a formal grievance.
   b. *The Filing of the Grievance:*
      1. If informal means of resolution prove unsatisfactory, the student should set forth in writing a statement of the decision that constitutes the subject matter of the dispute, the grounds on which it is being challenged, and the reasons why the grievant believes that the decision was improperly taken. The statement should also include a description of the remedy sought and the informal efforts taken to date to resolve the matter. It is at this point that the complaint becomes a formal grievance. The written grievance should specifically address the matters set forth in the Standards for Review, as stated in Section 4 below. The grievance should include an allegation of any adverse effects on the grievant, known to the grievant at the time of filing.
      2. The grievance document should be submitted to the dean of the school in which the grievance arose; for a grievance concerning a decision of the University Registrar, the Vice Provost for Undergraduate Education, or of a Senate committee or subcommittee, the procedures set forth herein for grievances and appeals shall be modified as stated in Section 3 below. A grievance must be filed in a timely fashion, that is, normally within 30 days of the end of the academic quarter in which the adverse decision occurred or should reasonably have been discovered. Except in extraordinary circumstances, delay in filing a grievance may will constitute grounds for rejection of the grievance.
   c. *The Response to the Grievance:*
      1. The relevant dean willconsider the grievance. The dean may attempt to resolve the matter informally or make whatever disposition of the grievance that he or she deems appropriate. The dean may, in appropriate cases, remand the grievance to a lower administrative level (including to the level at which the grievance arose) for further consideration.
      2. The dean may also refer the grievance, or any issue therein, to any person (the "grievance officer") who will consider the matter and report to the dean as the latter directs. The dean will inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and will specify the matters referred, the directions to the person or persons to whom the referral is made (including the time frame within which the person is to report back to the dean), and the name of that person.
      3. In undertaking the review, the dean or the grievance officer may request a response to the issues raised in the grievance from any individuals believed to have information considered relevant, including faculty, staff, and students.
      4. Should attempts to resolve the matter informally not be successful, the dean will decide the grievance, and will notify the grievant (and the party against whose decision the grievance has been filed) in writing of the disposition made of the grievance and the grounds for the disposition at the earliest practicable date after his or her receipt of the grievance.
      5. Normally, no more than 60 days should elapse between the filing of a grievance and the disposition by the dean. If, because of absence of key persons from the campus or other circumstances or exigencies (including those due to breaks in the academic calendar), the dean decides that disposition on that schedule is not possible, he or she shall inform the grievant (and the party against whose decision the grievance has been filed) of that in writing, giving the grounds therefore and an estimate of when a disposition can be expected. During summers and the winter closure, this time frame will nearly always be extended.
   d. *The Filing of an Appeal:*
      1. If the grievant is dissatisfied with the disposition of the grievance at the decanal level, either on substantive or on procedural grounds, he or she may appeal in writing to the Provost.
      2. The appeal must specify the particular substantive or procedural bases of the appeal (that is, the appeal must be made on grounds other than general dissatisfaction with the disposition) and must be directed only to issues raised in the grievance as filed or to procedural errors in the grievance process itself, and not to new issues. The appeal must contain the following:
   a. A copy of the original grievance and any other documents submitted by the grievant in connection therewith.
   b. A copy of the determination made by the dean on that grievance.
   c. A statement of why the reasons for the determination of the dean are not satisfactory to the grievant. This statement should specifically address the matters set forth in the *Standards for Review* in Section 4 below.
      3. The grievant will file his or her appeal at the earliest practicable date after the grievant's receipt of the determination by the dean. Normally, no more than 30 days should elapse between the transmittal of the dean's decision on the grievance and the filing of the appeal. Except in extraordinary circumstances, delay in filing an appeal will constitute grounds for rejection of the appeal.
   e. *The Response to the Appeal:*
      1. The Provost may attempt to resolve the matter informally, or refer the appeal, or any issue thereof, to any person (the "grievance appeal officer") who shall consider the matter and report to the Provost as the latter directs. The Provost may also, in appropriate cases, remand the matter to a lower administrative level (including to the level at which the grievance arose) for further consideration.
      2. The Provost will inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and will specify the matters referred, the directions to the person to whom the referral is made (including the time frame within which the person is to report back to the Provost), and the name of that person.
      3. Should attempts be made to resolve the matter informally not be successful, the Provost will decide the appeal, and will notify the grievant (and the party against whose decision the grievance has been filed) in writing of the disposition made of the grievance and the grounds for the disposition at the earliest practicable date after his or her receipt of the appeal. The decision of the Provost shall be final, unless the grievant requests a further appeal to the President pursuant to

subsection 2f below, and the President agrees to entertain this further appeal.

4. Normally no more than 45 days should elapse between the filing of the appeal and the disposition by the Provost. If, because of absence of key persons from the campus or other circumstances or exigencies (including those due to breaks in the academic calendar), the Provost judges that disposition on that schedule is not possible, he or she will inform the grievant (and the party against whose decision the grievance has been filed) of the fact in writing, giving the grounds therefore and an estimate of when a disposition can be expected. During summers and the winter closure, this time frame will nearly always be extended.

f. *The Request to the President:* if the student is dissatisfied with the disposition of the appeal by the Provost, he or she may write to the President of the University giving reasons why he or she believes the grievance result to be wrong (following the general format set forth in subsection 2d.2 above). No more than 30 days should elapse between the transmittal of the Provost's disposition and the written statement to the President urging further appeal. In any case, the President may agree or decline to entertain this further appeal. If the President declines to entertain the further appeal, the decision of the Provost is final. If the President decides to entertain the further appeal, he or she will follow the general procedures set forth in Section 2e above, and the decision of the President will be final.

3. Grievances Concerning Decisions of the University Registrar, the Vice Provost for Undergraduate Education, or of a Senate Committee or Subcommittee
   a. For a grievance concerning a decision of the University Registrar, the Vice Provost for Undergraduate Education, the C-USP Subcommittee on Academic Standing, or of a Senate committee or subcommittee, the grievant will file his or her grievance with the Provost, rather than with the dean, and the Provost will handle that grievance in accordance with the procedures set forth in Section 2c above.
   b. There is no appeal of the Provost's disposition of that grievance, except as may be available under Section 2f above.
4. Standards for Review and Procedural Matters
   a. The review of grievances or appeals will usually be limited to the following considerations:
      1. Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
      2. Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
      3. Given the proper facts, criteria, and procedures, was the decision one which a person in the position of the decision maker might reasonably have made?
   b. The time frames set forth herein are guidelines. They may be extended by the relevant administrative officer in his or her discretion for good cause.
   c. Questions concerning the filing and appeal of grievances should be directed to the Office of the Provost.

UNDERGRADUATE EDUCATION

Vice Provost for Undergraduate Education: Harry J. Elam, Jr.
Senior Associate Vice Provost for Undergraduate Education: TBA
Web Site: http://ual.stanford.edu

The Vice Provost for Undergraduate Education (VPUE) is responsible for building partnerships with faculty, departments, programs, and schools to promote and sustain excellence in undergraduate education at Stanford. It has a special focus on the academic programs in the first and second year that engage students in critical thinking and scholarly inquiry and that lay the foundations for their subsequent fields of concentration and future achievements. Other VPUE programs support upper class students in research, the arts, overseas study, and writing. VPUE works to ensure equity and accessibility for all students and to promote the core values of a liberal arts education. It seeks to help students create individually meaningful and coherent educational programs by guiding them in their choice of courses, programs of study, and extracurricular academic opportunities. VPUE fosters productive interactions between faculty and students and excellence in teaching through the provision of resources to departments and faculty for research with undergraduates, curriculum and pedagogical development, opportunities for mentoring, and small group seminars.

VPUE programs for first- and second-year students include New Student Orientation/Approaching Stanford, Introduction to the Humanities, Program in Writing and Rhetoric, Introductory Seminars, and Sophomore College. Programs for more advanced students include the Bing Overseas Study Program, Writing in the Major, Arts Intensive Program, and Bing Honors College. Undergraduate Advising and Research, the Center for Teaching and Learning, Diversity Outreach, and the Hume Writing Center serve undergraduates throughout their time at Stanford. The Office of the VPUE works closely with the Office of the Vice Provost for Student Affairs and the Admissions Office. The Vice Provost for Undergraduate Education reports to the Provost.

Policies governing undergraduate education are formulated by Faculty Senate committees and voted into legislation by the Faculty Senate. The Committee on Undergraduate Standards and Policies (C-USP) addresses such topics as general education requirements, grading, awards, advising, and teaching evaluation. The Committee to Review Undergraduate Majors (C-RUM) oversees the initiation and review of undergraduate degree programs. Committee members include the Vice Provost for Undergraduate Education or his delegated staff (ex-officio) and representatives from the faculty at large, administration (such as the Office of the University Registrar), and students. The Associated Students of Stanford University (ASSU) nominations committee selects student members. The VPUE also maintains, by rule of the Faculty Senate, the Introduction to the Humanities Governance Board and the Writing and Rhetoric Governance Board to oversee these University degree requirements. Finally, the Undergraduate Advisory Council (UGAC) was established by the Provost in 1996 to serve as the main faculty advisory body for the Vice Provost for Undergraduate Education.

STANFORD INTRODUCTORY STUDIES

Program Directors: Marvin Diogenes, Ellen Woods
Offices: Sweet Hall
Phone: (650) 723-2631
Email: stanfordintrostudies@stanford.edu
Web Site: http://sis.stanford.edu

Stanford Introductory Studies offers courses taught by faculty from across the seven Schools of the University. Some of these courses satisfy University Requirements (IHUM, GER, and the Writing and Rhetoric Requirement) while others provide seminar opportunities for first- and second-year students. Special residential programs such as Structured Liberal Education and September Studies (Sophomore College, Arts Intensive, and Bing Honors College) expand SIS curricular opportunities for students. The Hume Writing Center, which manages writing services such as tutorials and workshops for all students, is also part of SIS.

INTRODUCTION TO THE HUMANITIES PROGRAM

Director: Russell A. Berman
Associate Director: Ellen Woods
Affiliated Faculty: Lanier Anderson (Philosophy), Chris Bobonich (Philosophy), Eavan Boland (English), Scott Bukatman (Art and Art History), Steven Carter (Asian Languages), David Como (History), Adrian Daub (German Studies), Dan Edelstein (French and Italian), Harry Elam (Drama), Michele Elam (English), Zephyr Frank (History), Paul Harrison (Religious Studies), Robert Harrison (French and Italian), Ursula Heise (English), Ian Hodder (Archaeology and Anthropology), Christian Kaesser (Classics), Joshua Landy (French and Italian), Henry Lowood (University Libraries, Science and Technology), Marsh H. McCall, Jr. (Classics), Ian Morris (Classics), Alice Rayner (Drama), Eric Roberts (Computer Science), Orrin Robinson (German Studies), Janice Ross (Drama), Gabriella Safran (Slavic Languages), Nariman Skakov (Slavic Languages), Jennifer Summit (English), Kenneth Taylor (Philosophy), Blakey Vermeule (English), Barbara Voss (Archaeology and Anthropology), Steven Weitzman (Religious Studies), Laura Wittman (French and Italian), Tobias Wolff (English), Allen Wood (Philosophy), Lee Yearley (Religious Studies), Mark Zoback (Geophysics)
Lecturers: Sarah Allison, Lalaie Ameeriar, Nicholas Bauch, Kristin Boyce, Renu Cappelli, Bill Carter, Dan Contreras, John Corbally, Zenon Culverhouse, Jon Daehnke, Matthew Daube, William Elison, Jackie Feke, Catherine Flynn, Corinne Gartner, James Genone, William Goldman, Abby Heald, Andrew Hui, Michael Hunter, Ruth Kaplan, Kimberly Lewis, Tomas Matza, Liz Mullane, Christy Pichichero, Anne Pollok, Toma Roberts, Kathryn Lafrenz Samuels, Matthew Sayre, Jeffrey Schwegman, Janna Segal, Patricia Slatin, Melissa Stevenson, Anise Strong, Natalya Sukhonos, Bulbul Tiwari, Candace West, Gabriel Wolfenstein, Joshua Wright, Zhaohua Yang, Kari Zimmerman
Offices: Sweet Hall, Second Floor
Mail code: 3068
Phone: (650) 723-0944
Email: ihumprogram@stanford.edu
Web Site: http://ual.stanford.edu/ihum

Courses offered by the Introduction to the Humanities Program have the subject code IHUM and are listed in the "Introduction to the Humanities Courses" section of this bulletin.

Introduction to the Humanities offers courses that satisfy a three-quarter General Education Requirement (GER) for first-year students. The purpose of the Introduction to the Humanities (IHUM) requirement is to build an intellectual foundation in the study of human thought, values, beliefs, creativity, and culture.

Introduction to the Humanities courses enhance skills in analysis, reasoning, argumentation, and oral and written expression, thus helping to prepare students for more advanced work in the humanities, and for work in other areas.

The IHUM requirement may be satisfied in two ways:

1. *Introduction to the Humanities courses*—a one quarter, interdisciplinary course followed by a two quarter course sequence.
2. *The Program in Structured Liberal Education*—a three quarter, residence-based learning experience, which satisfies the IHUM requirement, both of the University Writing and Rhetoric requirements, and the General Education Requirement in Disciplinary Breadth: Humanities. For information on the program, see the "Structured Liberal Education" section of this bulletin.

PROGRAM IN WRITING AND RHETORIC

Faculty Director: Nicholas Jenkins
Associate Director: Jonathan Hunt
Lecturers: Christine Alfano, Paul Bator, Katherine Baxter, Julia Bleakney, Shaleen Brawn, Subho Chakravarty, Kevin DiPirro, Mark Feldman, Marjorie Ford, Wendy Goldberg, Patti Hanlon-Baker, Arturo Heredia, Donna Hunter, Lee Konstantinou, John Lee, Sohui Lee, Sangeeta Mediratta, Kimberly Moekle, Gabrielle Moyer, Kelly Myers, Alyssa O'Brien, John Peterson, Michael Reid, Carolyn Ross, Helle Rytkonen, Kim Savelson, Susan Schuyler, Rod Taylor, Davy Walter, Ann Watters, Susan Wyle
Teaching Affiliates: Steffi Dippold (Autumn), Ingrid Fernandez (Autumn), Hanna Janiszewska (Autumn), Mark Vega (Autumn, Winter, Spring), Jessica Weare (Winter, Spring)
Offices: Sweet Hall, Third Floor
Mail Code: 3069
Phone: (650) 723-2631
Email: pwrcourses@stanford.edu
Web Site: http://ual.stanford.edu/AP/univ_req/PWR/Req

Courses offered by the Program in Writing and Rhetoric are listed under the subject code PWR on the *Stanford Bulletin's* ExploreCourses web site.

The Program in Writing and Rhetoric (PWR) designs and teaches courses that meet the Writing and Rhetoric requirement for undergraduates at Stanford as well as intermediate and advanced writing and rhetoric classes. For more information on the requirement, see the "Writing and Rhetoric Requirement" section of this bulletin.

PWR courses engage students in rhetorical and contextual analysis of texts and substantive research-based argument. Students in PWR courses learn and practice time-tested rhetorical principles to gain increasing control over the intellectual and stylistic elements of their writing; they learn to analyze the ideas and persuasive strategies of others and to apply those insights to their own writing.

Toward these ends, PWR 1 focuses on elements of academic argument: understanding a writer's stance; developing a supportable argumentative thesis; discovering, developing, and deploying cogent proofs; making appropriate organizational and stylistic choices; and understanding the expectations of audiences. The course emphasizes research-based writing, including the effective use of print and non-print sources, primary and secondary sources, and data based on fieldwork. Students enrolled in PWR 1 carry out significant research and use it as the basis for a polished and persuasive research-based argument.

PWR 2 further develops students' skills in writing and oral presentation, emphasizing the ongoing development of content, organization, and style. The course addresses the dynamic interdependence of writing and speaking, as well as the importance of visual and multimedia elements in the effective presentation of research. Students enrolled in PWR 2 have opportunities to draft and revise written assignments and oral presentations as well as opportunities to present the results of scholarly inquiry, with an emphasis on how to work purposefully and well with a variety of presentation media.

As a general rule, students complete a minimum of three major assignments in both PWR 1 and 2. Written assignments vary from 5 to 15 pages in length, and students work intensively on revising each piece of writing. Oral presentations may involve collaborative work as well as multimedia elements. All assignments involve analyzing a range of texts as well as identifying, evaluating, and using multiple sources in support of academic and research-based arguments. In-class work focuses on how to read with an increasingly critical eye and how to identify, evaluate, integrate, and cite sources effectively.

Writing and Rhetoric classes enroll no more than 15 students, and all classes are conducted as seminars in which participation is crucial. In-class activities include close reading of and responding to the writing of peers; these workshops are augmented by a minimum of three individual or small group conferences with the PWR instructor during the quarter.

COURSES

The Writing and Rhetoric requirement includes courses at three levels.

1. The first-level course, taken in the first year, can be satisfied by courses in PWR or Structured Liberal Education; the curriculum emphasizes analysis and research-based argument.
2. The second-level course, to be completed by the end of the sophomore year, is a writing and oral/multimedia presentation course taught by the Program in Writing and Rhetoric and by other programs and departments; completion of Structured Liberal Education also satisfies the second-level requirement.
3. The third-level course is a Writing in the Major (WIM) course taught in each major, providing students with systematic opportunities to develop skills for writing in their chosen fields. A list of certified WIM courses may be found in the table of "Undergraduate Major Unit Requirements" in the "Undergraduate Degrees and Programs" section of this bulletin. WIM course descriptions may be found under individual department and program sections.

The sequence of required courses provides a coordinated approach responsive to how students mature as writers, researchers, and presenters during their undergraduate years. At each level, students develop greater sophistication in conducting inquiry and producing scholarly work in progressively more specific disciplinary contexts.

Before the term in which students enroll in the first two levels of the requirement, they review course descriptions on the web site at http://ual.stanford.edu/AP/univ_req/PWR/Courses. After reviewing the offerings, students submit a list of top choices, and the PWR office assigns students to courses based on these preferences.

WRITING AND RHETORIC 2 REQUIREMENT

The Writing and Rhetoric 2 requirement may be satisfied through completion of courses offered through PWR or by other programs and departments. Before the quarter in which students are assigned to enroll in the second-level course, they will be able to review all available courses that meet the requirement on the web site at http://ual.stanford.edu/AP/univ_req/PWR/Courses. In addition to PWR 2, Introductory Seminars certified by the Writing and Rhetoric Governance Board satisfy the second-level Writing and Rhetoric requirement (Write-2). Courses offered as Introductory Seminars require an additional application form; see http://ual.stanford.edu/OO/intro_seminars/IntroSemsCurrent for more information.

HUME WRITING CENTER

The Hume Writing Center, located in Room 20 of Margaret Jacks Hall (Building 460), supports student writing in the full range of academic and extracurricular contexts. The Center emphasizes support for students' writing for PWR, Introduction to the Humanities, and Stanford Introductory Seminars, while also serving all Stanford undergraduates through one-to-one and group

tutorials, workshops, and seminars. Other events sponsored or hosted by the Center include readings for Parents Weekend and Admit Weekend. For further details on the Center, see http://ual.stanford.edu/ARS/help_writing/WritingProject.

PWR PEDAGOGY PROGRAM

PWR offers ENGLISH 397A, a pedagogy seminar for all graduate students (TAs) from English, Modern Thought and Literature, and Comparative Literature who teach PWR courses as part of their graduate studies. Taught in the Autumn Quarter, the pedagogy seminar focuses on syllabus design, developing writing assignments, and responding to student writing. The history of rhetoric and writing supplies a theoretical foundation as well as practical lessons for how to teach writing and research most effectively. In the Winter and Spring, graduate students continue their pedagogical development through a series of workshops and seminars focused on specific issues in the teaching of writing. Elements of the pedagogy program include class visits; group evaluation of writing assignments; workshops and lectures; a handbook on teaching; a library of teaching materials; a program web site with links to other writing program sites; and individual work with mentors and peers.

PEER WRITING CONSULTANTS

The Program in Writing and Rhetoric offers PWR 195, a course on the tutoring of writing for undergraduates chosen to serve as peer writing consultants in the Hume Writing Center and across the campus.

COMMUNITY WRITING PROJECT (CWP)

Students may elect to enroll in a section of PWR 1 or 2 designated as "CWP" on the PWR web site. Students in CWP sections complete at least one project during the term (a grant proposal, pamphlet, news article, profile, or web site) for a local community service agency. The program provides an orientation for each CWP section, including a description of participating agencies. Community Writing Project assignments are then made in consultation with the instructor, the agencies, and the program.

STRUCTURED LIBERAL EDUCATION

Director: Carolyn Lougee Chappell (History)
Assistant Director: Greg Watkins
Lecturers: Yoon Sook Cha, Nicole Lopez, Jacob Mackey, Jeremy Sabol, Greg Watkins
Offices: Sweet Hall, Second Floor, and Florence Moore Hall
Mail Code: 94305-8581
Phone: (650) 725-0102
Email: sle-program@stanford.edu
Web Site: http://sle.stanford.edu

The Program in Structured Liberal Education (SLE) is a yearlong residence-based great works course that satisfies several requirements at once: IHUM, Writing and Rhetoric (both PWR1 and PWR2), and the Disciplinary Breadth GER in Humanities. The curriculum includes works of philosophy, literature, art, and music from the ancient world to the present. The program is interdisciplinary in approach; it emphasizes intellectual rigor and individualized contact between faculty and students.

SLE has two fundamental purposes: to develop a student's ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in critical reading, expository writing, logical reasoning, and group discussion. SLE encourages students to live a life of ideas in an atmosphere that stresses critical thinking and a tolerance for ambiguity. Neither the instructors nor the curriculum provides ready-made answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

The residence hall is the setting for lectures and small group discussions. SLE enhances the classroom experience with other educational activities, including a weekly film series, writing tutorials, occasional special events and field trips, and a student-produced play each quarter.

Freshmen interested in enrolling in SLE should indicate this preference for their IHUM assignment. SLE is designed as a three-quarter sequence, and students are expected to make a commitment for the entire year (9 units autumn and winter, 10 units spring).

INTRODUCTORY SEMINARS

Participating Faculty: Over 200 faculty from more than 60 departments teach an SIS Introductory Seminar. See faculty listings in each department's section of this bulletin for pertinent information.
Offices: Sweet Hall, Third Floor
Mail Code: 3069
Phone: (650) 724-2405
Email: introsems@stanford.edu
Web Site: http://introsems.stanford.edu

Introductory Seminars provide opportunities for first- and second-year students to work closely with faculty in an intimate and focused setting. These courses aim to intensify the intellectual experience of the freshman and sophomore years by allowing students to work with faculty members in a small group setting; introducing students to the variety and richness of academic topics, methods, and issues which lie at the core of particular disciplines; and fostering a spirit of mentorship between faculty and students. Over 200 faculty from more than 60 departments take part in the program. The courses provide department credit and most count towards an eventual major as well as fulfill General Education Requirements (GERs).

Some faculty who have taught Freshman Seminars volunteer to continue working with their students through a formal advising relationship during the students' sophomore year.

Freshman Seminars and Sophomore Seminars and Dialogues are offered in many disciplines throughout the academic year. Freshman preference seminars are typically given for 3-4 units to a maximum of 16 students, and generally meet twice weekly. Although preference for enrollment is given to freshmen, sophomores and first-year transfer students may participate on a space-available basis and with the consent of the instructor. Sophomore preference seminars and dialogues give preference to sophomores and first-year transfer students, but freshmen may participate on a space-available basis and with the consent of the instructor. Sophomore preference seminars are given for 3-5 units to a maximum of 14 students, while sophomore preference dialogues take the form of a directed reading, and are given for 1-2 units to a maximum of 5 students.

For a list of introductory seminars offered in 2010-11, as well as information for applying, see the Introductory Seminars online catalog.

All seminars require a brief application. See Explore Courses, the *Stanford Introductory Seminars Course Catalogue* published each August, or the course webpage http://vcais.stanford.edu. Due dates for 2010-11 applications for both freshman and sophomore preference courses are at 5pm on the following dates: Autumn Quarter - September 6, 2010; Winter Quarter - November 29, 2010; Spring Quarter - February 28, 2011.

SEPTEMBER STUDIES

Director: Marvin Diogenes

Courses in September Studies at Stanford are characterized by intense engagement. These residential programs allow students to return to campus three weeks prior to the beginning of Autumn Quarter to work with faculty on a focused area of study or artistic practice. The programs are designed to facilitate mentoring relationships between faculty and students. Sophomore College participants have completed their first year and are rising sophomores; Arts Intensive participants are sophomores, juniors and seniors; and Bing Honors College participants are seniors.

SOPHOMORE COLLEGE

Offices: Sweet Hall, Second Floor
Mail code: 3068

Phone: (650) 723-4338
Email: sophcollege@stanford.edu
Web Site: http://soco.stanford.edu

Sophomore College offers sophomores the opportunity to study intensively in small groups with Stanford faculty for several weeks before the beginning of Autumn Quarter. Students immerse themselves in a subject and collaborate with peers, upper-class course assistants, and faculty in constructing a community of scholars. They are also encouraged to explore the full range of Stanford's academic resources both in workshops and individually. At its best, Sophomore College is characterized by an atmosphere of intense academic exploration. Each Sophomore College course enrolls twelve to fourteen students, who live together in a Stanford residence and receive two units of academic credit. Courses are announced in March, and applications are due in April. For more information or to apply, see http://soco.stanford.edu.

ARTS INTENSIVE

Offices: Sweet Hall, Second Floor
Phone: (650) 721-6253
Email: artsintensive@stanford.edu

The Arts Intensive (AI) Program enrolls small groups of Stanford students in arts courses that encourage a dynamic immersion into the process of making art. The program aims to engage students, regardless of the level of expertise, in the practice of a particular artistic discipline. In 2010, courses were offered in acting, filmmaking, ballet, graphic design, sound design, improvisation, and product design. Courses are taught by Stanford arts faculty and a visiting artist; students live together in a Stanford residence during the program and receive two units of academic credit. Enrollment is by application and takes place in Spring for the upcoming September program. For more information or to apply see the Arts Intensive web site at http://artsintensive.stanford.edu.

BING HONORS COLLEGE

Bing Honors College brings students who are writing honors theses to campus in September before the start of the regular school year for a program of intensive scholarship and writing guided by faculty from participating departments and programs. By concentrating solely on the thesis for nearly three weeks, the college participants begin the senior year with a commitment to independent scholarship in an atmosphere of shared intellectual purpose. The college sponsors cross-disciplinary forums, such as writing workshops and methodology panels, as well as residential activities, and a celebratory concluding event to which students invite their research advisers. Students participating in the college receive room and board, and access to computers.

If you are a prospective honors student and interested in joining Bing Honors College, please contact your department to find out whether it is participating.

FRESHMAN-SOPHOMORE COLLEGE

Location: 236 Santa Teresa, Stanford, CA 94305
Web Site: http://frosoco.stanford.edu

The Freshman-Sophomore College (FroSoCo) at Sterling Quad is a residence for approximately 180 freshmen and sophomores interested in broad intellectual exploration of the liberal arts and sciences. The college integrates intellectual, academic, and social activities with residential life. Entering freshmen have the option of living for two years in FroSoCo.

BING OVERSEAS STUDIES PROGRAM

Program Director: Robert Sinclair

Stanford Program in Australia
Director: Peter Mumby, School of Biological Sciences, University of Queensland
Faculty-in-Residence: Kevin Arrigo
Program Faculty: Claire Baker, Bill Casey, Norm Duke, Simon Dunn, Ron Johnstone, Ian Lilly, Selina Ward

Stanford Program in Beijing
Director: Xiaohong Shen
Faculty-in-Residence: Thomas Fingar, Scott Rozelle
Program Faculty: Dong Chen, Li Chen, Bobai Li, Kun Li, Shizhou Wang, Suolao Wang, Yan Wang, Pei Zhang, Yun Zhou, Xiaoya Zhu

Stanford Program in Berlin
Director: Karen Kramer
Faculty-in-Residence: Philippe Buc, David Holloway, Barbara Pitkin, Brent Sockness
Program Faculty: Maria Biege, Camilla Bork, Ulrich Brückner, Knut Ebeling, Martin Jander, Wolf-D. Junghanns, Ingo Klein, Sylvia Kloetzer, Matthias Pabsch, Kathryn Strachota, Sylke Tempel, Ufuk Topkara, Jochen Wohlfeil

Stanford Program in Cape Town
Director: Timothy Stanton
Faculty-in-Residence: James P. Daughton, Raymond Levitt
Program Faculty: Mohamed Adhikari, Azeem Badroodien, Diane Cooper, Aslam Fataar, Stephan Klingebiel, Janice McMillan, Xolani Ngazimbi, Sophie Oldfield, John Parkington, Jeremy Seekings, Mary Simons, Nolubabalo Tyam

Stanford Program in Florence
Director: Ermelinda Campani
Faculty-in-Residence: Eric Bettinger, Reviel Netz, Leonard Ortolano
Program Faculty: Khaled Fouad Allam, Pompeo Della Posta, Paolo Galluzzi, Giuseppe Mammarella, Leonardo Morlino, Fiorenza Quercioli, Filippo Rossi, Timothy Verdon

Stanford Center for Technology and Innovation (SCTI)—Kyoto
Director: Andrew Horvat
Faculty-in-Residence: James Reichert
Program Faculty: Naoko Asami, Peter Duus, Toshiko Fujiwara, Toshihiko Hayashi, Yuko Kawahara, Catherine Ludvik, Kiyoko Tanaka, Hiroko Tayama, Haruka Ueda

Stanford Program in Madrid
Director: Santiago Tejerina-Canal
Faculty-in-Residence: Laurence Baker, Jorge Ruffinelli, Thomas Sheehan
Program Faculty: Francisco Javier Bobillo de la Peña, Miguel Buñuel, María Teresa Camblor Portilla, Julia Doménech, Sylvia Hilton, Sheila Klaiber, Miguel Larrañaga Zulueta, Pablo de Lora del Toro, Antonio Muñoz, Laura Murcia, Alicia Pérez Blanco, Oscar Sánchez Fuster

Stanford Program in Moscow
Director: Alexander Abashkin
Faculty-in-Residence: Jack Kollmann, Nancy Kollmann
Program Faculty: Tatyana Boldyreva, Maxim Bratersky, Galina Filatova, Edward Ivanian, Sergey Kortunov, Lisa Kurganova, Vladimir Mau, Sergei Medvedev, Vadim Novikov, Tatyana Ryndak

Stanford Program in Oxford
Director: Geoffrey Tyack
Faculty-in-Residence: Mark Applebaum, Judith Goldstein, Robert Sinclair
Program Faculty: Giovanni Capoccia, James Forder, Rosemary Hill, Helen Kidd, Robert McMahon, Amanda Palmer, Emma Plaskitt, Richard Rowley

Stanford Program in Paris

Director: Estelle Halevi
Faculty-in-Residence: Jean-Marie Apostolides, Jill Helms, Caroline Winterer
Program Faculty: Laurie Boussaguet, Patrick Chamorel, Colette Deremble, Jean Paul Deremble, Jean-Marie Fessler, Brigitte Gallini, Sonia Gourevitch, Patrick Guedon, Choukri Hmed, Tiphanie Karsenti, Eloi Laurent, Jacques Le Cacheux, Benoit Leguet, Florence Mercier, Marie-Madeleine Mervant-Roux, Elizabeth Molkou, Christian de Perthuis, Pauline Reychman, Marie-Christine Ricci, Sylvie Strudel, Fabrice Virgili

Stanford Program in Santiago
Director: Iván Jaksic
Faculty-in-Residence: Héctor Hoyos, Shripad Tuljapurkar
Program Faculty: Mabel Abad, Marcela Bustamante, Cristóbal Aninat, César Albornoz, Andrés Bobbert, Marcela Bustamante, Germán Correa, Claudio Fuentes, Sergio Micco, Sergio Missana, Alvaro Palma, Hernan Pons, Emilio Rivano, Bernardo Subercaseaux, Gloria Toledo

Program Offices: Sweet Hall, Ground Floor, 590 Escondido Mall
Mail Code: 94305-3089
Phone: (650) 723-3558
Email: bospstudy@lists.stanford.edu
Web Site: http://bosp.stanford.edu

Courses offered by the Overseas Studies Program are listed on the *Stanford Bulletin's* ExploreCourses web site under subject codes beginning with OSP:

- Australia [OSPAUSTL
- Barcelona (Consortium for Advanced Studies) [OSPBARCL]
- Beijing [OSPBEIJ]
- Berlin [OSPBER]
- Cape Town [OSPCPTWN]
- Florence [OSPFLOR]
- Kyoto [OSPKYOTO]
- Kyoto Consortium for Japanese Studies [OSPKYOCT]
- Madrid [OSPMADRD]
- Moscow [OSPMOSC]
- Oxford [OSPOXFRD]
- Paris [OSPPARIS]
- Santiago [OSPSANTG].

The Bing Overseas Studies Program (BOSP) provides opportunities for Stanford students to broaden their undergraduate education through study in another country and immersion in its culture. Regular programs in Australia, Beijing, Berlin, Cape Town, Florence, Kyoto, Madrid, Moscow, Oxford, Paris, and Santiago offer courses in social and natural sciences, humanities, and engineering with full Stanford credit. Many courses also count toward major requirements and/or fulfill General Education Requirements. Students may enroll for one or more quarters at most locations. Academic or paid internships are available at the Beijing, Berlin, Florence, Kyoto-SCTI, Madrid, Moscow, Paris, and Santiago programs. Research opportunities are available in various formats at different centers. Service-learning and community-based research opportunities are available in Cape Town. Minimum academic and language prerequisites are specific to each program. See http://bosp.stanford.edu for information on these requirements.

While studying overseas through BOSP, students remain registered at Stanford and pay regular tuition, along with the overseas fee, which is based on Stanford room and board rates. Regular financial aid applies, and may be increased to cover additional costs. At most centers, students live in a homestay or with local students.

In addition to regular programs offered for enrolled Stanford students, the University is a member of two consortia: the Consortium for Advanced Studies in Barcelona and the Kyoto Consortium for Japanese Studies. Overseas Studies occasionally offers a limited number of special programs.

Overseas Studies, located on the ground floor of Sweet Hall, has full-time staff members and student advisers to assist in planning for overseas study. Course information, while accurate at the time of publication, is subject to change. See http://bosp.stanford.edu for updated information.

UNDERGRADUATE ADVISING AND RESEARCH

Dean: Julie Lythcott-Haims
Program Office: Sweet Hall, first floor
Phone: (650) 723-2426
Fax: (650) 725-1436
Web Site: http://ual.stanford.edu
Email: vpue-advising@stanford.edu, vpue-research@stanford.edu
Appointments: (650) 723-2426

Undergraduate Advising and Research introduces students to the full intellectual richness of undergraduate study at Stanford, supports students in their academic and intellectual pursuits, and seeks to instill within them a deep sense of identity within and belonging to our community of scholars at Stanford. This means different things for different students at different times, leading to anemphasis on extended one-on-one interactions between students and advisers. The substance of these interactions flows from the scholarship and teaching of the broad intellectual community at Stanford.

The UAR staff includes professional advisors in Sweet Hall, the Athletics Academic Resource Center, and in the undergraduate residences. Freshmen are assigned to academic advisers (faculty and academic staff) according to their preliminary academic interest and residence. The professional advisers in Sweet Hall, the Athletics Academic Resource Center, and the undergraduate residences complement the role of the assigned advisers with a comprehensive understanding of the curriculum; they advise students broadly on their courses of study and long-term goals. Some freshmen receive enhanced academic support through participation in Expanded Advising Programs (EAP).

UAR functions include:

- overseeing the transition of freshmen/transfers into the university
- assistance with curriculum planning
- consultation on choosing a major
- advice on integrating research into an undergraduate program of study
- support for students considering and applying for merit-based scholarships and national fellowships
- practical advice on how to prepare for and apply to graduate and professional schools
- academic and personal advising related to academic performance
- guidance on policies and procedures concerning academic standing
- assistance with interpretation and application of academic rules and regulations
- referrals to campus tutoring resources and counseling offices

SCHOLARSHIPS AND FELLOWSHIPS, AND POST-BACCALAUREATE STUDIES

Together with advisers at the Overseas Resource Center (http://stanford.edu/dept/icenter/orc) and the Haas Center for Public Service (http://studentaffairs.stanford.edu/haas), UAR advisers help students to compete for merit scholarships and post-baccalaureate fellowships. UAR also administers campus nomination competitions for the Beinecke, Carnegie, Center for the Study of the Presidency, Goldwater, Liebmann, Merage, Mellon Mays, Truman, and Udall scholarships. Binders containing applications of previous winners of these scholarships are available for review on the first floor of Sweet Hall and in the offices of Academic Directors.

UAR offers workshops and individual consultations on planning for graduate or professional studies, such as in law or medicine, and on how to write personal statements, how to solicit letters of recommendation, and how to prepare for interviews.

UNDERGRADUATE RESEARCH

UAR sponsors and supports programs that encourage undergraduates to work individually with faculty on research, advanced scholarship, and creative projects. Programs are designed to serve students new to research and those with considerable research experience who are able to take on advanced, independent projects. See http://undergradresearch.stanford.edu http://undergradresearch.stanford.edu for more information.

STUDENT GRANT PROGRAMS

UAR offers research grants to registered Stanford undergraduates. Grants support faculty-mentored research projects, and are typically used to pay for research/creative supplies, travel, and room and board/ Major Grant and Chappell Lougee Scholarship recipients may include a stipend within their budget if they are working full-time on their project over the Summer Quarter.

For the 2010-11 academic year, students have access to the following grant programs:

- Small Grants provide for student projects that explore a topic of interest or contribute to the development of future intellectual pursuits. They are often used for smaller projects, preliminary research, and follow-up expenses associated with larger projects.
- Major Grants support larger projects that normally span several quarters. Funded projects typically culminate in an honors thesis or some other substantial capstone product that demonstrates a focused and intellectually rigorous perspective on the topic of interest. Major grant proposals are subject to a review process that includes input from faculty in the relevant departments.
- The Chappell Lougee Scholarship supports sophomores who wish to undertake research in the humanities, creative arts, and qualitative social sciences. Students receive a grant for full-time research under the supervision of a faculty mentor. In addition, UAR provides guidance for students to transform their research into a creative performance, a capstone or honors project, or post-baccalaureate study.
- Angel Grants assist students in producing a finished public creative work such as an art exhibit, film, stage production, or concert.
- Conference Travel Grants support students who have been invited to present their research at a professional or scholarly conference. The grants fund travel expenses to and from the conference, and normal conference registration. Students demonstrating financial need may also include conference-associated food and lodging in their budget. Normally, Conference Travel Grants are intended to match funds made available by the faculty mentor or some other source.

For current deadlines and program details, see http://studentgrants.stanford.edu.

The application for any student grant consists of:

1. a student-authored project proposal, including a line-item budget
2. a letter of support written by a qualified member of the Stanford faculty

UAR may also consult student transcripts as well as outside faculty reviewers. Proposals are judged on intellectual significance, rigor and feasibility of project design, and evidence of student preparedness. The program is competitive, and not all good proposals can be funded.

UAR provides advising support for students considering a research grant, including proposal writing and project design consultation and advice on administrative policies. Students can view sample proposals at the UAR office. For more information, see http://studentgrants.stanford.edu.

DEPARTMENTAL AND FACULTY SPONSORED RESEARCH OPPORTUNITIES

Departments, interdisciplinary programs, and Stanford research centers use VPUE Departmental Grants for Undergraduate Research to support programs that provide undergraduates with mentorship and training in scholarship and research. Typically, departments pair students with a faculty member or faculty-led research group according to their mutual scholarly interests. Students conduct substantive, directed research on a particular aspect of the faculty member's research project, and they meet frequently with their faculty mentors to discuss progress and future directions for the project. For more information and the Request for Proposals, see http://vpuedepartmentalgrants.stanford.edu. Students should consult directly with the departments and programs of interest to learn about these opportunities.

Similarly, individual faculty members may use VPUE Faculty Grants for Undergraduate Research. Faculty grants provide funding for undergraduates to work closely with faculty on a directed research project. Students gain valuable experience with the methods of inquiry and analysis in their chosen discipline, and are able to subsequently leverage this experience in pursuit of more independent projects or theses. For more information and the Request for Proposals, see http://vpuefacultygrants.stanford.edu.

CENTER FOR TEACHING AND LEARNING

Associate Vice Provost for Undergraduate Education and Director: Michele Marincovich
Senior Associate Director (Science and Engineering): Robyn Wright Dunbar
Associate Director (Humanities): Mariatte Denman
Associate Director (Social Sciences and Technology): Marcelo Clerici-Arias
Associate Director for Academic Support: Adina Glickman
Tutoring and Academic Skills Specialist: Amy Chambers
Oral Communication Program Director and Senior Lecturer: Doree Allen
Oral Communication Specialist and Tutor Manager: Lindsey Paul
Lecturers: Thomas Freeland, Marianne Neuwirth, James Wagstaffe

Department Offices: Sweet Hall, 4th floor
Speaking Center: Meyer Library 123
Mail Code: 94305-3087
Center Phone: (650) 723-1326
Email: TeachingCenter@stanford.edu
Web Site: http://ctl.stanford.edu

The Center for Teaching and Learning is a University-wide resource on effective teaching and public speaking for faculty, lecturers, and teaching assistants and on effective learning and public speaking for undergraduates and graduate students. All courses listed with CTL promote acquisition of public speaking skills, enhanced learning skills, and/or teaching excellence. Courses offered by the Center for Teaching and Learning are listed under the subject code CTL on the *Stanford Bulletin's* ExploreCourses web site.

CTL SERVICES TO UNDERGRADUATES AND GRADUATE STUDENTS

CTL provides resources for students who want to enhance their study approaches and clarify their learning strategies. Through courses, individual counseling, and workshops, CTL helps students

build skills that are the foundation for continuous improvement and lifelong learning. Students benefit from developing and applying individually crafted strategies that build on their existing strengths. Time management, test preparation, note taking, reading comprehension and retention, and procrastination are common topics for discussion.

Free tutoring is available to undergraduates in many subjects; see http://tutoring.stanford.edu for details on where and when tutors can be found. Students with strong academic records, especially in the subject areas that they would like to tutor, may apply and, if accepted, are expected to take CTL's course on tutoring; the application process takes place each February.

CTL SERVICES TO FACULTY, LECTURERS, AND TEACHING ASSISTANTS

CTL provides the Stanford community with services and resources on effective teaching. Our goals are: to identify and involve successful faculty, lecturers, and TAs who are willing to share their talents with others; to provide those who are seeking to improve their teaching with the means to do so; to acquaint the Stanford community with important innovations and new technologies for teaching; to prepare new faculty and TAs for their responsibilities; to contribute to the professional development of teaching assistants; to expand awareness of the role of teaching at research universities; and to increase the rewards for superior teaching. CTL is also available to help departments/programs in the design of effective TA training programs.

Resources available to faculty, lecturers, and TAs include: videotaping, microteaching (simulated practice teaching), and consultation; small group and other forms of mid-quarter evaluation; workshops and lectures; a handbook on teaching and a library of teaching materials; quarterly teaching orientations; and work with individuals, groups, and departments on their specific needs. For further details, see CTL's teaching handbook or the CTL brochure, both available by calling (650) 723-1326, or see http://ctl.stanford.edu.

For questions or requests, email TeachingCenter@stanford.edu.

ORAL COMMUNICATION PROGRAM

The Oral Communication Program at CTL provides opportunities for undergraduates and graduate students to develop or improve their oral communication skills. Courses and workshops offer a comprehensive approach to speech communication, including training in the fundamental principles of public speaking and the effective delivery of oral presentations. The goal is to enhance students' general facility and confidence in oral expression. The program also provides innovative, discipline-based instruction to help students refine their personal speaking styles in small groups and classroom settings. Those interested in individualized instruction or independent study are invited to make an appointment to use the program's Speaking Center in Meyer Library, room 123, where trained student tutors, multimedia, and instructional resource materials are available on an ongoing basis. Students with a passion for public speaking are encouraged to apply to become Oral Communication Tutors; the application process takes place each January. To schedule appointments, see http://speakinghelp.stanford.edu. For further details, call (650) 725-4149 or 723-1326 or email speakinghelp@stanford.edu.

GRADUATE EDUCATION

Vice Provost for Graduate Education: Patricia J. Gumport
Associate Vice Provosts for Graduate Education: John Boothroyd, Chris M. Golde, Sheri D. Sheppard
Assistant Dean for Research and Graduate Policy: Ann George
Director of Fellowships and Programs: Pat Cook
Associate Director, Programs and Administration: Rebecca Jantzen
Web site: http://vpge.stanford.edu
Office: Building 310
Mail code: 94305-2102
Phone: (650) 736-0775

The Vice Provost for Graduate Education (VPGE) plays a leadership role in initiating and managing policies and programs that enhance the quality of graduate education for master's, doctoral, and professional students across Stanford's seven schools. VPGE fosters academic innovation and supports the schools and programs that have primary responsibility for organizing and delivering graduate education. In addition to providing University-wide graduate policy direction, the VPGE office has three primary areas of program activity: administering University-wide graduate fellowship programs; advancing graduate student diversity; and promoting cross-school educational opportunities (interdisciplinary learning, leadership and professional development). The Vice Provost for Graduate Education reports to the Provost.

GRADUATE POLICY

The Faculty Senate Committee on Graduate Studies (C-GS) formulates policy concerning the substance and process of graduate education as well as the evaluation and recording of graduate achievement, and reviews the implementation of such policy. The committee also monitors the academic quality and effectiveness of the University's graduate interdisciplinary and joint degree granting programs. Committee members include the Vice Provost for Graduate Education or her delegated staff (ex officio) and representatives from the faculty at large, administration such as the Office of the University Registrar, and students. The Graduate Student Council and the Nominations Committee of the Associated Students of Stanford University (ASSU) choose student members.

VPGE recommends, promulgates, and interprets University policies related to graduate education. VPGE oversees administrative and financial systems related to graduate student support, including policies related to requirements for research and teaching assistantships, and minimum compensation levels for those positions. For other policies related to graduate admissions and degree requirements, see relevant sections of this bulletin.

RESEARCH POLICIES FOR GRADUATE STUDENTS

Graduate education and research are interrelated enterprises. Many Stanford graduate students are conducting research under the guidance and sponsorship of Stanford faculty members. The Dean of Research has primary responsibility for oversight of the research enterprise. Several policies in that arena are particularly relevant to graduate students. These include:

Academic Authorship—Guidelines related to academic authorship, such as the allocation of responsibility and credit for scholarly publications. For complete text of the guidelines, see Research Policy Handbook memo 2.8, On Academic Authorship, at http://rph.stanford.edu//2-8.

Intellectual Property—Policies on copyrights and patents resulting from University work. Graduate students and postdoctoral fellows, as well as all faculty, staff, and visitors engaged in research, must sign the Stanford University Patent and Copyright Agreement. For complete text of the currently applicable versions of these policies, see Research Policy Handbook chapter 5, Intellectual Property, at http://rph.stanford.edu/Chpt5.

Openness in Research—Policy on openness in research, such as the principle of freedom of access by all interested persons to the underlying data, processes, and final results of research. Stanford University does not accept funding for research projects that require secrecy. For complete text of the currently applicable version of this policy, see Research Policy Handbook memo 2.6, Openness in Research, at http://rph.stanford.edu/2-6.

Relationships between Students and Outside Organizations—Summary of policies on the establishment of relationships between students and outside entities, such as private companies or nonprofit organizations, as part of or outside the student's academic program at Stanford. This covers open versus proprietary nature of the work, ownership of intellectual property, and possible conflicts of commitment and interest. For complete text of the currently applicable versions of these policies, see Research Policy Handbook memo 2.11, Relationships Between Students (Including Postdoctoral Scholars) and Outside Entities, at http://rph.stanford.edu/2-11.

Research Compliance—Seven administrative panels review and approve research projects to safeguard the rights and welfare of all human research subjects, ensure the humane care and use of laboratory animals, and protect the safety of personnel and the general public in the areas of biosafety and radiological safety. For more information, contact the Research Compliance Office, http://researchcompliance.stanford.edu.

Research Misconduct—Policy on allegations, investigations, and reporting of research misconduct. Each member of the University community has a responsibility to foster an environment which promotes intellectual honesty and integrity, and which does not tolerate misconduct in any aspect of research or scholarly endeavor. For complete text of the currently applicable version of this policy, see Research Policy Handbook memo 2.5, Research Misconduct: Policy on Allegations, Investigations and Reporting, at http://rph.stanford.edu/2-5.

COMPETITIVE GRADUATE FELLOWSHIP PROGRAMS

Several University-wide graduate fellowship programs are administered by the VPGE, including the Stanford Graduate Fellowships Program in Science and Engineering (SGF) and the Stanford Interdisciplinary Graduate Fellowship (SIGF) program. VPGE also administers several smaller University-wide fellowships programs to new and continuing doctoral students that require nomination by faculty or deans.

STANFORD GRADUATE FELLOWSHIPS PROGRAM IN SCIENCE AND ENGINEERING (SGF)

Web site: http://sgf.stanford.edu

SGF competitively awards approximately 100 two- and three-year fellowships providing tuition support and stipend to outstanding students pursuing a doctoral degree in the sciences and engineering. SGF fellows can explore labs in a variety of fields. Nominations for SGF fellowships are submitted by science and engineering departments and programs.

STANFORD INTERDISCIPLINARY GRADUATE FELLOWSHIPS (SIGF)

Web Site: http://sigf.stanford.edu

Beginning in 2008-09, the new SIGF program awards fellowships on a competitive basis to doctoral students engaged in interdisciplinary research. The fellowships enable Stanford doctoral students to pursue questions that cross traditional disciplinary boundaries. Nominations for SIGF fellowships are submitted by faculty.

GRADUATE STUDENT DIVERSITY

VPGE works to diversify the graduate student population by supporting recruitment and retention programs in collaboration with faculty and staff in each of the schools. VPGE funds recruiting activities to expand the pool of qualified applicants, such as visits to campus and travel grants. VPGE offers resources to groups within and across schools for activities that enhance the quality of students' educational experiences and improve retention. VPGE also works collaboratively to develop programs that cultivate interest in academic careers and diversify the pipeline for future faculty. The DARE Doctoral Fellowship Program, administered by VPGE, awards two-year fellowships on a competitive basis to Stanford doctoral students in their final two years who want to investigate and prepare for academic careers and whose participation can help to diversify the professoriate.

CROSS-SCHOOL LEARNING OPPORTUNITIES

VPGE provides seed funding to initiatives that foster cross-school interactions for graduate students. The Stanford Graduate Summer Institute (SGSI) offers noncredit interdisciplinary short courses exclusively for Stanford graduate students and postdoctoral scholars. VPGE also seeks to facilitate enrollment in courses outside of students' home departments and schools.

Leadership, pedagogy, communication, and entrepreneurship are topics of interest to graduate students across the University. VPGE collaborates with other departments, such as the Center for Teaching and Learning, the Graduate Life Office, and the Writing Center to raise the visibility and expand the breadth of these offerings.

STANFORD GRADUATE SUMMER INSTITUTE (SGSI)

Web site: http://sgsi.stanford.edu

SGSI courses introduce graduate students to multidisciplinary and interdisciplinary thinking. Students from across the University have the opportunity to meet others outside their fields, create networks, and foster crossdisciplinary collaborations. Most SGSI courses are small and taught in an intensive workshop format at the end of Summer Quarter. Courses are non-credit bearing and free of tuition or fees.

GRADUATE SCHOOL OF BUSINESS

Emeriti: (Professors) David P. Baron, William H. Beaver, Charles P. Bonini, Alain C. Enthoven,* Robert J. Flanagan,* Charles A. Holloway,* Charles T. Horngren, James E. Howell, Robert K. Jaedicke, Robert L. Joss,* James G. March, Joanne Martin, Gerald M. Meier, Arjay Miller, James R. Miller III, William F. Miller, David B. Montgomery, George G. C. Parker,* Jerry I. Porras, Evan L. Porteus,* Michael L. Ray, Henry S. Rowen, Myron S. Scholes, William F. Sharpe, George P. Shultz, A. Michael Spence, Venkataraman Srinivasan, James C. Van Horne, Robert B. Wilson*; *(Associate Professor)* Andrea Shepard; *(Senior Lecturers)* David L. Bradford,* Steven Brandt, Kirk O. Hanson; *(Lecturer)* Robert Augsburger

Dean: Garth Saloner

Senior Associate Deans: Glenn R. Carroll, Peter M. DeMarzo, Madhav Rajan, Daniel N. Rudolph

Associate Deans: Gale H. Bitter, Sharon J. Hoffman, Sharon A. Marine, Claudia J. Morgan, Karen A. Wilson

Assistant Deans: Derrick Bolton, Pulin Sanghvi. Priya Singh, Robert Urstein

Professors: Jennifer L. Aaker, Anat R. Admati, William P. Barnett, Mary E. Barth, Jonathan Bendor, Jonathan B. Berk, David W. Brady, Jeremy I. Bulow, Robert A. Burgelman, Glenn R. Carroll, Peter M. DeMarzo, J. Darrell Duffie, Yossi Feinberg, George Foster, Steven R. Grenadier, Deborah H. Gruenfeld, Michael T. Hannan, J. Michael Harrison, Chip Heath, Charles I. Jones, Daniel P. Kessler, Roderick M. Kramer, Keith Krehbiel, Ilan Kremer, David M. Kreps, Sunil Kumar, David F. Larcker, James M. Lattin, Edward P. Lazear, Charles M.C. Lee, Hau L. Lee, John G. McDonald, Maureen F. McNichols, Haim Mendelson, Dale T. Miller, Margaret A. Neale, Charles A. O'Reilly III, Paul Oyer, James M. Patell, Jeffrey Pfeffer, Paul C. Pfleiderer, Erica L. Plambeck, Madhav Rajan, Hayagreeva Rao, Stefan J. Reichelstein, Peter C. Reiss, Condoleezza Rice, D. John Roberts, Garth Saloner, Kathryn L. Shaw, Baba Shiv, Kenneth W. Shotts, Itamar Simonson, Kenneth J. Singleton, Andrzej Skrzypacz, Jesper Sørensen, Sarah A. Soule, Larissa Z. Tiedens, Lawrence W. Wein, Seungjin Whang, Stefanos Zenios, Jeffrey H. Zwiebel

Associate Professors: Anne Beyer, Steven Callander, Michaela M. Draganska, Francis J. Flynn, Wesley Hartmann, Ron Kasznik, Phillip Leslie, Brian S. Lowery, Benoit Monin, Elizabeth Mullen, Stefan Nagel, Harikesh S. Nair, Sridhar Narayanan, Michael Ostrovsky, Joseph D. Piotroski, Alan T. Sorensen, Ilya A. Strebulaev, Zakary L. Tormala, Tunay I. Tunca, S. Christian Wheeler

Assistant Professors: John L. Beshears, Konstantinos Bimpikis, Jules H. van Binsbergen, T. Renee Bowen, John-Paul Ferguson, Ilan Guttman, Sharique Hasan, John W. Hatfield, Dan A. Iancu, Joy Ishii, Dirk Jenter, Saumitra Jha, Uzma Khan, Arthur G. Korteweg, Nicholas S. Lambert, Claire S.H. Lim, Ian Martin, Maria Ogneva, Francisco Pérez-González, Monic J. Sun, Robert P. Swinney, Ali Yurukoglu

Professor (Teaching): James A. Phills, Jr.

Acting Assistant Professor: Nir Halevy

Courtesy Professors: Eric P. Bettinger, Nicholas Bloom, Timothy F. Bresnahan, M. Kate Bundorf, Geoffrey L. Cohen, Robert M. Daines, Alan M. Garber, Warren H. Hausman, Ronald A. Howard, Mark G. Kelman, Larry Kramer, Jonathan D. Levin, Daniel A. McFarland, Debra E. Meyerson, Paul R. Milgrom, Walter W. Powell, Ilya Segal, Robert I. Sutton, Paul Yock

Lecturers: Douglas Abbey, Dick Allen, Laura K. Arrillaga-Andreessen, Rick Aubry, Kirk D. Bowman, Scott Bristol, Anne Casscells, Safra A. Catz, Patricia Chang, Robert B. Chess, Stephen J. Ciesinski, David M. Dodson, R. James Ellis, Christopher M. Flink, Richard P. Francisco, Andrew S. Grove, William Guttentag, Keith Hennessey, Mary Ann Huckabay, John Hurley, Franklin P. Johnson, Jr., Peter B. Kelly, Dan Klein, Kay Kostopoulos, Mark Leslie, Geoffrey L. Lieberthal, Leo E. Linbeck III, David Lockwood, Michael E. Marks, R. Bruce McKern, William L. McLennan, William F. Meehan III, John P. Morgridge, Jill G. Parker, Robert Pearl, Joel C. Peterson, Andrew Rachleff, Carole Robin, Dennis M. Rohan, JD Schramm, Russell Siegelman, F. Victor Stanton, Mark A. Stevens, Myra H. Strober, Kevin Taweel, John G.Watson, Jane Wei-Skillern, Peter C. Wendell, Evelyn Willliams

Consulting Professors: Anthony S. Bryk, H. Irving Grousbeck, Mark A. Wolfson

Acting Instructors: Leslie Chin, Richard Kass

Visiting Professor: John Van Reenen

Visiting Associate Professor: Andrea Larson

Visiting Assistant Professor: Parag A. Pathak

* Recalled to active duty.

The mission of the Graduate School of Business is to create ideas that deepen and advance the understanding of management and, with these ideas, develop innovative, principled, and insightful leaders.

The two-year Master of Business Administration (M.B.A.) degree program is for students who aspire to contribute to society through leadership in business, government, and the nonprofit sector. The general management curriculum rests on a foundation of social science principles and management functions layered with interdisciplinary themes of leadership, entrepreneurship, global management, and social responsibility. The M.B.A. curriculum stresses breadth rather than depth, but includes options for certificates in Global Management and Public Management. A number of joint degree programs allow the M.B.A. to be combined with degrees in the Schools of Education, Law, and Medicine, as well as interdisciplinary degrees in Public Policy and Environmental Studies. The primary criteria for admission are demonstrated leadership potential, intellectual vitality, and diversity among students. No specific undergraduate major or courses are required for admission, but experience with analytic and quantitative concepts is important. Some students enter directly following undergraduate study, but most obtain one or more years of work experience.

The Stanford Sloan Program is an intensive, one-year course of study for middle management executives leading to the degree of Master of Science in Management. Participants must have demonstrated superior achievement and are normally sponsored by their company.

Those interested in college teaching and research are served by the Doctor of Philosophy program.

For detailed information on programs, curricula, and faculty, see the School's web site at http://gsb.stanford.edu.

SCHOOL OF EARTH SCIENCES

Dean: Pamela A. Matson
Associate Dean for Academic Affairs and Diversity Programs: Stephan A. Graham
Assistant Dean for Academic Affairs and Diversity Programs: Roni Holeton

Courses offered by the School of Earth Sciences are listed under the subject code EARTHSCI on the *Stanford Bulletin's* ExploreCourses web site. Courses offered by departments and programs of the school are linked on their separate sections, and are available at the ExploreCourses web site.

The School of Earth Sciences includes the departments of Geological and Environmental Sciences, Geophysics, Energy Resources Engineering (formerly Petroleum Engineering), and Environmental Earth System Science; and three interdisciplinary programs: the Earth Systems undergraduate program, the Emmett Interdisciplinary Graduate Program in Environment and Resources (E-IPER), and the graduate-level Earth, Energy, and Environmental Sciences Graduate Program (EEES). The Earth Systems Program and E-IPER offer study of biophysical and social dimensions of environment and resources, while EEES is intended for students working across departments and disciplines within the School of Earth Sciences.

The aims of the school are:

1. to prepare students for careers in the fields of biogeochemistry, climate science, energy resource engineering, environmental science, geology, geochemistry, geomechanics, geophysics, geostatistics, hydrogeology, land science, oceanography, petroleum engineering, and petroleum geology
2. to conduct research in the Earth sciences
3. to provide opportunities for Stanford undergraduates to learn about the planet's history, to understand the energy and resource base that supports humanity, to appreciate the geological and geophysical hazards that affect human societies, and to understand the challenges and solutions related to the environment and sustainability.

To accomplish these objectives, the school offers a variety of programs adaptable to the needs of the individual student

- four-year undergraduate programs leading to the degree of Bachelor of Science (B.S.)
- five-year programs leading to the coterminal Bachelor of Science and Master of Science (M.S.
- graduate programs offering the degrees of Master of Science, Engineer, and Doctor of Philosophy.\

Details of individual degree programs are found in the section for each department or program.

UNDERGRADUATE PROGRAMS IN EARTH SCIENCES

Any undergraduate admitted to the University may declare a major in one of the Earth Science departments or programs by contacting the appropriate department or program office.

Requirements for the B.S. degree are listed in each department or program section. Departmental academic advisers work with students to define a career or academic goal and assure that the student's curricular choices are appropriate to the pursuit of that goal. Advisers can help devise a sensible and enjoyable course of study that meets degree requirements and provides the student with opportunities to experience advanced courses, seminars, and research projects. To maximize such opportunities, students are encouraged to complete basic science and mathematics courses in high school or during their freshman year.

Each department offers an honors program involving research during the senior year. Each department also offers an academic minor for those undergraduates majoring in compatible fields. The Earth Systems Program also offers an honors program in Environmental Science, Technology, and Policy through the Woods Institute for the Environment.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN EARTH SCIENCES

The Stanford coterminal degree plan enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. This may result in more expeditious progress towards the advanced degree than would otherwise be possible, making the program especially important to Earth scientists because the master's degree provides an excellent basis for entry into the profession. The coterminal plan permits students to apply for admission to a master's program after earning 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree.

Under the plan, the student may meet the degree requirements in the more advantageous of the following two ways: by first completing the 180 units required for the B.S. degree and then completing the three quarters required for the M.S. degree; or by completing a total of 15 quarters during which the requirements for the two degrees are completed concurrently. In either case, the student has the option of receiving the B.S. degree upon meeting all the B.S. requirements or of receiving both degrees at the end of the coterminal program. Students earn degrees in the same department or program, in two different departments, or even in different schools; for example, a B.S. in Physics and an M.S. in Geological and Environmental Sciences. Students are encouraged to discuss the coterminal program with their advisers during their junior year. Additional information is available in the individual department offices.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

GRADUATE PROGRAMS IN EARTH SCIENCES

Admission to the Graduate Program—A student who wishes to enroll for graduate work in the school must be qualified for graduate standing in the University and also must be accepted by one of the school's four departments or one of the two interdisciplinary Ph.D. programs. One requirement for admission is submission of scores on the verbal and quantitative sections of the Graduate Record Exam. Admission to one department of the school does not guarantee admission to other departments.

Faculty Adviser—Upon entering a graduate program, the student should report to the head of the department or program who arranges with a member of the faculty to act as the student's adviser. Alternatively, in several of the departments, advisers are established through student-faculty discussions prior to admission. The student, in consultation with the adviser(s), then arranges a course of study for the first quarter and ultimately develops a complete plan of study for the degree sought.

Financial Aid—Detailed information on scholarships, fellowships, and research grants is available from the school's individual departments and programs. Applications should be filed by the various dates listed in the application packet for awards that become effective in Autumn Quarter of the following academic

year.Earth, Energy, and Environmental Sciences Graduate Program (EEES)

Director: Kevin R. Arrigo

Academic Oversight Committee: Kevin Arrigo (Environmental Earth System Science), Biondo Biondi (Geophysics), Jef Caers (Energy Resources Engineering), Louis Durlofsky (Energy Resources Engineering), Scott Fendorf (Environmental Earth System Science)

Program Offices: Yang and Yamazaki Environment and Energy Building, Room 140

Mail Code: 94305-4216

Web Site: http://pangea.stanford.edu/EEES

Courses offered by the Earth, Energy, and Environmental Sciences Program are listed under the subject code EEES on the *Stanford Bulletin's* ExploreCourses web site.

The Earth, Energy, and Environmental Sciences Graduate Program (EEES) is not accepting new students. The program continues to provide courses and advising for students already enrolled.

The goal of Earth, Energy, and Environmental Sciences (EEES) is to complement the disciplinary Earth Science and Engineering programs offered within the departments of the School of Earth Sciences and to train graduate students to integrate knowledge from these disciplines through tools and methods needed to evaluate the linkages among physical, chemical, and biological systems of the Earth, and understand the dynamics or evolution of these integrated systems and the resources they provide.

Students in EEES must make significant headway in, and combine insights from, more than one scientific discipline. For example, a student whose goal is to understand the structure of the Earth's interior using computational methods might design a study plan that includes high-level mathematics, numerical modeling, and geophysical imaging techniques. A student interested in water management might integrate water flow analysis and modeling, geophysical imaging, geostatistics, and satellite remote sensing of changes in agricultural intensity and land use. A student interested in marine carbon cycling might use knowledge and tools from numerical modeling, marine biogeochemistry and geochemistry, oceanography, and satellite imaging. The key to the program is its academic flexibility and ability to exploit an increasingly interdisciplinary faculty, particularly in the School of Earth Sciences, but also in the greater Stanford community.

GRADUATE PROGRAMS IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

The objective of the M.S. degree in Earth, Energy, and Environmental Sciences is to prepare the student either for a professional career or for doctoral studies.

Students in the M.S. degree program must fulfill the following requirements:

1. Complete EARTHSCI 300, Earth Sciences Seminar, during their first quarter of enrollment.
2. Complete a 45-unit program of study, of which a minimum of 30 units must be course work, with the remainder consisting of no more than 15 research units.
3. Course work units must be divided among two or more scientific and/or engineering disciplines and can include the three core courses required for the Ph.D. degree.
4. The program of study must be approved by the research adviser and the academic oversight committee.
5. Each candidate must either present and defend the results of his or her research at a public oral presentation attended by the candidate's advisor at least two faculty members, or submit a thesis/report to the candidate's adviser and at least two faculty members.

DOCTOR OF PHILOSOPHY IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. The Interdepartmental Program in Earth, Energy, and Environmental Sciences has the following requirements:

1. Ph.D. students must complete EARTHSCI 300, Earth Sciences Seminar, during their first quarter of enrollment.
2. Students must complete a minimum of 13 courses, including the three core courses and five courses from each of the two areas of specialization. At least half of the ten non-core classes must be at a 200 level or higher, and all must be taken for a letter grade. Students obtaining their M.S. from within the program can apply all master's units toward Ph.D. requirements. Students with an M.S. degree or other specialized training from outside EEES may be able to waive some of the non-core course requirements, depending on the nature of the prior courses or training. The number and distribution of courses to be taken by these students is determined with input from the research advisers and academic oversight committee.
3. Prior to the formation of a thesis committee, the student works with research advisers and the academic oversight committee to design a course of study with depth in at least two areas of specialization and preparation in analytical methods and skills. Students can select other courses from departments of the School of Earth Sciences and other University departments as appropriate. All courses must be approved by the student's thesis committee or by the academic oversight committee.The research advisers and academic oversight committee have primary responsibility for the adequacy of the course of study.
4. During Spring Quarter of each year, students must undergo an annual review by their thesis committee to allow the committee to monitor the progress of the student and make recommendations, where necessary.
5. Prior to taking the oral qualifying examination at or before the end of the sixth academic quarter, the student must have completed 24 units of letter-graded course work, developed a written crossdisciplinary dissertation proposal suitable for submission to a funding organization, and selected a thesis committee.
6. To be admitted to candidacy for the Ph.D. degree, the student must pass an oral qualifying examination. At least two of the minimum four-member examining committee must be faculty within the School of Earth Sciences. During the exam, students present and defend their proposed thesis research work; the exam generally takes the form of a 20-30 minute presentation by the student, followed by 1-2 hours of questioning.
7. The research advisers and two other faculty members comprise the dissertation reading committee. Upon completion of the thesis, the student must pass a University Oral Examination in defense of the dissertation.

Additional information may be found in the *Graduate Academic Policies and Procedures* handbook at http://gap.stanford.edu/.

EARTH SYSTEMS

Director: Robert B. Dunbar
Associate Director, Academics: Julie Kennedy, Senior Lecturer
Associate Director, Administration: Deana Fabbro-Johnston
Committee of the Whole: Nicole Ardoin (School of Education), Kevin Arrigo (Environmental Earth System Science; Earth, Energy and Environmental Sciences), Gregory Asner (Department of Global Ecology, Carnegie Institution), Barbara Block (Biology, Hopkins Marine Station), Carol Boggs (Biology), Alexandre Boucher (Environmental Earth System Science), Margaret Caldwell (Law), Page Chamberlain (Environmental Earth System Science), Gretchen Daily (Biology), Jenna Davis (Civil and Environmental Engineering), Mark Denny (Biology, Hopkins Marine Station), Noah Diffenbaugh (Environmental Earth System Science), Rodolfo Dirzo (Biology), Robert B. Dunbar (Earth Systems, Environmental Earth System Science), William Durham (Anthropology), Anne Egger (School of Earth Sciences), Gary Ernst (Geological and Environmental Sciences, emeritus), Walter Falcon (Freeman Spogli Institute for International Studies), Scott Fendorf (Environmental Earth System Science), Christopher Field (Department of Global Ecology, Carnegie Institution), Christopher Francis (Environmental Earth System Science), Zephyr Frank (History), David Freyberg (Civil and Environmental Engineering), Margot Gerritsen (Energy Resources Engineering), Deborah Gordon (Biology), Steven Gorelick (Environmental Earth System Science), Elizabeth Hadly (Biology), George Hilley (Geological and Environmental Sciences), David Kennedy (History), Donald Kennedy (Biology, Freeman Spogli Institute for International Studies, emeritus), Julie Kennedy (Earth Systems, Environmental Earth System Science), Rosemary Knight (Geophysics), Jeffrey Koseff (Civil and Environmental Engineering), Anthony Kovscek (Energy Resources Engineering), Eric Lambin (Environmental Earth System Science), David Lobell (Environmental Earth System Science), Gilbert Masters (Civil and Environmental Engineering), Pamela Matson (Dean, School of Earth Sciences; Freeman Spogli Institute for International Studies), Stephen Monismith (Civil and Environmental Engineering), Harold Mooney (Biology), Rosamond Naylor (Environmental Earth System Science, Freeman Spogli Institute for International Studies), Stephen Palumbi (Biology, Hopkins Marine Station), Jonathan Payne (Geological and Environmental Sciences), Gary Schoolnik (Medicine), George Somero (Biology, Hopkins Marine Station), James Sweeney (Management Science and Engineering), Paul Switzer (Environmental Earth System Science, Statistics), Leif Thomas (Environmental Earth System Science), Barton Thompson (Law), Peter Vitousek (Biology; Interdisciplinary Program in Environment and Resources), Virginia Walbot (Biology), Mark Zoback (Geophysics)
Program Office: Yang and Yamazaki Environment and Energy (Y2E2) Building, Room 131
Mail Code: 94305-4215
Phone: (650) 725-7427
Email: deana@stanford.edu or emburns@stanford.edu
Web Site: http://pangea.stanford.edu/ESYS

Courses offered by the Earth Systems Program are listed under the subject code EARTHSYS on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN EARTH SYSTEMS

The Earth Systems Program is an interdisciplinary environmental science major. Students learn about and independently investigate complex environmental problems caused by human activities in interaction with natural changes in the Earth system. Earth Systems majors become skilled in those areas of science, economics, and policy needed to tackle the globe's most pressing environmental problems, becoming part of a generation of scientists, professionals, and citizens who approach and solve problems in a new way: a systematic, interdisciplinary way.

For students to be effective contributors to solutions for such problems, their training and understanding must be both broad and deep. To this end, Earth Systems students take courses in the fundamentals of biology, calculus, chemistry, geology, and physics, as well as economics, policy, and statistics. After completing breadth training, they concentrate on advanced work in one of five focus areas: biology, energy, environmental economics and policy, land management, or oceanography. Tracks are designed to support focus and rigor but include flexibility for specialization. Examples of specialized focus have included but are not limited to environment and human health, sustainable agriculture, energy economics, sustainable development, business and the environment, and marine policy. Along with formal course requirements, Earth Systems students complete a 9-unit (270-hour) internship. The internship provides a hands-on academic experience working on a supervised field, laboratory, government, or private sector project.

The following is an outline of the sequential topics covered and skills developed in this major.

1. *Fundamentals:* The Earth Systems Program includes courses that describe the natural workings of the physical and biological components of the Earth as well as courses that describe the human activities that lead to change in the Earth system. Training in fundamentals includes introductory course work in geology, biology, chemistry, physics, and economics. Depending on the Earth Systems track chosen, training may also include introduction to the study of energy systems, microbiology, oceans, or soils.
2. *System Interactions:* Focus in these courses is on the fundamental interactions among the physical, biological, and human components of the Earth system. The dynamics of the interplay between natural variation and human-imposed influences must be understood to achieve effective solutions to environmental problems. Earth Systems courses that introduce students to the dynamic and multiple interactions that characterize global change problems include EARTHSYS 10, Introduction to Earth Systems, EARTHSYS 111, Biology and Global Change, and EARTHSYS 112, Human Society and Environmental Change. Competence in understanding system-level interactions is critical to development as an Earth Systems thinker, so additional classes that meet this objective are excellent choices as electives.
3. *Skills Development:* Students take skills courses that help them to recognize, quantify, describe, and help solve complex problems that face society.

Field and laboratory methods can help students to recognize the scope and nature of environmental change. For example, training in satellite remote sensing and geographic information systems allows students to monitor and analyze large-scale spatial patterns of change. This training is either required or recommended for all tracks. EARTHSYS 189, Field Studies in Earth Systems, is also recommended.

Quantification of environmental problems requires training in single and multivariable calculus, linear algebra, and statistics. Training in statistics is specific to the area of focus: geostatistics, biostatistics, econometrics.

Success in building workable solutions to environmental problems is linked to the ability to effectively communicate ideas, data, and results. Writing intensive courses (WIM) help students to communicate complex concepts to expert and non-expert audiences. All Stanford students must complete one WIM course in their major. The Earth Systems WIM course is EARTHSYS 260. Other Earth Systems courses also focus on effective written and oral communication and are recommended.

Effective solutions to environmental problems take into consideration natural processes as well as human needs. Earth Systems emphasizes the importance of interdisciplinary analysis and implementation of workable solutions through the required 9-unit

internship, EARTHSYS 260, and knowledge synthesis in EARTHSYS 210, Senior Seminar.

A comprehensive list of environmental courses, as well as advice on those that focus on problem solving, is available in the program office.

The Earth Systems Program provides an advising network that includes faculty, staff, and student peer advisers.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. demonstrate knowledge of foundational skills and concepts relevant to interdisciplinary study of the environment.
2. analyze environmental problems at the interface of natural and human systems in an interdisciplinary fashion.
3. demonstrate the ability to communicate complex concepts and data to expert and non-expert audiences.
4. independently and as part of a team apply relevant science, economics, engineering, and policy to problem analysis and proposed solutions.

BACHELOR OF SCIENCE IN EARTH SYSTEMS

The B.S. in Earth Systems (EARTHSYS) requires the completion of at least 94 units that can be divided into three levels of courses. The student must complete a series of courses comprising a broad base of specialized study which includes the Earth Systems core, as well as track-specific requirements and electives. Finally, the student must carry out a senior-level research or internship project and participate in the senior seminar, as well as the writing in the major requirement.

REQUIRED CORE

Subject and Catalog Number	*Units*
EARTHSYS 10. Introduction to Earth Systems	4
EARTHSYS 111. Biogeosphere	4
EARTHSYS 112. Human Society and Environmental Change	4
EARTHSYS 210. Senior Seminar	3
EARTHSYS 260. Internship	9

REQUIRED FOUNDATION AND BREADTH COURSES

Biology (any one course below):

BIO 41. Genetics, Biochemistry, and Molecular Biology	5
or BIO 43. Plant Biology, Evolution, and Ecology	5
or BIO 101. Ecology	3
or HUMBIO 2A,B. Genetics, Evolution and Ecology; Culture Evolution, and Society	10

Chemistry:

CHEM 31A. Chemical Principles I	4
CHEM 31B. Chemical Principles II	4
or CHEM 31X. Chemical Principles	4

Economics:

ECON 1A. Elementary Microeconomics	5

Geological and Environmental Sciences:

GES 1A, B, or C. Fundamentals of Geology	4-5
or EESS 2. Earth System History	3

Mathematics:

MATH 19. Calculus	3
MATH 20. Calculus	3
MATH 21. Calculus	4
or MATH 41. Calculus	5
MATH 42. Calculus	5
MATH 51. Linear Equations and Differential Calculus of Several Variables	5

Probability and Statistics (any one course below):

BIOHOPK 174H. Experimental Design and Probability	3
BIO 141. Biostatistics (Same as STATS 141)	4
ECON 102A. Introduction to Statistical Methods for Social Scientists	5
EESS 160. Statistical Methods for Earth and Environmental Sciences	4
EESS 161. Geostatistics	4
STATS 60. Introduction to Statistical Methods	5
STATS 110. Statistical Methods in Engineering and Physical Sciences	4
STATS 116. Theory of Probability	3-5

Physics:

PHYSICS 41. Mechanics	4

More extensive work in mathematics and physics may be expected for those planning graduate study. Graduate study in ecology and evolutionary biology and in economics requires familiarity with differential equations, linear algebra, and stochastic processes. Graduate study in geology, oceanography, and geophysics may require more physics and chemistry. Students should consult their adviser for recommendations beyond the requirements specified above.

TRACKS

ANTHROSPHERE

Additional foundation and breadth courses:

ECON 50. Economic Analysis	5
ECON 155. Environmental Economics and Policy	5

Choose one course in each of the three following subcategories, total six required. At least one of the six must be a skills class marked with and asterisk (*).

Economics and Environmental Policy:

ECON 51. Economic Analysis II	5
ECON 102B. Introduction to Econometrics*	5
ECON 150. Economic Policy Analysis	5
ECON 154. Economics of Legal Rules and Institutions	5
EARTHSYS 147. Controlling Climate Change in the 21st Century	3
EARTHSYS 175. The California Coast: Science, Policy, and Law	3-4
MSE 197. Ethics and Public Policy	5
MSE 243. Energy and Environmental Policy Analysis	3
MSE 248. Economics of Natural Resources	3-4
MSE 294. Climate Policy Analysis	3

Social Entrepreneurship and the Environment:

MSE 245G. Finance 1 for Non-MBAs	3-5
MSE 280. Organizational Behavior: Evidence in Action	3-4
MSE 285. Negotiation	3
MSE 288. Creating Infectious Action	3-4
URBANST 132. Concepts and Analytical Skills for the Social Sector*	4
URBANST 133. Social Entrepreneurship Collaboratory	4

Sustainable Development:

ANTHRO 115A. Environmental Crises and State Collapse	3
ANTHRO 162. Indigenous Peoples and Environmental Problems	3-5
ANTHRO 343. Culture as Commodity	5
ANTHRO 349. Anthropology of Capitalism	5
ANTHRO 161. Human Behavioral Ecology	3-5
BIO 102. Demography: Health, Development, Environment	3
CEE 124. Sustainable Development Studio (must be taken for at least 3 units)	1-5
CEE 142A. Sustainable Development	3
EARTHSYS 180. Fundamentals of Sustainable Agriculture	3
ECON 52. Economic Analysis III*	5
ECON 106. World Food Economy*	5
ECON 118. The Economics of Development	5
HUMBIO 118. Theory of Environmental and Ecological Anthropology	5
MSE 264. Sustainable Product Development and Manufacturing	3
POLISCI 140. Political Economy of Development	5
POLISCI 143. Nongovernmental Organizations and Development in Poor Countries	5
URBANST 163. Land Use Control	4

BIOSPHERE

Additional foundation and breadth courses:
BIO 41. Genetics, Biochemistry, and Molecular Biology 5
BIO 43. Plant Biology, Evolution, and Ecology 5
CHEM 33. Structure and Reactivity 4

Biogeochemistry (choose one):
BIO 216. Terrestrial Biogeochemistry 3
EARTHSYS 189. Field Studies in Earth Systems 5
EESS 143. Marine Biogeochemistry 3-4
EESS 155. Science of Soils 4

Conservation Biology (choose one):
HUMBIO 112. Conservation Biology 4
BIOHOPK 173H. Marine Conservation Biology 3

Ecology (choose two):
BIO 101. Ecology 3
BIO 125. Ecosystems of California 3
BIO 136. Evolutionary Paleobiology 4
BIO 145. Behavioral Ecology 4
GES 123. Invertebrate Paleobiology 4

Ecosystems and Society (choose one):
ANTHRO 115A. Environmental Crises and State Collapse: Lessons from the Past 3
ANTHRO 162. Indigenous Peoples and Environmental Problems 3-5
ANTHRO 165. Parks and Peoples: The Benefits and Costs of Protected Area Conservation 5
ANTHRO 166. Political Ecology of Tropical Land Use 3-5
EARTHSYS 165. Promoting Behavior Change 4
EARTHSYS 180. Fundamentals of Sustainable Agriculture 3
HUMBIO 114. Environmental Change and Emerging Infectious Diseases 3-5
HUMBIO 118. Theory of Ecological and Environmental Anthropology 5

ENERGY SCIENCE AND TECHNOLOGY

ADDITIONAL FOUNDATION AND BREADTH COURSES:
PHYSICS 43. Electricity and Magnetism 4
PHYSICS 45. Light and Heat 4

Energy Resources and Technology:
CEE 176A. Energy Efficient Buildings 3-4
CEE 176B. Electric Power: Renewables and Efficiency 3-4
EARTHSYS 101. Energy and the Environment 3
Choose one of the following:
EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes 3
or EARTHSYS 103. Energy Resources 4-5

Energy Fundamentals:
ENGR 30. Engineering Thermodynamics 3

Energy Policy (Choose one):
EARTHSYS 147. Controlling Climate Change in the 21st Century 3
MSE 243. Energy and Environmental Policy Analysis 3
MSE 294. Climate Policy Analysis 3
MSE 295. Energy Policy Analysis 3

LAND SYSTEMS

ADDITIONAL FOUNDATION AND BREADTH COURSES:
EARTHSYS 144. Fundamentals of GIS 4
PHYSICS 45. Light and Heat 4

Choose six courses, with at least one from each grouping:

Land:
BIO 125. Ecosystems of California 3
BIO 144. Conservation Biology 3-4
EARTHSYS 180. Fundamentals of Sustainable Agriculture 3
EARTHSYS 189. Field Studies in Earth Systems 5
ECON 106. World Food Economy 5
EESS 155. Science of Soils 4
HISTORY 254. Popular Culture and American Nature 5

Water:
CEE 101B. Mechanics of Fluids 4
CEE 166A. Watersheds and Wetlands 3
CEE 166B. Floods and Droughts, Dams and Aqueducts 3
CEE 171. Environmental Planning Methods 3
CEE 265D. Water and Sanitation in Developing Countries 3
EARTHSYS 104. The Water Course 3
GES 130. Soil Physics and Hydrology 3

Urban:
CEE 115. Goals and Methods of Sustainable Building Projects 3
CEE 124. Sustainable Development Studio 3-5
CEE 176A. Energy Efficient Buildings 3-4
URBANST 110. Introduction to Urban Studies 4
URBANST 113. Introduction to Urban Design 5
URBANST 163. Land Use Control 4
URBANST 165. Sustainable Urban and Regional Transportation Planning 4-5

OCEANS

ADDITIONAL FOUNDATION AND BREADTH COURSES:
GES 8. The Oceans: An Introduction to the Marine Environment 3
PHYSICS 45. Light and Heat 4

Physics of the Sea:
CEE 164. Introduction to Physical Oceanography 4

Biological Oceanography (choose one):
BIOHOPK 163H. Oceanic Biology 4
EESS 143. Marine Biogeochemistry 3-4

Remote Sensing of the Ocean (choose one):
EESS 141. Remote Sensing of the Ocean 4
EARTHSYS 144. Fundamentals of Geographic Information Science (GIS) 4

Additional Requirement (choose one):
- One quarter Stanford@SEA (EARTHSYS 323)
- One quarter abroad at the Stanford in Australia Program
- One quarter at the Hopkins Marine Station

EARTH SYSTEM SCIENCE TRACK

Tailored interdisciplinary course of study constructed under the guidance of program directors and the faculty adviser. See Associate Director of Academics for additional information.

UPPER-DIVISION ELECTIVES

Two to three additional courses at the 100-level or above are required. Electives allow students to personalize their curriculum by pursuing higher-level courses offered in their focus area, or by incorporating new academic perspectives. Each must be a minimum of three units and approved by an adviser. The following courses are suggested but not required; this is not an exhaustive list.

ANTHROSPHERE TRACK

CEE 171. Environmental Planning Methods 4
CEE 266A. Watersheds and Wetlands 3
CEE 266B. Floods and Droughts, Dams and Aqueducts 3
CEE 266C. Water Resources and Water Hazards Field Trips 2
ECON 158. Antitrust and Regulation 5
ECON 165. International Economics 5
MS&E 241. Economic Analysis 3-4
PUBLPOL 103B. Ethics and Public Policy 5
GSBGEN 339. Environmental Entrepreneurship 4

BIOSPHERE TRACK

BIO 139. Biology of Birds 3
BIO 175. Tropical Ecology and Conservation 5
BIO 215. Biochemical Evolution 3
BIO 216. Terrestrial Biogeochemistry 3
BIOHOPK 161H. Invertebrate Zoology 5
BIOHOPK 163H. Oceanic Biology 4
BIOHOPK 164H. Marine Botany 4
CEE 274E. Pathogens in the Environment 3
EARTHSYS 147. Controlling Climate Change in the 21st Century 3

ENERGY SCIENCE AND TECHNOLOGY TRACK

CEE 156. Building Systems	4
ECON 158. Antitrust and Regulation	5
EE 293A. Fundamentals of Energy Processes	3
EE 293B. Fundamentals of Energy Processes	3
ENERGY120. Fundamentals of Petroleum Engineering	3
ENERGY269. Geothermal Reservoir Engineering	3
GES 115. Engineering Geology Practice	3
ME 131A. Heat Transfer	3
MSE 248. Economics of Natural Resources	3-4

LAND SYSTEMS TRACK

CEE 173A. Energy Resources	4-5
CEE 175A. California Coast: Science, Policy, and Law	3-4
GES 112. Mapping the Geological Environment	3
GES 115. Engineering Geology Practice	3
GES 131. Environmental Earth Sciences II: Fluvial Systems and Landscape Evolution	3
URBANST 132. Concepts and Analytic Skills for the Social Sector	4

OCEANS TRACK

BIOHOPK 161H. Invertebrate Zoology	5
BIOHOPK 164H. Marine Botany	4
EARTHSYS 175. The California Coast: Science, Policy, and Law	3-4

SUMMARY OF COURSE REQUIREMENTS AND UNITS

Earth Systems Introduction and Core	12
Required allied courses	41-62
TRACKS	
Anthrosphere	19-30
Biosphere	15-22
Energy Science and Technology	18-22
Land Systems	18-29
Oceans	10-12
Upper-division electives	6-15
Senior research or internship	9
Senior seminar	3
Total units (depending on track, electives)	94-126

HONORS PROGRAM

The honors program in Earth Systems provides students with an opportunity to pursue individual research within a specific area or between areas of Earth Systems, through a year-long mentored research project with an Earth Systems-affiliated faculty member that culminates in a written thesis.

To be admitted to the honors program, applicants must maintain a minimum GPA of 3.4 in Earth Systems course work. Potential honors students should complete the EARTHSYS 111 and EARTHSYS 112 sequence by the end of the junior year. Qualified students apply in Spring Quarter of the junior year, or the fourth quarter before graduation, by submitting a detailed research proposal and a brief statement of support from a faculty research adviser. Students who elect to do an honors thesis should begin planning no later than Winter Quarter of the junior year.

A maximum of 9 units is awarded for thesis research through EARTHSYS 199. Those 9 units may not substitute for any other required parts of the Earth Systems curriculum. All theses are evaluated for acceptance by the thesis faculty adviser and one additional member of the Earth Systems Committee of the Whole.

Honors students are encouraged to present their research through the School of Earth Sciences Annual Research Review, which highlights undergraduate and graduate research in the school during the annual visit of the School of Earth Sciences external Advisory Board. Faculty advisers are encouraged to sponsor presentation of student research results at professional society meetings.

Students interested in a group-oriented, interdisciplinary honors experience should investigate the Goldman Interschool Honors Program in Environmental Science, Technology, and Policy, a program of the School of Earth Sciences. More information on Goldman may be obtained by phoning (650) 725-2745.

COTERMINAL B.S. AND M.S. DEGREES IN EARTH SYSTEMS

The Stanford coterminal degree enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. Undergraduates with a minimum 3.4 Stanford GPA may apply to work simultaneously toward B.S. and M.S. degrees. The M.S. degree in Earth Systems provides the student with enhanced tools to evaluate the primary literature of the discipline most closely associated with the student's track and allows an increased specialization through additional course work that may include 9 units of thesis research. Integration of earth systems concepts is furthered by participation in EARTHSYS 290, the Master's Seminar.

To apply, complete and return to the Earth Systems office an application that includes:

- a statement of purpose
- a resume
- a Stanford transcript
- two letters of recommendation, one of which must be from the master's adviser
- a list of courses that fulfill degree requirements signed by the Associate Director, Academics, and the master's adviser.

Applications must be submitted by the quarter preceding the anticipated quarter of graduation. An application fee is assessed by the Registrar's Office for coterminal applications.

Students may either:

1. complete 180 units required for the B.S. degree and then complete the three quarters required for the M.S. degree
2. *or,* complete a total of 15 quarters during which the requirements of the degrees are fulfilled concurrently.

The student has the option of receiving the B.S. degree after completing that degree's requirements or receiving two degrees concurrently at the end of the master's program.

These requirements must be fulfilled to receive an M.S. degree:

1. All requirements for the B.S. degree.
2. Further course work (and/or thesis research), all of which should be at the 100-level or above, including 22 units at the 200-level or above, leading to further focus within the student's track.
3. Participation in the Master's Seminar (EARTHSYS 290).

The program consists of a minimum of 45 units of course work and/or thesis research, at least 22 of which must be at the 200-level or above.

The student must devise a program of study that shows a level of specialization appropriate to the master's level, as determined in consultation with the adviser. The program should demonstrate further specialization and focus within the student's undergraduate track. Students applying from an undergraduate major other than Earth Systems or students applying for a coterminal M.S. in Environmental Earth System Science should meet with Julie Kennedy or Deana Fabbro-Johnston for clarification.

With the adviser's approval, 9 units may be in the form of research. This may culminate in the preparation of a master's thesis; however, a thesis is not required for the degree. Master's students must take part in the Spring Quarter Master's Seminar, EARTHSYS 290, and have additional responsibilities appropriate to the master's level (thesis presentation, modeling problems, and so on).

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

OVERSEAS STUDIES COURSES IN EARTH SYSTEMS

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site

(http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

AUSTRALIA

- OSPAUSTL 10. Coral Reef Ecosystems. 3 units, Kevin Arrigo, Simon Dunn, Selina Ward, GER:DB:EngrAppSci
- OSPAUSTL 20. Coastal Resource Management. 3 units, Ron Johnstone, GER:DB:EngrAppSci
- OSPAUSTL 30. Coastal Forest Ecosystems. 3 units, Claire Baker, Norman Duke, GER:DB:EngrAppSci

FLORENCE

- OSPFLOR 38. Water Resources Engineering in Italy: An Historical Perspective. 4-5 units, Leonard Ortolano, GER:DB:EngrAppSci

SANTIAGO

- OSPSANTG 58. Living Chile: A Land of Extremes. 5 units, Marcela A. Bustamante, GER:DB:EngrAppSci

WINTER QUARTER

BERLIN

- OSPBER 62. Shades of Green: Environmental Policy in Germany and the U.S. in Historical Perspective. 5 units, Sylke Tempel, GER:DB:SocSci

SANTIAGO

- OSPSANTG 27. Humans and the Environment: The Great Transitions. 3-5 units, Shripad Tuljapurkar
- OSPSANTG 58. Living Chile: A Land of Extremes. 5 units, GER:DB:EngrAppSci

SPRING QUARTER

PARIS

- OSPPARIS 33. The Economics of Climate Change: Policies in Theory and in Practice in the EU and the US. 5 units, Christian de Perthuis, Benoit Leguet, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 85. Marine Ecology of Chile and the South Pacific. 5 units, Alvaro Palma, GER:DB:NatSci

EMMETT INTERDISCIPLINARY PROGRAM IN ENVIRONMENT AND RESOURCES (E-IPER)

Director: Peter Vitousek (Biology)
Associate Director: Helen J. Doyle
Faculty: Nicole Ardoin (Education, Woods Institute for the Environment), Kevin Arrigo (Environmental Earth System Science), Kenneth J. Arrow (Economics, emeritus), Gregory Asner (Global Ecology, Carnegie Institution), Shilajeet Banerjee (Mechanical Engineering), William Barnett (Business), Michele Barry (Medicine), Sally M. Benson (Energy Resources Engineering, Global Climate and Energy Program), Sarah L. Billington (Civil and Environmental Engineering), Douglas W. Bird (Anthropology), Rebecca Bleige Bird (Anthropology), Barbara Block (Biology), Alexandria Boehm (Civil and Environmental Engineering), Carol Boggs (Biology), Jef Caers (Energy Resources Engineering), Ken Caldeira (Global Ecology, Carnegie Institution), Margaret Caldwell (Law), Page Chamberlain (Environmental Earth System Science), Joshua Cohen (Political Science), Craig S. Criddle (Civil and Environmental Engineering), Lisa Curran (Anthropology, Woods Institute for the Environment), Gretchen C. Daily (Biology), Jennifer Davis (Civil and Environmental Engineering, Woods Institute for the Environment), Noah Diffenbaugh (Environmental Earth System Science, Woods Institute for the Environment), Rodolfo Dirzo (Biology), Robert B. Dunbar (Environmental Earth System Science), William H. Durham (Anthropology), Anne Ehrlich (Biology), Paul Ehrlich (Biology), Gary Ernst (Geological and Environmental Sciences, emeritus), Walter Falcon (Freeman Spogli Institute for International Studies, emeritus), Scott Fendorf (Environmental Earth System Science), James Ferguson (Anthropology), Christopher B. Field (Biology, Environmental Earth System Science, Carnegie Institution), Martin Fischer (Civil and Environmental Engineering), Zephyr Frank (History), David Freyberg (Civil and Environmental Engineering), Oliver Fringer (Civil and Environmental Engineering), Tadashi Fukami (Biology), Margot Gerritsen (Energy Resources Engineering), Steven Gorelick (Environmental Earth System Science), Lawrence Goulder (Economics), Mark Granovetter (Sociology), Elizabeth Hadly (Biology), Ursula Heise (English), Thomas Heller (Law), Henning Hillmann (Sociology), Dominique Irvine (Anthropology), Mark Jacobson (Civil and Environmental Engineering), James Holland Jones (Anthropology, Woods Institute for the Environment), Terry Karl (Political Science), David Kennedy (History), Donald Kennedy (Biology, emeritus), Herve Kieffel (Management Science and Engineering), Jeffrey Koseff (Civil and Environmental Engineering, Woods Institute for the Environment), Anthony Kovscek (Energy Resources Engineering), Eric Lambin (Environmental Earth System Science, Woods Institute for the Environment), Raymond Levitt (Civil and Environmental Engineering), David Lobell (Environmental Earth System Science), Richard Luthy (Civil and Environmental Engineering), Janet Martinez (Law), Gilbert M. Masters (Civil and Environmental Engineering, emeritus), Michael D. Mastrandrea (Woods Institute for the Environment), Pamela Matson (Dean, School of Earth Sciences), Douglas McAdam (Sociology), Monica McDermott (Sociology), Michael D. McGehee (Materials Science and Engineering), Lynn Meskell (Anthropology), Fiorenza Micheli (Biology), Grant Miller (Medicine), Stephen Monismith (Civil and Environmental Engineering), Harold Mooney (Biology), Rosamond Naylor (Environmental Earth System Science), Leonard Ortolano (Civil and Environmental Engineering), Stephen Palumbi (Biology), Erica Plambeck (Business), Walter W. Powell (Education), Dariush Rafinejad (Management Science and Engineering), Stefan J. Reichelstein (Business), Thomas N. Robinson (Medicine),

Terry L. Root (Woods Institute for the Environment), Robert Sapolsky (Biology), Debra Satz (Philosophy), Lee Schipper (Precourt Energy Efficiency Center), Gary Schoolnik (Medicine), Richard Scott (Sociology), Sarah A. Soule (Business), James Sweeney (Management Science and Engineering, Precourt Energy Efficiency Center), Barton Thompson (Law, Woods Institute for the Environment), Shripad Tuljapurkar (Biology), Peter Vitousek (Biology), Michael Wara (Law), Jeremy Weinstein (Political Science), John Weyant (Management Science and Engineering, Precourt Energy Efficiency Center), Richard White (History), Jennifer Wilcox (Energy Resources Engineering), Mark Zoback (Geophysics)

Senior Lecturer: Julie Kennedy

Lecturers: Jon Christensen, Stan Christensen, Thomas Hayden, Kathleen A. Phillips

Program Offices: Yang and Yamazaki (Y2E2) Building, Suite 226
Mail Code: 4210
Phone: (650) 723-6117
Email: nelsondn@stanford.edu
Web Site: http://e-iper.stanford.edu

Courses offered by the Emmett Interdisciplinary Program in Environment and Resources are listed under the subject code ENVRES on the *Stanford Bulletin's* ExploreCourses web site.

The Emmett Interdisciplinary Program in Environment and Resources (E-IPER) is designed to create interdisciplinary scholars and leaders to address the world's most challenging environmental and sustainability issues. E-IPER students combine academic disciplines, including natural and earth sciences, engineering, economics, humanities, social sciences, law, health, policy, and business, to yield new insights and novel solutions to urgent global problems, such as energy use, climate change, food security, freshwater availability, depletion of ocean resources, land degradation, and biodiversity loss.

E-IPER offers a Ph.D. in Environment and Resources and, for students currently enrolled in Stanford's Graduate School of Business, Stanford Law School, and School of Medicine, a joint degree consisting of an M.S. in Environment and Resources in combination with their professional degree. Both E-IPER's Ph.D. and M.S. degrees are interdisciplinary, giving students exposure to environmental and sustainability issues and insight into new knowledge, technologies, and policies to help solve these problems. Within the guidelines of their respective degrees, E-IPER students are advised by faculty from and take classes offered in all seven schools of the University.

Through their original research and their work in policy and industry, E-IPER students address issues such as the science and policy of global climate change, regional food security, the mapping and valuation of ecosystem services, the development of new energy technologies, the effects of agricultural intensification and other land use changes, and conservation finance. For additional information about E-IPER students, see http://e-iper.stanford.edu/people.students.php.

E-IPER's affiliated faculty members come from all seven Stanford schools. Collectively, they represent an extraordinary diversity of environment and sustainability interests and breadth of research and policy approaches. More information about individual faculty can be found at http://e-iper.stanford.edu/people.faculty.php. More details about Stanford's interdisciplinary environmental research and policy work generally can be found on the Woods Institute for the Environment's web site, http://woods.stanford.edu.

GRADUATE PROGRAMS IN ENVIRONMENT AND RESOURCES

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin. The E-IPER Ph.D. and M.S. degrees are guided by comprehensive requirements created with faculty and student input and approved by E-IPER's executive committee. To access the current Ph.D. and M.S. degree requirement documents, see http://e-iper.stanford.edu/resources.academic.php.

MASTER OF SCIENCE IN ENVIRONMENT AND RESOURCES

Students may not apply directly for the M.S. in Environment and Resources degree. The M.S. is an option exclusively for students currently enrolled in the joint degree programs with the M.B.A. in the Graduate School of Business or the J.D. with the Stanford Law School; concurrently pursuing the M.D. in the School of Medicine; or for E-IPER Ph.D. students who do not continue in the Ph.D. degree program.

JOINT MASTER'S DEGREE

Students enrolled in a professional degree program in Stanford's Graduate School of Business or the Stanford Law School are eligible to apply for admission to the joint M.S. in Environment and Resources degree program (JDP). Enrollment in the JDP allows students to pursue an M.S. degree concurrently with their professional degree and to count a defined number of units toward both degrees, resulting in the award of joint M.B.A. and M.S. in Environment and Resources degrees or joint J.D. and M.S. in Environment and Resources degrees.

The joint M.B.A./M.S. degree program requires a total of 129 quarter units to be completed over approximately eight academic quarters (compared to 105 units for the M.B.A. and 45 units for the M.S. if pursued as separate degrees).

The joint J.D./M.S. degree program requires a minimum of 111 quarter units, although it is possible that students may need to take additional units to satisfy the degree requirements for both the J.D. and M.S. The joint J.D/M.S. may be completed in three years.

The student's program of study is subject to the approval of the student's faculty adviser and E-IPER staff. The joint degrees are conferred when the requirements for both the E-IPER M.S. and the professional degree programs have been met. For application information, see http://e-iper.stanford.edu/admissions.php. For additional information, see http://e-iper.stanford.edu/academic.requirements.php.

In addition to requirements for the professional degree, requirements for the JDP include:

1. Completion of a required introductory core course:
   - For joint M.B.A/M.S. students: ENVRES 338, Environmental Science for Managers and Policy Makers (same as OIT 338). If offered, ENVRES 339/OIT 339 also fulfills this requirement.
   - For all other JDP students: ENVRES 310, Environmental Forum Seminar.
2. Attendance at two mandatory workshops to be held in Autumn Quarter 2010 to introduce new E-IPER joint M.S. students to the E-IPER community and program requirements.
3. Completion and presentation of a capstone project that integrates the student's professional and M.S. degrees, as part of the required course ENVRES 290, Capstone Project Seminar in Environment and Resources.
4. Completion of a minimum of four letter-graded courses, while maintaining a 'B' average, from one joint M.S. course track:
   - Energy
   - Climate and Atmosphere
   - Cleantech
   - Land Use and Agriculture
   - Oceans and Estuaries
   - Freshwater
   - Global, Community, and Environmental Health
   - Sustainable Built Environment.

   Approved courses in each track are below. See also http://e-iper.stanford.edu/academic.jointms.curriculum.php.
5. Completion of at least four additional graded elective courses at the 100-level or higher, which may be taken from one or more course tracks or elsewhere in the University, while maintaining a 'B' average.

6. Among the courses fulfilling requirements 4 and 5 above, completion of at least four courses at the 200-level or above, excluding individual study courses. Individual study courses, directed reading. and independent research units may count for a maximum of 4 units for joint M.S. students (such as ENVRES 398 or ENVRES 399).

Restrictions on course work that may fulfill the Joint M.S. degree include:

1. A maximum of 5 units from courses that are identified as primarily consisting of guest lectures, such as the Energy Seminar or the Environmental Law Workshop, may be counted toward the joint M.S. degree. Additional courses in this category are listed at http://e-iper.stanford.edu/academic.jointms.curriculum.php.
2. A maximum of 12 units from approved courses related to the environmental and resource fields from the student's professional school may be applied toward the M.S. A list of approved courses from the GSB, School of Law, and School of Medicine can be found at http://e-iper.stanford.edu/academic.jointms.curriculum.php.

DUAL MASTER'S DEGREE

Only students in the School of Medicine may apply to pursue the M.S. in Environment and Resources degree. For the dual degree, students must meet the University's minimum requirements for the M.D. and complete an additional 45 units for the M.S. in Environment and Resources. Completion of the M.S. is anticipated to require at least three quarters in addition to the quarters required for the M.D. For additional information, see http://e-iper.stanford.edu/academic.requirements.php.

The student's program of study is subject to the approval of the student's faculty adviser and E-IPER staff. The two degrees are conferred when the requirements for both the E-IPER M.S. and the professional degree programs have been met. For application information, see http://e-iper.stanford.edu/admissions.php.

In addition to requirements for the M.D., requirements for the dual M.S. include:

1. Completion of a required introductory core course: ENVRES 310, Environmental Forum Seminar.
2. Attendance at two mandatory workshops to be held in Autumn Quarter 2010 to introduce all new E-IPER joint M.S. students to the E-IPER community and program requirements.
3. Completion and presentation of a capstone project that integrates the student's professional and M.S. degrees, as part of the required course ENVRES 290, Capstone Project Seminar in Environment and Resources.
4. Completion of a minimum of four graded courses, while maintaining a 'B' average, from one Joint M.S. Course Track:
   - Energy
   - Climate and Atmosphere
   - Cleantech
   - Land Use and Agriculture
   - Oceans and Estuaries
   - Freshwater
   - Global, Community, and Environmental Health
   - Sustainable Built Environment.

   Approved courses in each track are below. See also http://e-iper.stanford.edu/academic.jointms.curriculum.php.
5. Completion of at least four additional letter-graded elective courses at the 100-level or higher, which may be taken from one or more course tracks or elsewhere in the University, while maintaining a 'B' average.
6. Among the courses fulfilling requirements 4 and 5 above, completion of at least four courses at the 200-level or above, excluding individual study courses. Individual study courses, directed reading, and independent research units may count for a maximum of 4 units for dual M.S. students (such as ENVRES 398 or ENVRES 399).

Restrictions on course work that may fulfill the Dual M.S. degree include:

1. A maximum of 5 units from courses that are identified as primarily consisting of guest lectures, such as the Energy Seminar or the Environmental Law Workshop may be counted toward the Joint M.S. degree. Additional courses in this category are listed at http://e-iper.stanford.edu/academic.jointms.curriculum.php.
2. A maximum of 12 units from courses related to the environmental and resource fields from the student's professional school may be applied toward the M.S. A list of approved courses from the GSB, School of Law, and School of Medicine can be found at http://e-iper.stanford.edu/academic.jointms.curriculum.php.

JOINT M.S. AND DUAL M.S. COURSE TRACKS

Students should consult *Stanford Bulletin's* Explore Courses web site to determine course description, class schedule, location, eligibility, and prerequisites. Course tracks and other recommended courses are also available at http://e-iper.stanford.edu/academic.jointms.curriculum.php.

ENERGY

APPPHYS 219. Solid State Physics and the Energy Challenge
CEE 173A. Energy Resources
CEE 176A. Energy Efficient Buildings
CEE 176B. Electric Power: Renewables and Efficiency
CEE 236. Green Architecture
CEE 272P. Distributed Generation and Grid Integration of Renewables
CHEMENG 454. Synthetic Biology and Metabolic Engineering
EARTHSYS 232. Energy Cooperation in the Western Hemisphere
EE 237. Solar Conversion
EE 293A. Fundamentals of Energy Processes
EE 293B. Fundamentals of Energy Processes
ENERGY 101. Energy and the Environment
ENERGY 102. Renewable Energy Sources and Greener Energy Processes
ENERGY 104. Technology in the Greenhouse
ENERGY 120. Fundamentals of Petroleum Engineering
ENERGY 208. Large Scale Solar Technology and Policy
ENERGY 226. Thermal Recovery Methods
ENERGY 227. Enhanced Oil Recovery
ENERGY 253. Carbon Capture and Sequestration
ENERGY 269. Geothermal Reservoir Engineering
ENERGY 291. Optimization of Energy Systems
MS&E 198. Applied Modeling of Energy and Environmental Markets
MS&E 243. Energy and Environmental Policy Analysis
MS&E 295. Energy Policy Analysis
MS&E 296. Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport
MS&E 491. Real-World Clean Energy Project Development
MATSCI 256. Solar Cells, Fuel Cells, and Batteries
MATSCI 302. Solar Cells
MATSCI 316. Nanoscale Science, Engineering, and Technology
ME 260. Fuel Cell Science and Technology
ME 370A. Energy Systems I: Thermodynamics
ME 370B. Energy Systems II: Modeling and Advanced Concepts
ME 370C. Energy Systems III: Projects

CLIMATE AND ATMOSPHERE

BIO 117. Biology and Global Change
BIO 247. Controlling Climate Change in the 21st Century
BIO 264. Biosphere-Atmosphere Interactions
CEE 172. Air Quality Management
CEE 263A. Air Pollution Modeling
CEE 263D. Air Pollution: From Urban Smog to Global Change
CEE 278A. Air Pollution Physics and Chemistry
CEE 278B. Atmospheric Aerosols
CEE 278C. Indoor Air Quality

EARTHSYS 143. Climate Change in the West: A History of the Future
EARTHSYS 233. California Climate Change Law and Policy
EARTHSYS 284. Climate and Agriculture
EESS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation
EESS 246B. Atmosphere, Ocean, and Climate Dynamics: The Ocean Circulation
ENERGY 253. Carbon Capture and Sequestration
MS&E 294. Climate Policy Analysis
MS&E 296. Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport

CLEANTECH

APPPHYS 219. Solid State Physics and the Energy Challenge
CHEMENG 274. Environmental Microbiology I
CHEMENG 355. Advanced Biochemical Engineering
CHEMENG 454. Synthetic Biology and Metabolic Engineering
CHEMENG 456. Metabolic Biochemistry of Microorganisms
CEE 172P. Distributed Generation and Grid Integration of Renewables
CEE 173A. Energy Resources
CEE 176A. Energy Efficient Buildings
CEE 176B. Electric Power: Renewables and Efficiency
CEE 215. Goals and Methods of Sustainable Building Projects
CEE 226. Life Cycle Assessment for Complex Systems
CEE 275B. Process Design for Environmental Biotechnology
ENERGY 253. Carbon Capture and Sequestration
ENERGY 269. Geothermal Reservoir Engineering
MS&E 264. Sustainable Product Development and Manufacturing
MS&E 296. Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport
MS&E 491. Real-World Clean Energy Project Development
MATSCI 302. Solar Cells
MATSCI 316. Nanoscale Science, Engineering, and Technology
ME 221. Green Design Strategies
ME 222. Design for Sustainability
ME 260. Fuel Cell Science and Technology

LAND USE AND AGRICULTURE

BIO 101. Ecology
BIO 117. Biology and Global Change
BIO 121. Biogeography
BIO 125: Ecosystems of California
BIO 144. Conservation Biology
BIO 206. Field Studies in Earth Systems
BIO 216. Terrestrial Biogeochemistry
BIO 264. Biosphere-Atmosphere Interactions
BIO 280. Fundamentals of Sustainable Agriculture
EARTHSYS 143. Climate Change in the West: A History of the Future
EARTHSYS 233. California Climate Change Law and Policy
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy
EARTHSYS 281. Concepts of Urban Agriculture
EARTHSYS 284. Climate and Agriculture
EESS 155. Science of Soils
EESS 162. Remote Sensing of Land Use and Land Cover
EESS 256. Soil Chemistry
URBANST 163. Land Use Control
URBANST 165. Sustainable Urban and Regional Transportation Planning

OCEANS AND ESTUARIES

BIO 274S. Hopkins Microbiology Course
BIOHOPK 263H. Oceanic Biology
BIOHOPK 271H. Ecological and Evolutionary Physiology
BIOHOPK 272H. Marine Ecology
BIOHOPK 285H. Ecology and Conservation of Kelp Forest Communities
CEE 262D. Introduction to Physical Oceanography
CEE 272. Coastal Contaminants
CEE 275A. Law and Science of California Coastal Policy
EARTHSYS 208. Coastal Wetlands
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy
EESS 241. Remote Sensing of the Oceans
EESS 243. Marine Biogeochemistry
EESS 244. Marine Ecosystem Modeling
EESS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation
EESS 246B. Atmosphere, Ocean, and Climate Dynamics: The Ocean Circulation
EESS 258. Geomicrobiology

FRESHWATER

CEE 101B. Mechanics of Fluids
CEE 177. Aquatic Chemistry and Biology
CEE 260A. Physical Hydrogeology
CEE 260C. Contaminant Hydrogeology
CEE 262A. Hydrodynamics
CEE 262B. Transport and Mixing in Surface Water Flows
CEE 262E. Lakes and Reservoirs
CEE 264A. Rivers, Streams, and Canals
CEE 265A. Sustainable Water Resources Development
CEE 265C. Water Resources Management
CEE 265D. Water and Sanitation in Developing Countries
CEE 266A. Watersheds and Wetlands
CEE 266B. Floods and Droughts, Dams and Aqueducts
CEE 266D. Water Resources and Water Hazards Field Trips
CEE 268. Groundwater Flow
CEE 270. Movement and Fate of Organic Contaminants in Waters
CEE 271A. Physical and Chemical Treatment Processes
CEE 273. Aquatic Chemistry
CEE 273A. Water Chemistry Laboratory
CEE 275B. Process Design for Environmental Biotechnology
EARTHSYS 143. Climate Change in the West: A History of the Future
EARTHSYS 233. California Climate Change Law and Policy
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy

GLOBAL, COMMUNITY, AND ENVIRONMENTAL HEALTH

ANTHRO 261A. Ecology, Nature, and Society: Principles in Human Ecology
ANTHRO 262. Indigenous Peoples and Environmental Problems
ANTHRO 263. Conservation and Evolutionary Ecology
ANTHRO 266. Political Ecology of Tropical Land Use
ANTHRO 277. Environmental Change and Emerging Infectious Diseases
ANTHRO 282. Medical Anthropology
ANTHRO 291C. Anthropological Methods in Ecology, Environment, Evolution
ANTHRO 362. Conservation and Evolutionary Ecology
BIO 102. Demography: Health, Development, Environment
BIO 117. Biology and Global Change
CEE 260C. Contaminant Hydrogeology
CEE 263A. Air Pollution Modeling
CEE 263D. Air Pollution: From Urban Smog to Global Change
CEE 265A. Sustainable Water Resources Development
CEE 265C. Water Resources Management
CEE 265D. Water and Sanitation in Developing Countries
CEE 270. Movement and Fate of Organic Contaminants in Waters
CEE 272. Coastal Contaminants
CEE 274D. Pathogens and Disinfection
CEE 274E. Pathogens in the Environment
CEE 276. Introduction to Human Exposure Analysis
CEE 276E. Environmental Toxicants
CEE 278A. Air Pollution Physics and Chemistry
CEE 278B. Atmospheric Aerosols
CEE 278C. Indoor Air Quality
EARTHSYS 165. Promoting Behavior Change

EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions
HUMBIO 111. Human Dimensions of Global Environmental Change
HUMBIO 151. Introduction to Epidemiology
HUMBIO 152. Viral Lifestyles
HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges
HUMBIO 166. Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context

SUSTAINABLE BUILT ENVIRONMENT

CEE 100. Managing Sustainable Building Projects
CEE 136. Green Architecture
CEE 176A. Energy Efficient Buildings
CEE 176B. Electric Power: Renewables and Efficiency
CEE 177P. Sustainability in Theory and Practice
CEE 215. Goals and Methods of Sustainable Building Projects
CEE 224A. Sustainable Development Studio
CEE 226. Life Cycle Assessment for Complex Systems
CEE 248. Real Estate Development
CEE 248G. Certifying Green Buildings
CEE 265A. Sustainable Water Resources Development
CEE 272P. Distributed Generation and Grid Integration of Renewables
CEE 341P. Politics and Infrastructure Investment
MS&E 296. Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport
URBANST 163. Land Use Control
URBANST 165. Sustainable Urban and Regional Transportation Planning

MASTER OF SCIENCE

In exceptional circumstances, E-IPER offers a Master of Science degree for students in E-IPER's Ph.D. program who opt to complete their training with a M.S. degree or who do not advance to candidacy for the Ph.D. degree. Admission directly to the M.S. program is not allowed.

Requirements for the M.S. include:

1. Completion of a minimum of 45 units at or above the 100-level, of which the majority of units should be at or above the 200-level.
2. Completion of the E-IPER Ph.D. core curriculum, each with a letter grade of 'B' or higher, comprising:
   - ENVRES 310. Environmental Forum Seminar
   - ENVRES 315. Environmental Research Design Seminar
   - ENVRES 320. Designing Environmental Research
   - ENVRES 330. Research Approaches to Environmental Problem Solving, taken concurrently with ENVRES 398. Directed Individual Study in Environment and Resources
3. Additional courses may be chosen from approved course lists in E-IPER's four focal areas (culture and institutions; economics and policy analysis; engineering and technology; or natural sciences) or from other courses approved by the student's lead advisers.
4. Students may take no more than 6 of the required 45 units credit/no credit and must maintain at least a 'B' average in all courses taken for the M.S. degree.
5. Directed research and independent study may count for a maximum of 8 units of the 45 unit M.S.

The M.S. degree does not have an M.S. with thesis option. Students may write a M.S. thesis, but it is not formally recognized by the University.

DOCTOR OF PHILOSOPHY IN ENVIRONMENT AND RESOURCES

E-IPER's Ph.D. requirements, updated annually at http://e-iper.stanford.edu/resources.academic.php, lay out a scaffold of advising meetings, core courses, program activities, and milestones to guide students' progress. Each student works with a faculty advising team, comprising at least two faculty from different disciplines, to design a course of study that allows the student to develop and exhibit: a) familiarity with analytical tools and research approaches for interdisciplinary problem solving, and a mastery of those tools and approaches central to the student's thesis work; b) interdisciplinary breadth in each of four focal areas: culture and institutions; economics and policy analysis; engineering and technology; and natural sciences; and c) depth in at least two distinct fields of inquiry.

Program specific Ph.D. requirements are outlined in detail in the current year requirements and are summarized below:

1. Completion of the Ph.D. core course sequence: ENVRES 310, Environmental Forum Seminar; ENVRES 315, Environmental Research Design Seminar; ENVRES 320, Designing Environmental Research; and ENVRES 330, Research Approaches for Environmental Problem Solving, taken concurrently with ENVRES 398. Directed Individual Study in Environment and Resources, each with a letter grade of 'B' or higher. E-IPER Ph.D. students are also required to take EARTHSCI 300, Earth Sciences Seminar, which is required of all incoming School of Earth Sciences graduate students.
2. Completion of the breadth requirement in all four focal areas (culture and institutions; economics and policy analysis; engineering and technology; and natural sciences) through a sequence of courses, independent study, and/or demonstration of proficiency through prior course work or experience. Specific requirements and approved courses that satisfy breadth in each of the four focal areas as of July 2010 are listed below and in the current Ph.D. requirements document. Updated course lists are available at http://e-iper.stanford.edu/academic.phd.curriculum.php. Fulfillment of the breadth requirement must be certified by the student's two lead faculty advisers and the E-IPER faculty director.
3. Fulfillment of depth in the student's chosen fields of inquiry through additional courses, research, and/or independent studies. The student's two lead faculty advisers must certify that a) the two fields of inquiry are sufficiently distinct such that work integrating the two is interdisciplinary; and b) the student's course work and independent study has provided the substantial depth of understanding normally expected at the Ph.D. level.
4. Completion of quarterly meetings with advisers during the first year, culminating in the Spring Quarter first-year big picture advising meeting; and at minimum, annual meetings thereafter, including the Spring Quarter Second Year Meeting of the Minds, prior to which students must formally identify their two lead advisers and two distinct fields of inquiry.
5. Submission of a candidacy plan by end of Spring Quarter of the second year, for review at the Second Year Meeting of the Minds and subject to the approval of E-IPER's faculty director. The candidacy plan should document how the student has fulfilled the program requirements to date and include a summary of research ideas and a list of faculty who might serve as qualifying exam committee members.
6. Completion of the oral qualifying exam and completion of the requirements for candidacy, including at least 25 graded graduate course units (200 level and above) with at least a 'B' average, by the end of Winter Quarter of the third year. The oral qualifying exam committee should include the student's two lead advisers and 2-3 other faculty with expertise in the student's research area. The majority of the oral qualifying exam committee should be members of the Academic Council; the chair of the committee must be an Academic Council member and may not be one of the student's two lead advisers. In exceptional cases, the committee may include a member-at-large who is not a Stanford faculty member as a fourth or fifth member.
7. Completion of a written dissertation, approved by the student's dissertation reading committee consisting of the student's lead advisers and at least one other member, and passage of the University oral examination in defense of the dissertation following the guidelines outlined in the "Graduate Degrees" sec-

tion of this bulletin. The University oral examination committee comprises the student's two lead advisers, at least two additional members, and a chair who is outside of the departments of the lead advisers, all of whom are normally Academic Council members. Appointment of a non-Academic Council member must be justified and approved by the faculty director.

In addition to the requirements listed above, all Ph.D. students must:

1. Serve as a teaching assistant for at least one quarter in a course with a discussion section or with an opportunity to lecture in at least two class sessions, in any department or program, including ENVRES 320 or ENVRES 330. Seminars, including Introductory Seminars, may not be used to fulfill this requirement. Students should fulfill the teaching requirement by the end of the third year unless they obtain a firm commitment from a faculty member to TA a future course.
2. On an ongoing basis, submit grant proposals for external funding, defined as fellowship and/or research funds provided by a government agency, a private foundation, or a University entity other than E-IPER or the School of Earth Sciences.
3. Participate each year in a Spring Quarter annual review in which the student and lead advisers submit progress reports to the E-IPER executive committee.

The following courses may be taken to satisfy the breadth requirement in E-IPER's four focal areas. Updated lists are available at http://e-iper.stanford.edu/academic.phd.curriculum.php. Students should consult the *Stanford Bulletin's* Explore Courses web site to determine the course schedule, location, eligibility, and prerequisites.

CULTURE AND INSTITUTIONS BREADTH COURSES

At least two courses are required. Students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

ANTHRO 247. Nature, Culture, Heritage
ANTHRO 262. Indigenous Peoples and Environmental Problems
CEE 265D. Water and Sanitation in Developing Countries
CEE 275 A. Law and Science of California Coastal Policy
CEE 277C. Environmental Governance
EARTHSYS 112. Human Society and Global Change
EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions
ECON 228. Institutions and Organizations in Historical Perspective
EDUC 332X. Theory and Practice of Environmental Education
EDUC 371X. Social Psychology and Social Change
HISTORY 376. Modern Brazil
LAW 280. Toxic Harms
LAW 281. Natural Resources Law and Policy
LAW 306. Law, Economics and Politics of International Trade
LAW 338. Land Use
LAW 437. Water Law
LAW 455. Energy Law
LAW 603. Environmental Law and Policy
LAW 604. Environmental Law Workshop
LAW 656. International Conflict: Management and Resolution
MS&E 252. Decision Analysis I
MS&E 383. Doctoral Seminar on Ethnographic Research
POLISCI 351A. Foundations of Political Economy
POLISCI 362. New Economics of Organizations
POLISCI 364. Theories of Political Institutions
POLISCI 436. Rational Choice
POLISCI 440A. Theories in Comparative Politics
POLISCI 440B. Comparative Political Economy
POLISCI 440C. Methods in Comparative Politics
POLISCI 444. Comparative Political Economy: Advanced Industrial Societies
PSYCH 223. Social Norms
PUBLPOL 102. Organizations and Public Policy
PUBLPOL 194. Technology Policy
PUBPOL 202. Organizations and Public Policy
SOC 260. Formal Organizations
SOC 314. Economic Sociology
SOC 318. Social Movement and Collective Action
SOC 320. Foundations of Social Psychology
SOC 362. Organization and Environment
SOC 363. Social and Political Processes in Organizations
SOC 363A. Seminar on Organizational Theory
SOC 363B. Seminar on Organizational Theory: Institutional Analysis
SOC 364. Social Psychology of Organizations
SOC 366. Organization Studies: Theories and Analysis
SOC 367. Perspectives on Organization and Environment
SOC 377. Comparing Institutional Forms: Public, Private, and Nonprofit

ECONOMICS AND POLICY ANALYSIS BREADTH COURSES

One of the course sequences listed below, culminating in ENVRES 243 (same as MS&E 243), satisfies the minimum breadth requirement. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

ECON 50 and 51. Economic Analysis I and II; and MS&E/ENVRES 243
ECON 50. Economic Analysis I and ECON 155. Environmental Economics and Policy; and MS&E/ENVRES 243
ECON 202 *or* ECON 202N and ECON 203 *or* ECON 203N. Core Economics; and MS&E/ENVRES 243
ECON 106. World Food Economy; and MS&E/ENVRES 243
MS&E 241. Economic Analysis; and MS&E/ENVRES 243
MS&E 248. Economics of Natural Resources; and MS&E/ENVRES 243
PUBLPOL 301A. Microeconomics; and MS&E/ENVRES 243

Possible substitutes for ENVRES 243:

ECON 250. Environmental Economics
ECON 251. Natural Resources and Energy
PUBLPOL 301B. Cost-Benefit Analysis and Evaluation

The same prerequisites listed above apply to PUBLPOL 301B, ECON 250, and ECON 251. PUBLPOL 301B focuses less on environmental issues than ENVRES 243. Ph.D. students choosing economics and policy analysis as one of their fields of inquiry are encouraged to take ECON 202 or ECON 202N and ECON 203 or ECON 203N, in addition to ENVRES 243, ECON 250, and/or ECON 251.

ENGINEERING AND TECHNOLOGY BREADTH COURSES

At least one course is required; this list represents examples of appropriate courses only. Students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

CEE 101B. Mechanics of Fluids
CEE 161A. Rivers, Streams, and Canals
CEE 172. Air Quality Management
CEE 176A. Energy Efficient Buildings
CEE 176B. Electric Power: Renewables and Efficiency
CEE 177. Aquatic Chemistry and Biology
CEE 201D. Computations in Civil and Environmental Engineering
CEE 207A. Energy Resources
CEE 215. Goals and Methods of Sustainable Building Projects
CEE 260A. Physical Hydrogeology
CEE 262B. Transport and Mixing in Surface Water Flows
CEE 263A. Air Pollution Modeling
CEE 264A. Rivers, Streams, and Canals

CEE 265A. Sustainable Water Resources Development
CEE 266B. Floods and Droughts, Dams and Aqueducts
CEE 270. Movement and Fate of Organic Contaminants in Surface Waters and Groundwater
CEE 275A. Law and Science of California Coastal Policy
EE 293A. Fundamentals of Energy Processes
EE 293B. Fundamentals of Energy Processes
MS&E 250A. Engineering Risk Analysis

NATURAL SCIENCES BREADTH COURSES

At least two courses are required. Students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advanced and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

BIO 101. Ecology
BIO 102. Demography: Health, Development, Environment
BIO 106. Human Origins
BIO 117. Biology and Global Change
BIO 121. Biogeography
BIO 136. Evolutionary Paleobiology
BIO 139. Biology of Birds
BIO 144. Conservation Biology
BIO 175. Tropical Ecology and Conservation
BIO 216. Terrestrial Biogeochemistry
BIO 247. Controlling Climate Change in the 21st Century
BIO 264. Biosphere-Atmosphere Interactions
BIO 280. Fundamentals of Sustainable Agriculture
BIOHOPK 263H. Oceanic Biology
BIOHOPK 266H. Molecular Ecology
BIOHOPK 272H. Marine Ecology
CEE 164. Introduction to Physical Oceanography
CEE 266A. Watersheds and Wetlands
CEE 272. Coastal Contaminants
CEE 274A,B. Environmental Microbiology I,II
CEE 274P. Environmental Health Microbiology
CEE 275A. Law and Science of California Coastal Policy
EARTHSYS 208. Coastal Wetlands
EARTHSYS 242. Remote Sensing of Land Use and Land Cover
EESS 143. Marine Biogeochemistry
EESS 155. Science of Soils
EESS 162. Remote Sensing of Land Use and Land Cover
EESS 164. Fundamentals of Geographic Information Science (GIS)
EESS 215. Earth Systems Dynamics
EESS 220. Physical Hydrogeology
EESS 240. Advanced Oceanography
EESS 241. Remote Sensing of the Oceans
EESS 246A. Atmosphere, Ocean and Climate Dynamics
EESS 256 Soil and Water Chemistry
EESS 258. Geomicrobiology
EESS 259. Environmental Microbial Genomics
EESS 266. Soil Chemistry
EESS 284. Climate and Agriculture
ENERGY 260. Groundwater Pollution and Oil Slicks
GEOPHYS 104. The Water Course
GEOPHYS 130. Biological Oceanography
GES 170. Environmental Geochemistry
GES 259. Marine Chemistry

ENERGY RESOURCES ENGINEERING

Emeriti: (Professors) Khalid Aziz (recalled to active duty), John W. Harbaugh, André Journel* (recalled to active duty), Sullivan S. Marsden, Jr.
Chair: Louis J. Durlofsky
Professors: Sally M. Benson, Louis J. Durlofsky, Roland N. Horne, Anthony R. Kovscek, Franklin M. Orr, Jr.
Associate Professors: Jef Caers, Margot Gerritsen, Tapan Mukerji, Hamdi Tchelepi
Assistant Professor: Jennifer Wilcox
Courtesy Professors: Stephan A. Graham, Mark Jacobson
Lecturers: Louis M. Castanier, Denis V. Voskov
Consulting Professors: Ruben Juanes, Warren K. Kourt, Robert G. Lindblom, Stuart Macmillan, Kiran Pande, Marco R. Thiele
Acting Assistant Professor: Adam R. Brandt

* Joint appointment with Geological and Environmental Sciences

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Mail Code: 94305-2220
Phone: (650) 723-4744
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Web Site: http://pangea.stanford.edu/ERE

Courses offered by the Department of Energy Resources Engineering are listed under the subject code ENERGY on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Energy Resources Engineering (ERE) awards the following degrees: the Bachelor of Science, Master of Science, Engineer, and Doctor of Philosophy in Energy Resources Engineering. The department also awards the Master of Science, Engineer, and Doctor of Philosophy in Petroleum Engineering. Consult the ERE student services office to determine the relevant program.

Energy resources engineers are concerned with the design of processes for energy recovery. Included in the design process are characterizing the spatial distribution of hydrocarbon and geothermal reservoir properties, drilling wells, designing and operating production facilities, selecting and implementing methods for enhancing fluid recovery, examining the environmental aspects of petroleum and geothermal exploration and production, monitoring reservoirs, and predicting recovery process performance. The program also has a strong interest in related energy topics such as renewable energy, global climate change, and CO_2 sequestration. The Energy Resources Engineering curriculum provides a sound background in basic sciences and their application to practical problems to address the complex and changing nature of the field. Course work includes the fundamentals of chemistry, computer science, engineering, geology, geophysics, mathematics, and physics. Applied courses cover most aspects of energy resources engineering and some related fields like geothermal engineering and geostatistics. The curriculum emphasizes the fundamental aspects of fluid flow in the subsurface. These principles apply equally well to optimizing oil recovery from petroleum reservoirs, geothermal energy production and remediating contaminated groundwater systems.

Faculty and graduate students conduct research in areas including: enhanced oil recovery by thermal means, gas injection, and the use of chemicals; flow of fluids in pipes; geostatistical reservoir characterization and mathematical modeling; geothermal engineering; natural gas engineering; carbon sequestration optimization; properties of petroleum fluids; reservoir simulation using computer models; and well test analysis. Undergraduates are encouraged to participate in research projects.

M.S., Engineer, and Ph.D. degrees may be awarded with field designations for students who follow programs of study in the fields of geostatistics, geothermal, crustal fluids, or environmental specialties.

The department is housed in the Green Earth Sciences Building. It operates laboratories for research in enhanced oil recovery processes, geological carbon storage operations, clean energy conversions, and geothermal engineering. Students have access to a variety of computers for research and course work. Computers available for instruction and research include ten multiprocessor Windows 2008 servers within the department, as well as campus-wide computer clusters. Graduate students performing research are provided with one 3 GHz dual-4CPU computer.

MISSION OF THE UNDERGRADUATE PROGRAM IN ENERGY RESOURCES ENGINEERING

The mission of the Energy Resources Engineering major is to provide students with the engineering skills and foundational knowledge needed to flourish as technical leaders within the energy industry. Such skills and knowledge include resource assessment, choices among energy alternatives, and carbon management, as well as the basic scientific background and technical skills common to engineers. The curriculum is designed to prepare students for immediate participation in many aspects of the energy industry and graduate school.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. apply skills developed in fundamental courses to engineering problems.
2. research, analyze, and synthesize solutions to an original and contemporary energy problem.
3. work independently and as part of a team to develop and improve engineering solutions.
4. apply written, visual, and oral presentation skills to communicate scientific knowledge.

BACHELOR OF SCIENCE IN ENERGY RESOURCES ENGINEERING

The four-year program leading to the B.S. degree provides a foundation for careers in many facets of the energy industry. The curriculum includes basic science and engineering courses that provide sufficient depth for a wide spectrum of careers in the energy and environmental fields.

One of the goals of the program is to provide experience integrating the skills developed in individual courses to address a significant design problem. In ENERGY 199, taken in the senior year, student teams identify and propose technical solutions for an energy-resource related problem of current interest.

PROGRAM

The requirements for the B.S. degree in Energy Resources Engineering are similar, but not identical, to those described in the "School of Engineering" section of this bulletin. Students must satisfy the University general education, writing, and language requirements. The normal Energy Resources Engineering undergraduate program automatically satisfies the University General Education Requirements (GERs) in the Disciplinary Breadth areas of Natural Sciences, Engineering and Applied Sciences, and Mathematics.

Engineering fundamentals courses and Energy Resources Engineering depth and elective courses must be taken for a letter grade.

The Energy Resources Engineering undergraduate curriculum is designed to prepare students for participation in the energy industry or for graduate studies, while providing requisite skills to evolve as the energy landscape shifts over the next half century. The program provides a background in mathematics, basic sciences, and engineering fundamentals such as multiphase fluid flow in the subsurface. In addition, the curriculum is structured with flexibility that allows students to explore energy topics of particular individual interest and to study abroad.

In brief, the unit and subject requirements are:

Subject	*Minimum Units*
Energy Resources Core	16
Energy Resources Depth	18
Mathematics	25
Engineering Fundamentals and Depth	24
Science	30
Technology in Society	3-5
University Requirements: IHUM, GERs, Writing, Language	60-67
Total	176-185

The following courses constitute the normal program leading to a B.S. in Energy Resources Engineering. The program may be modified to meet a particular student's needs and interests with the adviser's prior approval.

REQUIRED CORE IN ENERGY RESOURCES ENGINEERING

The following courses constitute the core program in Energy Resources Engineering:

ENERGY 101. Energy Resources and the Environment	3
ENERGY 104. Technology in the Greenhouse: Options for Reducing Greenhouse Gas Emissions	3
ENERGY 120. Fundamentals of Petroleum Engineering	3
ENERGY 160. Modeling Uncertainty in the Earth Sciences	3
ENERGY 199. Senior Project and Seminar in Energy Resources (WIM)	4
Total	16

MATHEMATICS:

- MATH 41. Single Variable Calculus
  - *and* MATH 42. Single Variable Calculus
- *or* MATH 19. Calculus
  - *and* MATH 20. Calculus
  - *and* MATH 21. Calculus
- MATH 51. Linear Algebra and Differential Calculus of Several Variables
  - *or* CME 100. Vector Calculus for Engineers
- MATH 52. Integral Calculus of Several Variables
  - *or* CME104. Linear Algebra and Partial Differential Equations for Engineers
- MATH 53. Ordinary Differential Equations with Linear Algebra
  - *or* CME 102. Ordinary Differential Equations for Engineers

SCIENCE:

- CHEM 31A. Chemical Principles
- CHEM 31B. Chemical Principles II
  - *or* CHEM 31X may be substituted for CHEM 31A,B
- CHEM 33. Structure and Reactivity
- GES 1. Fundamentals of Geology
- PHYSICS 41. Mechanics
- PHYSICS 43. Electricity and Magnetism
- PHYSICS 45. Light and Heat
- PHYSICS 46. Light and Heat Laboratory

ENGINEERING FUNDAMENTALS:

- CS 106A. Programming Methodology
- CS 106B. Programming Abstractions
  - *or* CS 106X may be substituted for CS 106A,B
- ENGR 14. Applied Mechanics: Statics
- ENGR 30. Engineering Thermodynamics
- ENGR 60. Engineering Economy
- ME 70. Introductory Fluids Engineering
  - *or* CHEMENG 120A
- Technology in Society, 1 course

EARTH AND ENERGY DEPTH CONCENTRATION

Choose courses from the list below for a total of at least 18 units. At least one course must be completed in each category. Courses must be planned in consultation with the student's academic adviser. Appropriate substitutions are allowed with the consent of the adviser.

FLUID FLOW AND THE SUBSURFACE

ENERGY 121. Fundamentals of Multiphase Flow	3
ENERGY 130. Well Log Analysis	3
ENERGY 160. Groundwater Pollution and Oil Spills	3
ENERGY 175. Well Test Analysis	3
ENERGY 180. Production Engineering	3
ENGR 62. Introduction to Optimization	4

3D MODELING OF SUBSURFACE STRUCTURES

ENERGY 141. Practice of 3D Subsurface Modeling	3
ENERGY 146. Reservoir Characterization	3
GEOPHYS 112. Exploring the Geosciences with Matlab	3
GEOPHYS 222. Reflection Seismology	3
GES 151. Sedimentary Geology	3

EARTH AND ENERGY SYSTEMS

ENERGY 102. Renewable Energy Resources	3
ENERGY 153. Carbon Capture and Sequestration	3
ENERGY 169. Geothermal Reservoir Engineering	3
ENERGY 191. Optimization of Energy Systems	3
ENERGY 301. The Energy Seminar	1
CEE 64. Air Pollution	3
CEE 70. Environmental Science and Technology	3
CEE 173B. The Coming Energy Revolution	3
CEE 176B. Electric Power	3-4
GEOPHYS 104. The Water Course	3
GEOPHYS 150. General Geophysics and Physics of the Earth	3

HONORS PROGRAM

The program in Energy Resources Engineering leading to the Bachelor of Science with Honors provides an opportunity for independent study and research on a topic of special interest and culminates in a written report and oral presentation.

The Honors Program is open to students with a grade point average (GPA) of at least 3.5 in all courses required for the ERE major and minimum of 3.0 in all University course work. Qualified students intending to pursue honors must submit an Honors Program Application to the Undergraduate Program Director no later than the eighth week of their ninth quarter, but students are encouraged to apply to the program during Winter Quarter of their junior year. The application includes a short form, an unofficial transcript, and a 2-3 page research proposal prepared by the student and endorsed by a faculty member who will serve as the research advisor.

Upon approval, students enroll in the Honors Program via Axess. Students must enroll in a total of 9 units of ENERGY 193; these units may be spread out over the course of the senior year, and may include previous enrollment units for the same research project. Research undertaken for the Honors Program cannot be used as a substitute for regularly required courses. A formal written report must be submitted to the student's research advisor no later than the fourth week of the student's final quarter, and the report must be read, approved, and signed by the student's faculty advisor and a second member of the faculty. Each honors candidate must make an oral presentation of his or her research results.

MINOR IN ENERGY RESOURCES ENGINEERING

The minor in Energy Resources Engineering requires the following three courses plus three additional electives. Courses must be planned in consultation with an ERE adviser. Appropriate substitutions are allowed with the consent of the adviser.

Required courses—

ENERGY 101. Energy Resources and the Environment	3
ENERGY 120. Fundamentals of Petroleum Engineering	3
ENERGY 160. Modeling Uncertainty in the Earth Sciences	3

Elective courses (at least 3 courses from the list below)—

- ENERGY 102. Renewable Energy Resources
- ENERGY 104. Technology in the Greenhouse
- ENERGY 121. Fundamentals of Multiphase Flow
- ENERGY 125. Modeling and Simulation
- ENERGY 130. Well Log Analysis
- ENERGY 141. Practice of Geostatistics and Seismic Data Integration
- ENERGY 146. Reservoir Characterization
- ENERGY 153. Carbon Capture and Sequestration
- ENERGY 169. Geothermal Reservoir Engineering
- ENERGY 175. Well Test Analysis
- ENERGY 180. Production Engineering
- GEOPHYS 182. Reflection Seismology
- GES 151. Sedimentary Geology

COTERMINAL B.S. AND M.S. PROGRAM IN ENERGY RESOURCES ENGINEERING

The coterminal B.S./M.S. program offers an opportunity for Stanford University students to pursue a graduate experience while completing the B.S. degree in any relevant major. Energy Resources Engineering graduate students generally come from backgrounds such as chemical, civil, or mechanical engineering; geology or other earth sciences; or physics or chemistry. Students should have a background at least through MATH 53 and CS 106 before beginning graduate work in this program.

The two types of M.S. degrees, the course work only degree and the research degree, as well as the courses required to meet degree requirements, are described below in the M.S. section. Both degrees require 45 units and may take from one to two years to complete depending on circumstances unique to each student.

Requirements to enter the program are: two letters of recommendation from faculty members or job supervisors, a statement of purpose, scores from the GRE general test, and a copy of Stanford University transcripts. While the department does not require any specific GPA or GRE score, potential applicants are expected to compete favorably with graduate student applicants.

A Petroleum Engineering or Energy Resources Engineering master’s degree can be used as a terminal degree for obtaining a professional job in the petroleum or energy industries, or in any related industry where analyzing flow in porous media or computer simulation skills are required. It can also be a stepping stone to a Ph.D. degree, which usually leads to a professional research job or an academic position.

Students should apply to the program any time after they have completed 105 undergraduate units, and in time to take ENERGY 120, the basic introductory course in Autumn Quarter of the year they wish to begin the program. Contact the Department of Energy Resources Engineering to obtain additional information.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

GRADUATE PROGRAMS IN ENERGY RESOURCES ENGINEERING

The Energy Resources Engineering department offers two distinct degree programs at both the M.S and Ph.D. levels. One program leads to the degrees of M.S. or Ph.D. in Petroleum Engineering, and the other leads to the degrees of M.S. or Ph.D. in Energy Resources Engineering. The Engineer degree, which is offered in either Petroleum Engineering or Energy Resources Engineering, is an extended form of the M.S. degree with additional course work and research.

The University's basic requirements for M.S., Engineer, and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

The following are minimum requirements for a student in the Department of Energy Resources Engineering to remain in good academic standing regarding course work:

1. no more than one incomplete grade at any time
2. a cumulative grade point average (GPA) of 3.0
3. a grade point average (GPA) of 2.7 each quarter
4. a minimum of 15 units completed within each two quarter period (excluding Summer Quarter).

Unless otherwise stated by the instructor, incomplete grades in courses within the department are changed to 'NP' (not passed) at the end of the quarter after the one in which the course was given. This one quarter limit is a different constraint from the maximum one-year limit allowed by the University.

Academic performance is reviewed each quarter by a faculty committee. At the beginning of the next quarter, any student not in good academic standing receives a letter from the committee or department chair stating criteria that must be met for the student to return to good academic standing. If the situation is not corrected by the end of the quarter, possible consequences include termination of financial support, termination of departmental privileges, and termination from the University.

Students funded by research grants or fellowships from the department are expected to spend at least half of their time (a minimum of 20 hours per week) on research. Continued funding is contingent upon satisfactory research effort and progress as determined by the student's adviser. After Autumn Quarter of the first year, students receive a letter from the department chair concerning their research performance. If problems are identified and they persist through the second quarter, a warning letter is sent. Problems persisting into a third quarter may lead to loss of departmental support including tuition and stipend. Similar procedures are applied in subsequent years.

A balanced master's degree program including engineering course work and research requires a minimum of one maximum-tuition academic year beyond the baccalaureate to meet the University residence requirements. Most full-time students spend at least one additional summer to complete the research requirement. An alternative master's degree program based only on course work is available, also requiring at least one full tuition academic year to meet University residence requirements.

M.S. students who anticipate continuing in the Ph.D. program should follow the research option. M.S. students receiving financial aid normally require two academic years to complete the degree. Such students must take the research option.

The degree of Engineer requires a comprehensive maximum-tuition, two-year program of graduate study. This degree permits more extensive course work than the master's degree, with an emphasis on professional practice. All Engineer degree students receiving financial aid are limited to a 10-unit course load per quarter and need at least ten quarters of work to complete the degree.

The Ph.D. degree is awarded primarily on the basis of completion of significant, original research. Extensive course work and a minimum of 90 units of graduate work beyond the master's degree are required. Doctoral candidates planning theoretical work are encouraged to gain experimental research experience in the M.S. program. Ph.D. students receiving financial assistance are limited to 10 units per quarter and often require more than three years to complete the Ph.D.

In special cases, the M.S., Engineer, and Ph.D. degrees may be awarded with field designations for students who follow programs of study in the particular fields of (1) geostatistics, (2) geothermal, or (3) environment. For example, students may be awarded the degree Master of Science in Energy Resources Engineering (Geothermal).

MASTER OF SCIENCE IN PETROLEUM ENGINEERING

The objective is to prepare the student for professional work in the energy industry through completion of fundamental courses in the major field and in related sciences as well as independent research.

Students entering the graduate program are expected to have an undergraduate-level engineering or physical science background. Competence in computer programming in a high-level language (CS 106X or the equivalent) and knowledge of engineering and geological fundamentals (ENERGY 120, 130, and GES 151) are prerequisites for taking most graduate courses.

The candidate must fulfill the following requirements:

1. Register as a graduate student for at least 45 units.
2. Submit a program proposal for the Master's degree approved by the adviser during the first quarter of enrollment.
3. Complete 45 units with a grade point average (GPA) of at least 3.0. This requirement is satisfied by taking the core sequence, selecting one of the seven elective sequences, an appropriate number of additional courses from the list of technical electives, and completing 6 units of master's level research. Students electing the course work only M.S. degree are strongly encouraged to select an additional elective sequence in place of the research requirement. Students interested in continuing for a Ph.D. are expected to choose the research option and enroll in 6 units of ENERGY 361. All courses must be taken for a letter grade.
4. Students entering without an undergraduate degree in Petroleum Engineering must make up deficiencies in previous training. Not more than 10 units of such work may be counted as part of the minimum total of 45 units toward the M.S. degree.

Research subjects include certain groundwater hydrology and environmental problems, energy industry management, flow of non-Newtonian fluids, geothermal energy, natural gas engineering, oil and gas recovery, pipeline transportation, production optimization, reservoir characterization and modeling, carbon sequestration, reservoir engineering, reservoir simulation, and transient well test analysis.

RECOMMENDED COURSES AND SEQUENCES

The following list is recommended for most students. With the prior special consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

CORE SEQUENCE

Subject and Catalog Number	*Units*
ENERGY 175. Well Test Analysis	3
or ENERGY 130. Well Log Analysis	3
ENERGY 221. Fundamentals of Multiphase Flow	3
ENERGY 222. Reservoir Engineering*	3
ENERGY 246. Reservoir Characterization and Flow Modeling with Outcrop Data	3
ENERGY 251. Thermodynamics of Equilibria†	3
CME 200. Linear Algebra with Application to Engineering Computations	3
CME 204. Partial Differential Equations in Engineering	3
Total	21

* Students taking the Environmental sequence may substitute ENERGY 227.

† Optional for students taking the Geostatistics and Reservoir Modeling sequence.

ELECTIVE SEQUENCE

Choose one of the following:

CRUSTAL FLUIDS:

GES 230. Physical Hydrogeology	4
GES 231. Contaminant Hydrogeology	4
GEOPHYS 200. Fluids and Tectonics	3
Total	11

ENVIRONMENTAL:

ENERGY 227. Enhanced Oil Recovery	3
GES 231. Contaminant Hydrogeology	4

Plus two out of the following courses:

ENERGY 240. Geostatistics	3-4
ENERGY 260. Environmental Problems in Petroleum Engineering	3
CEE 270. Movement, Fate, and Effect of Contaminants in Surface Water and Groundwater	3
CEE 273. Aquatic Chemistry	3
CEE 274A. Environmental Microbiology	3
GES 230. Physical Hydrogeology	4
Total	13-14

ENHANCED RECOVERY:

ENERGY 225. Theory of Gas Injection Processes	3
ENERGY 226. Thermal Recovery Methods	3
ENERGY 227. Enhanced Oil Recovery	3
Total	9

GEOSTATISTICS AND RESERVOIR MODELING:

ENERGY 240. Geostatistics for Spatial Phenomena	3-4
ENERGY 241. Practice of Geostatistics	3-4
GEOPHYS 182. Reflection Seismology	3
or GEOPHYS 262. Rock Physics	3
Total	9-11

GEOTHERMAL:

ENERGY 269. Geothermal Reservoir Engineering	3
or ENERGY 102. Renewable Energy Sources	3
CHEMENG 120B. Energy and Mass Transport	4
ME 131A. Heat Transfer	3
Total	10

RESERVOIR PERFORMANCE:

ENERGY 223. Reservoir Simulation	3-4
ENERGY 280. Oil and Gas Production Engineering	3
GEOPHYS 202. Reservoir Geomechanics	3
Total	9-11

SIMULATION AND OPTIMIZATION:

ENERGY 223. Reservoir Simulation	3-4
ENERGY 224. Advanced Reservoir Simulation	3
ENERGY 284. Optimization	3
Total	9-10

RENEWABLE ENERGY:

ENERGY 102. Renewable Energy Sources	3
ENERGY 293A. Fundamentals of Energy Processes	3-4
ENERGY 293B. Fundamentals of Energy Processes	3-4
Total	9-11

RESEARCH SEQUENCE

ENERGY 361. Master's Degree Research in Petroleum Engineering*	6
Total units required for M.S. degree	45

* Students choosing the company sponsored course-work-only for the M.S. degree may substitute an additional elective sequence in place of the research.

TECHNICAL ELECTIVES

Technical electives from the following list of advanced-level courses usually complete the M.S. program. In unique cases, when justified and approved by the adviser prior to taking the course, courses listed here may be substituted for courses listed above in the elective sequences.

ENERGY 130. Well Log Analysis	3
ENERGY 224. Advanced Reservoir Simulation	3
ENERGY 230. Advanced Topics in Well Logging	3
ENERGY 260. Environmental Aspects of Petroleum Engineering	3
ENERGY 267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities and Properties	3
ENERGY 269. Geothermal Reservoir Engineering	3
ENERGY 273. Special Production Engineering Topics in Petroleum Engineering	1-3
ENERGY 280. Oil and Gas Production	3
ENERGY 281. Applied Mathematics in Reservoir Engineering	3
ENERGY 284. Optimization	3
ENERGY 301. The Energy Seminar	1
CME 204. Partial Differential Equations to Engineering	3
ENERGY 293A. Fundamentals of Energy Processes	3-4
ENERGY 293B. Fundamentals of Energy Processes	3-4
GEOPHYS 182. Reflection Seismology	3
GEOPHYS 190. Near Surface Geophysics	3
GEOPHYS 202. Reservoir Geomechanics	3

MASTER OF SCIENCE IN ENERGY RESOURCES ENGINEERING

The objective of the M.S. degree in Energy Resources Engineering is to prepare the student either for a professional career or for doctoral studies.

Students in the M.S. degree program must fulfill the following:

1. Complete a 45-unit program of study. The degree has two options:
   a. a course work degree, requiring 45 units of course work
   b. a research degree, of which a minimum of 39 units must be course work, with the remainder consisting of no more than 6 research units.
2. Course work units must be divided among two or more scientific and/or engineering disciplines and can include the core courses required for the Ph.D. degree.
3. All courses must be taken for a letter grade.
4. The program of study must be approved by the academic adviser and the department graduate program committee.
5. Students taking the research-option degree are required to complete an M.S. thesis, approved by the student's thesis committee.

RECOMMENDED COURSES AND SEQUENCES

The following list is recommended for most students. With the prior consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

CORE SEQUENCE

Subject and Catalog Number	*Units*
ENERGY 221. Fundamentals of Multiphase Flow	3
ENERGY 246. Reservoir Characterization and Flow Modeling	3
CME 200. Linear Algebra with Application to Engineering Computations	3
CME 204. Partial Differential Equations in Engineering	3
CS 106X. Programming Methodology and Abstractions	3
ENERGY 293A. Fundamentals of Energy Processes	3
ENERGY 293B. Fundamentals of Energy Processes	3
MS&E 248. Economics of Natural Resources	3
Total	24

SUBJECT SEQUENCE ALTERNATIVES

Geothermal—

ENERGY 223. Reservoir Simulation	3
ENERGY 269. Geothermal Reservoir Engineering	3
CHEMENG 120B. Energy and Mass Transport	4
GES 217. Faults, Fractures, and Fluid Flow	3
ME 131. Heat Transfer	3
ME 370. Energy Systems I	3
Total	15

Low Carbon Energy (select 15 units from the following)—

ENERGY 104. Technology in the Greenhouse	3
ENERGY223. Reservoir Simulation	3
ENERGY 251. Thermodynamics of Equilibria	3
ENERGY 252. Chemical Kinetics Modeling	3
ENERGY 269. Geothermal Reservoir Engineering	3
ENERGY 291. Optimization of Energy Systems	3
CHEMENG 130. Separation Processes	3
GES 170. Environmental Geochemistry	4
GES 171. Geochemical Thermodynamics	3
ME 370A. Energy Systems I: Thermodynamics	3
ME 370B. Energy Systems II: Modeling & Advanced Concepts	4

MATSCI 156. Solar Cells, Fuel Cells, and Batteries	4
CEE 272P. Distributed Generation and Grid Integration of Renewables	3
Total	15

Modeling Natural Resources (select 15 units from the following)—

ENERGY 240. Geostatistics for Spatial Phenomena	3
ENERGY 241. Seismic Reservoir Characterization	3
ENERGY 260. Modeling Uncertainty in the Earth Sciences	3
ENERGY 284. Optimization: Deterministic and Stochastic Approaches	3
GP 200. Fluids and Flow in the Earth: Computational Methods	3
GP. 262. Rock Physics	3
Total	15

Oil and Gas—

ENERGY 104. Technology in the Greenhouse	3
ENERGY 222. Advanced Reservoir Engineering	3
ENERGY 223. Reservoir Engineering	3
ENERGY 240. Geostatistics for Spatial Phenomena *or* ENERGY 260. Modeling Uncertainty in the Earth Sciences	3
ENERGY 251. Thermodynamics of Equilibria	3
Total	15

TECHNICAL ELECTIVES

- ENERGY 104. Technology in the Greenhouse
- ENERGY 120. Fundamentals of Petroleum Engineering
- ENERGY 130. Well Log Analysis I
- Any 200-level ENERGY course
- ENERGY 301. The Energy Seminar
- CEE 176A. Energy Efficient Buildings
- CEE 176B. Electric Power: Renewables and Efficiency
- CME 206. Introduction to Numerical Methods for Engineering
- CME 212. Introduction to Large Scale Computing in Engineering
- EARTHSYS 247. Controlling Climate Change in the 21st Century
- ECON 250. Natural Resource and Energy Economics
- ECON 251. Environmental Economics
- GES 217. Faults, Fractures, and Fluid Flow
- MATSCI 316. Nanoscale Science, Engineering, and Technology
- ME 131A. Heat Transfer
- ME 150. Internal Combustion Engines
- ME 260. Fuel Cell Science Technology
- ME 370A. Energy Systems I: Thermodynamics
- ME 370B. Energy Systems II: Modeling and Advanced Concepts
- MS&E 248. Economics of Natural Resources

ENGINEER IN PETROLEUM ENGINEERING OR ENERGY RESOURCES ENGINEERING

The objective of the Engineer degree program is to broaden training through additional work in engineering and the related sciences and by additional specialization.

Basic requirements include completion of 90 units of course work including 15 units of research (ENERGY 362), and including all course requirements of the department's master's degree (39 units, excluding research). If the candidate has received credit for research in the M.S. degree, this credit ordinarily would be transferable to the Engineer degree, in which case a total of 9 additional research units would be required. No more than 10 of the 90 required units can be applied to overcoming deficiencies in undergraduate training.

At least 30 units in Engineering and closely allied fields must be taken in advanced work, that is, work beyond the master's degree requirements and in addition to research (ENERGY 362). These may include courses from the Ph.D. degree list below or advanced-level courses from other departments with prior consent of the adviser. All courses must be taken for a letter grade. The student must have a grade point average (GPA) of at least 3.0 in courses taken for the degree of Engineer. A thesis based on 15 units of research must be submitted and approved by the adviser and one other faculty member.

DOCTOR OF PHILOSOPHY IN PETROLEUM ENGINEERING OR ENERGY RESOURCES ENGINEERING

The Ph.D. degree is conferred upon demonstration of high achievement in independent research and by presentation of the research results in a written dissertation and oral defense.

In addition to University and the Department of Energy Resources Engineering basic requirements for the doctorate, the Petroleum Engineering Ph.D. and Energy Resources Engineering Ph.D. degrees have the following requirements:

1. Students must complete a minimum of 36 course units and 54 research units (a total of 90 units) beyond the M.S. degree. At least half of the classes must be at a 200 level or higher and all must be taken for a letter grade. Students with an M.S. degree or other specialized training from outside ERE are generally expected to include ENERGY 221, 223, and 240, or their equivalents. The number and distribution of courses to be taken is determined with input from the research advisers and department graduate program committee.
2. To achieve candidacy (usually during or at the end of the first year of enrollment), the student must complete 24 units of letter-graded course work, develop a written Ph.D. research proposal, and choose a idissertation committee.
3. The research adviser(s) and two other faculty members comprise the dissertation reading committee. Upon completion of the dissertation, the student must pass a University oral examination in defense of the dissertation.
4. Complete 135 units of graduate work.
5. Act as a teaching assistant at least once, and enroll in ENERGY 359.

36 units of course work is a minimum; in some cases the research adviser may specify additional requirements to strengthen the student's expertise in particular areas. The 36 units of course work does not include required teaching experience (ENERGY 359) nor required research seminars. Courses must be taken for a letter grade, and a grade point average (GPA) of at least 3.25 must be maintained.

The dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Candidates who fail to meet this deadline must submit an Application for Extension of Candidacy for approval by the department chair if they wish to continue in the program.

Ph.D. students entering the department are required to hold an M.S. degree in a relevant science or engineering discipline. Students wishing to follow the Ph.D. program in Petroleum Engineering must hold an M.S. degree (or equivalent) in Petroleum Engineering. Students following the Ph.D. program in Energy Resources Engineering must hold an M.S. degree (or equivalent), although it need not be in Energy Resources Engineering.

PH.D. DEGREE QUALIFICATION

The procedure for the Ph.D. qualification differs depending upon whether the student entered the department as an M.S. or Ph.D. student. In either case, previous written and oral exams have been replaced by a written Ph.D. proposal followed by a proposal defense.

For students who complete an M.S. in the Energy Resources Engineering Department at Stanford—In the second year of the M.S. degree program, the student formally applies to the Ph.D. program. The student is considered for admission to the Ph.D. program along with external applicants. The admission decision is based upon course work and research progress. During or before the third quarter as a Ph.D. student, generally corresponding to Spring Quarter in the third year at Stanford, the student must pass a

QUALIFYING EXAM by presenting a Ph.D. proposal to a committee of three faculty members. This entails a written document, including material such as a literature review or proposed work, and an oral presentation. Following the presentation, the student is questioned on the research topic and general field of study. The student can pass, pass with qualifications requiring more classes or teaching assistancies, or fail. A student who substantially changes topics between the M.S. and Ph.D. may ask their advisor to petition for an extra quarter before presenting the Ph.D proposal.

For students who enter directly into the Ph.D. program after receiving an M.S. from another university—After the second quarter at Stanford, a faculty committee evaluates the student's progress. If a student is found to be deficient in course work and/or research, a written warning is issued. After the third quarter, the faculty committee decides whether or not funding should be continued for the student. Students denied funding after the third quarter are advised against proceeding with the Ph.D. proposal, though the student may choose to proceed under personal funding. Before the end of their fourth quarter at Stanford (not counting Summer Quarter), continuing Ph.D. students must present a Ph.D. proposal as described above.

COURSE WORK

The 36 units of course work may include graduate courses in Energy Resources Engineering (numbered 200 and above) and courses chosen from the following list. Other courses may be substituted with prior approval of the adviser. In general, non-technical courses are not approved.

Students who enter directly into the Ph.D. program after receiving an M.S. degree from another university are expected to show expertise in the core courses required for Stanford's M.S. degree in Energy Resources Engineering, either by including those courses in their Ph.D. degree or by showing that they have taken equivalent courses during their M.S. degree.

For a Ph.D. in Energy Resources Engineering, 12 of the 36 required course units must be completed from the following list of courses. If the student has not taken ENERGY 293A,B or their equivalent during the M.S., then these courses must be taken during the Ph.D. (they will satisfy 6 of the required 12 units).

- ENERGY 104. Technology in the Greenhouse
- ENERGY 252. Chemical Kinetics Modeling
- ENERGY 253. Carbon Capture and Sequestration
- ENERGY 260. Modeling Uncertainty in the Earth Sciences
- ENERGY 269. Geothermal Reservoir Engineering
- ENERGY 291. Optimization of Energy Systems
- ENERGY 293A. Fundamentals of Energy Processes
- ENERGY 239B. Fundamentals of Energy Processes
- ENERGY 301. The Energy Seminar (may be repeated for credit no more than 3 times)
- CEE 176A. Energy Efficient Buildings
- CEE 176B. Electric Power: Renewables and Efficiency
- CEE 272P. Distributed Generation and Grid Integration of Renewables
- CEE 268. Groundwater Flow
- EESS 221/CEE 260C. Contaminant Hydrogeology
- CHEMENG 130. Separation Processes
- CHEMENG 340. Molecular Thermodynamics
- EARTHSYS 247. Controlling Climate Change in the 21st Century
- ECON 250. Environmental Economics
- ECON 251. Natural Resource and Energy Economics
- GES170. Environmental Geochemistry
- GES 171. Geochemical Thermodynamics
- GES 217. Faults, Fractures, and Fluid Flow
- ME 131A. Heat Transfer
- ME 150. Internal Combustion Engines
- ME 260. Fuel Cell Technology
- ME 370A. Energy Systems I: Thermodynamics
- ME 370B. Energy Systems II: Modeling and Advanced Concepts
- MATSCI 156. Solar Cells, Fuel Cells, and Batteries
- MATSCI 316. Nanoscale Science, Engineering, and Technology
- MS&E 248. Economics of Natural Resources

MATH AND APPLIED MATH

Subject and Catalog Number	*Units*
AA 210A. Fundamentals of Compressible Flow	3
AA 214A. Numerical Methods in Fluid Mechanics	3
AA 214B. Numerical Computation of Compressible Flow	3
CHEMENG 300. Applied Mathematics in Chemical Engineering	3
CEE 268. Groundwater Flow	3-4
CME 108. Introduction to Scientific Computing	3-4
CME 200. Linear Algebra with Application to Engineering Computations	3
CME 204. Partial Differential Equations in Engineering	3
CME 206. Introduction to Numerical Methods for Engineering	3
CME 302. Numerical Linear Algebra	3
CME 306. Numerical Solution of Partial Differential Equations	3
CS 106X. Programming Methodology and Abstractions	5
CS 193D. Professional Software Development with C++	3
MATH 106. Functions of a Complex Variable	3
MATH 113. Linear Algebra and Matrix Theory	3
MATH 114. Linear Algebra and Matrix Theory II	3
MATH 115. Functions of a Real Variable	3
MATH 131. Partial Differential Equations I	3
MATH 132. Partial Differential Equations II	3
MATH 220A,B,C. Partial Differential Equations of Applied Mathematics	3 ea.
ME 331A,B. Classical Dynamics	3 ea.
ME 335A,B,C. Finite Element Analysis	3 ea.
STATS 110. Statistical Methods in Engineering and Physical Sciences	4
STATS 116. Theory of Probability	4
STATS 200. Introduction to Statistical Inference	3
STATS 202. Data Analysis	3

SCIENCE

GES 231. Contaminant Hydrogeology	4
GES 253. Petroleum Geology and Exploration	3
GEOPHYS 182. Reflection Seismology	3
GEOPHYS 190. Near Surface Geophysics	3
GEOPHYS 262. Rock Physics	3

ENGINEERING

CHEMENG 110. Equilibrium Thermodynamics	3
CHEMENG 120A. Fluid Mechanics	3
CHEMENG 120B. Energy and Mass Transport	3
CHEMENG 310A. Microscale Transport in Chemical Engineering	3
ENGR 298. Seminar in Fluid Mechanics	1

PH.D. MINOR IN PETROLEUM ENGINEERING OR ENERGY RESOURCES ENGINEERING

To be recommended for a Ph.D. degree with Petroleum Engineering or Energy Resources Engineering as a minor subject, a student must take 20 units of graduate-level lecture courses in the department. These courses must include ENERGY 221 and 222. The remaining courses should be selected from ENERGY 175, 223, 224, 225, 227, 240, 241, 251, 280, 281, and 284.

ENVIRONMENTAL EARTH SYSTEM SCIENCE

Chair: Scott Fendorf
Associate Chair: Kevin Arrigo
Professors: Kevin Arrigo, C. Page Chamberlain, Robert Dunbar, Scott Fendorf, Christopher Field,* Steven Gorelick, Eric Lambin,** Pamela Matson,** Rosamond Naylor **†
Assistant Professors: Karen Casciotti (effective Winter Quarter), Noah Diffenbaugh,** Christopher Francis, David Lobell,**† Leif Thomas
Courtesy Professors: Gregory Asner, Ken Caldeira, Peter Vitousek
Visiting Professors: Shemin Ge, Sally MacIntyre, John Melack, Alicia Wilson

* Joint appointment with Biology

** Joint appointment with Woods Institute for the Environment

† Joint appointment with the Freeman Spogli Institute for International Studies

Department Offices: Yang and Yamazaki Environment and Energy Building, Room 140
Phone: 650-721-5723
Mail Code: 94305-4216
Web Site: http://pangea.stanford.edu/eess

Courses offered by the Department of Environmental Earth System Science are listed under the subject code EESS on the *Stanford Bulletin's* ExploreCourses web site.

Environmental Earth System Science studies the planet's oceans, lands, and atmosphere as an integrated system, with an emphasis on changes occurring during the current period of overwhelming human influence, the Anthropocene. Faculty and students within the department use the principles of biology, chemistry, and physics to study problems involving processes occurring at the Earth's surface, such as climate change and global nutrient cycles, providing a foundation for problem solving related to environmental sustainability and global environmental change.

GRADUATE PROGRAMS IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

The purpose of the master's program is to continue a student's training in one of the earth science disciplines and to prepare students for a professional career or doctoral studies.

The department's graduate coordinator, in coordination with the departmental faculty, appoints an academic adviser during registration with appropriate consideration of the student's background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The student should select a thesis adviser within the first year of residence and submit to the thesis adviser a proposal for thesis research as soon as possible. The academic adviser supervises completion of the department requirements for the M.S. program as outlined below until the research proposal has been accepted; responsibility then passes to the thesis adviser. The student may change either thesis or academic advisers by mutual agreement and after approval of the graduate coordinator.

The University's requirements for M.S. degrees are outlined in the "Graduate Degrees" section of this bulletin. Additional departmental requirements include the following:

1. Completion of core course work: EESS 211. Fundamentals of Modeling; EESS 213. Spatial Statistics and Analysis for Environmental Data; EESS 215. Earth System Dynamics; EARTHSCI 300. Earth Sciences Seminar.
2. Enrollment in EESS 301. Topics in Environmental Earth System Science, each quarter during the academic year.
3. A minimum of 45 units of course work at the 100 level or above.
4. Half of the courses used to satisfy the 45-unit requirement must be intended primarily for graduate students, usually at the 200 level or above.
5. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
6. Some students may be required to make up background deficiencies in addition to these basic requirements.
7. By the end of Winter Quarter of the first year in residence, a student must complete at least three courses taught by a minimum of two different department faculty members.
8. Serve as a teaching assistant in at least two quarters during their graduate career.

Each student must have a research adviser who is a faculty member in the department and is within the student's thesis topic area or specialized area of study. The faculty adviser is charged with designing the curriculum in consultation with the student specific to the research topic. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis who must be approved by the graduate coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

The objectives of the doctoral program are to enable students to develop the skills needed to conduct original investigations in environmental and earth system sciences, to interpret the results, and to present the data and conclusions in a publishable manner. Graduates should develop strong communication skills and leadership skills with the ability to teach and communicate effectively with the public.

The University's requirements for the Ph.D. degree are outlined in the "Graduate Degrees" section of this bulletin. A summary of additional department requirements follows:

1. Completion of core course work: EESS 211. Fundamentals of Modeling; EESS 213. Spatial Statistics and Analysis for Environmental Data; EESS 215. Earth System Dynamics; EARTHSCI 300. Earth Sciences Seminar.
2. Enrollment in EESS 301. Topics in Environmental Earth System Science, each quarter during the academic year.
3. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different departmental faculty members.
4. Completion of required courses in their individual program or in their specialized area of study with a grade point average (GPA) of 3.0 (B) or higher, or demonstrate that they have completed the equivalents elsewhere.
5. Completion of a minimum of four letter grade courses of at least 3 units each from four different faculty members on the Academic Council in the University.
6. Serve as a teaching assistant in at least four quarters during their graduate career.
7. During Spring Quarter of each year, students must undergo an annual review by their thesis committee to allow the committee to monitor the progress of the student and make recommendations, where necessary.
8. Qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation

of a written research proposal, approval of this proposal by the thesis adviser, selection of a committee for the Ph.D. qualifying examination, and approval of the membership by the graduate coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal; examination on the research proposal; and examination on subject matter relevant to the proposed research. The exam should take place prior to May 1 so that its outcome is known at the time of the annual spring evaluation of graduate students.

Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a research committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the full research committee to present a progress report covering the past year and provide expected goals for the coming year.

Under the supervision of the research advisory committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research; curriculum must also be developed with the supervision of the committee, which should be designed to provide a rigorous foundation for the research area. The format of the dissertation must meet University guidelines. The student is urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

The doctoral dissertation is defended in the University oral examination. The department appoints the research adviser and two other members of the research committee to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Emeriti: (Professors) Robert Coleman, Robert R. Compton, Marco T. Einaudi, W. Gary Ernst,* John W. Harbaugh, James C. Ingle, Jr.,* Juhn G. Liou,* Ronald J. P. Lyon, Michael McWilliams, J. Michael Moldowan,* George A. Parks, Irwin Remson, Tjeerd H. Van Andel

Chair: Jonathan F. Stebbins

Associate Chair: Donald R. Lowe

Professors: Dennis K. Bird, Gordon E. Brown, Jr., Stephan A. Graham, Andre G. Journel,** Keith Loague, Donald R. Lowe, Gail A. Mahood, Elizabeth L. Miller, David D. Pollard, Jonathan F. Stebbins

Assistant Professors: George Hilley, Katherine Maher, Wendy Mao, Jonathan Payne, Jessica Warren

Professors (Research): Atilla Aydin, Martin J. Grove

Courtesy Professors: Page Chamberlain, Elizabeth Hadly, Simon L. Klemperer, Anders R. Nilsson, Alfred M. Spormann

Lecturers: Anne E. Egger, Bob Jones

Consulting Professors: Thomas L. Holzer, Jack J. Lissauer, Leslie B. Magoon, Mark S. Marley, Timothy R. McHargue, Kristian E. Meisling, Kenneth Peters

Consulting Associate Professor: Jorge A. Vazquez

Visiting Professors: Craig M. Bethke, Moonsup Cho, Knut Bertil Per Persson

* Recalled to active duty

** Joint appointment with Energy Resources Engineering

Department Offices: Braun Hall, Building 320

Mail Code: 94305-2115

Phone: (650) 723-0848

Web Site: http://ges.stanford.edu/

Courses offered by the Department of Geological and Environmental Sciences are listed under the subject code GES on the *Stanford Bulletin's* ExploreCourses web site.

The geological and environmental sciences are naturally interdisciplinary, and include: the study of earth materials, earth processes, and how they have changed over Earth's 4.56 billion year history. More specifically, courses and research within the department address: the chemical and physical makeup and properties of minerals, rocks, soils, sediments, and water; the formation and evolution of Earth and other planets; the processes that deform Earth's crust and shape Earth's surface; the stratigraphic, paleobiological, and geochemical records of Earth history including changes in climate, oceans, and atmosphere; present-day, historical, and long-term feedbacks between the geosphere and biosphere, and the origin and occurrence of our natural resources.

The department's research is critical to the study of natural hazards (earthquakes, volcanic eruptions, landslides, and floods), environmental and geological engineering, surface and groundwater management, the assessment, exploration, and extraction of energy, mineral and water resources, ecology and conservation biology, remediation of contaminated water and soil, geological mapping and land use planning, and human health and the environment.

A broad range of instrumentation for elemental and radiogenic/stable isotope analysis is available, including ion microprobe, electron microprobe, thermal and gas source mass spectrometry, inductively coupled plasma mass spectrometry and nuclear magnetic resonance. The Center for Materials Research and facilities at the SLAC National Accelerator Laboratory, Stanford Synchrotron Radiation Laboratory (SSRL), and the U.S. Geological Survey in nearby Menlo Park are also available for the department's research. Branner Library, devoted exclusively to the Earth Sciences, represents one of the department's most important resources. The department also maintains rock preparation (crushing, cutting, polishing), mineral separation, and microscopy facilities.

MISSION OF THE UNDERGRADUATE PROGRAM IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The purpose of the undergraduate program in Geological and Environmental Sciences is to provide students with a broad background in the fundamentals of the Earth sciences and the quantitative, analytical, and communications skills necessary to conduct research and think critically about questions involving the Earth. The major provides excellent preparation for graduate school and careers in geological and environmental consulting, land use planning, law, teaching, and other professions in which an understanding of the Earth and a background in science are important.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to develop and demonstrate:

1. an understanding of fundamental concepts in Earth science.
2. the ability to collect, analyze, and interpret geological and environmental data using a variety of techniques to test hypotheses.
3. the ability to address real geological and/or environmental problems in the field.
4. the ability to communicate scientific knowledge orally, visually, and in writing.

BACHELOR OF SCIENCE IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The major consists of five interrelated components:

1. *Earth Sciences Fundamentals*—Students must complete a set of core courses that introduce the properties of Earth materials, the processes that change the Earth, and the timescales over which those processes act. These courses provide a broad

foundational knowledge that can lead to specialization in many different disciplines of the geological and environmental sciences.

2. *Quantitative and Analytical Skills*—Students must complete adequate course work in mathematics, chemistry, and physics or biology. In addition, they learn analytical techniques specific to the Earth sciences through the laboratory component of courses.
3. *Advanced Course Work and Research*—Students gain breadth and depth in upper-level electives and are encouraged to apply these skills and knowledge to problems in the Earth sciences through directed research.
4. *Field Research Skills*—Most GES courses include field trips and/or field-based projects. In addition, students must complete at least six weeks of field research through departmental offerings or through a faculty-directed field research project that involves learning and application of field techniques, field mapping, and the preparation of a written report.
5. *Communication Skills*—To fulfill the Writing in the Major requirement, students take a writing-intensive senior seminar (GES 150), in which they give both oral and written presentations that address current research in the earth sciences.

The major requires at least 77 units; letter grades are required in all courses if available. Students interested in the GES major should consult with the undergraduate program coordinator for information about options within the curriculum.

COURSE SEQUENCE (77-101 UNITS TOTAL)

CORE REQUIREMENT

Students are required to take all of the following (28-30 units):

Subject and Catalog Number	*Units*
GES 1A, 1B,or 1C.. Introduction to Geology	4-5
GES 4. Evolution and Extinction: Introduction to Historical Geology	4
GES 90. Introduction to Geochemistry	3-4
GES 102. Earth Materials: Introduction to Mineralogy	3
GES 102L. Introductory Mineralogy Laboratory	1
GES 103. Earth Materials: Rocks in Thin Section	3
GES 104. Earth Materials: Introduction to Petrology	3
GES 104L. Introductory Petrology Laboratory	1
GES 105. Introduction to Field Methods	3
GES 150. Senior Seminar: Issues in the Earth Sciences (WIM)	3
GES 190, other field course, or field research (see below for more information)	6

BREADTH IN THE DISCIPLINE REQUIREMENT

To gain understanding of the breadth of subject areas within the geological and environmental sciences, students are required to take one course from each of the following six groups (19-25 units).

Courses marked with an asterisk (*) are offered in alternate years.

ENVIRONMENTAL GEOLOGY AND SURFACE PROCESSES

The chemical and physical properties of the solid, aqueous, and gaseous phases comprising Earth's surface environment, their natural compositional variations and biogeochemical interactions, and the processes that affect their distribution and stability.

EESS 155. Science of Soils	4
GES 130. Soil Physics and Hydrology	3
GES 131. Hydrologically-Driven Landscape Evolution	3
GES 170. Environmental Geochemistry	4

STRUCTURAL GEOLOGY AND TECTONICS

The nature, description, and modeling of deformation of earth materials in response to tectonic forces. Processes of plate tectonics, mountain building, and sedimentary basin formation. The origin and evolution of geologic structures including folds, faults, fabrics, and fractures.

GES 110. Structural Geology and Tectonics	5
GES 111A. Fundamentals of Structural Geology	3

EARTH MATERIALS AND GEOCHEMISTRY

The materials that comprise the Earth and how they can be used to deduce geological processes over time. The fundamental chemical and geologic processes responsible for the abundance and distribution of elements and their isotopes.

GES 163. Introduction to Isotope Geochemistry	3
*GES 180. Igneous Processes	4
*GES 185. Volcanology	3-4
GES 107. Journey to the Center of the Earth	3

SEDIMENTARY SYSTEMS

The processes of weathering, erosion, transportation, and deposition, interpretation of depositional environments, the formation and evolution of sediments and sedimentary basins, and the evolution of sedimentary systems over geologic time.

GES 151.Sedimentary Geology and Petrology	4

BIOGEOSCIENCES

The origin and evolution of life on Earth, the influence of biological processes on Earth's surface environments, and the role of geological processes in shaping large-scale evolutionary patterns.

*GES 123. Paleobiology	3

GEOSPATIAL STATISTICS AND COMPUTER SCIENCE

Statistical techniques specific to the geosciences that facilitate analysis of three- and four-dimensional data; computer programming and modeling.

CS 106A. Programming Methodology	3-5
EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction	3
EESS 161. Statistical Methods for Earth and Environmental Sciences: Geostatistics	3-4
EESS 164. Fundamentals of Geographic Information Science (GIS)	4
ENERGY 125. Modeling and Simulation for Geoscientists and Engineers	3
ENERGY 211. Computer Programming in C++ for Earth Scientists and Engineers	4
GEOPHYS 112. Exploring Geosciences with MATLAB	3
*GEOPHYS 140. Introduction to Remote Sensing	3

DEPTH IN THE DISCIPLINE REQUIREMENT (10 UNITS)

To allow students to go into greater depth in the major, students must complete at least 10 units of electives drawn primarily from the list above and other upper-level courses in GES (including graduate-level courses). Additional courses in Geophysics, EESS, and ERE may be counted towards the elective units if they allow a student to pursue a topic in depth; these options should be discussed with an adviser. A maximum of 3 elective units may be fulfilled by GES 192, 197, 198, or advanced seminars. Honors research (GES 199) may fulfill up to 4 elective units.

REQUIRED SUPPORTING MATHEMATICS (5-15 UNITS)

This requirement may also be fulfilled by Advanced Placement credit. Choose one of the following equivalent series:

MATH 19. Calculus	3
MATH 20. Calculus	3
MATH 21. Calculus	4
or	
MATH 41. Calculus	5
MATH 42. Calculus	5

Choose at least one of the following (the entire series is recommended for students who plan to pursue graduate studies in the sciences or engineering):

MATH 51. Multivariate Mathematics	5
MATH 52. Multivariate Mathematics	5
MATH 53. Multivariate Mathematics	5

REQUIRED SUPPORTING COGNATE SCIENCES (15-21 UNITS)

Advanced placement credit may be accepted for these courses as determined by the relevant departments.

CHEMISTRY

CHEM 31A,B. Chemical Principles I/II	8
or CHEM 31X. Chemical Principles	4
CHEM 135. Physical Chemical Principles	3
or CHEM 171. Physical Chemistry	3
or GES 171. Geochemical Thermodynamics	3

In addition to chemistry, students may choose between introductory sequences in biology and physics. This choice should be made after discussion with an adviser and based on a student's interests.

PHYSICS

Choose one of the following series:

PHYSICS 21. Mechanics and Heat	3
PHYSICS 22. Mechanics and Heat Lab	1
PHYSICS 23. Electricity and Optics	3
PHYSICS 24. Electricity and Optics Lab	1
or	
PHYSICS 41 (formerly 53). Mechanics	4
PHYSICS 45 (formerly 51). Light and Heat	4
PHYSICS 46 (formerly 52). Light and Heat Lab	1
or	
PHYSICS 41 (formerly 53). Mechanics	4
PHYSICS 43 (formerly 55). Electricity and Magnetism	3
PHYSICS 44 (formerly 56). Electricity and Magnetism Lab	1

BIOLOGY

BIO 41. Genetics, Biochemistry, and Molecular Biology	5
BIO 42. Cell Biology and Animal Physiology	5
or BIO 43. Plant Biology, Evolution, and Ecology	5
or BIO 101. Ecology	3

FIELD RESEARCH

Field research skills are a critical component of the undergraduate curriculum in GES. The conventional and most straightforward way for undergraduates to meet the field requirement is to take the two GES courses (GES 105 and GES 190) that are offered every year:

- GES 105, Introduction to Field Mapping, is a two-week introduction to field techniques and geologic mapping that is taught every year in the White Mountains of eastern California prior to the start of Autumn Quarter in September. This course gives students the tools to undertake geologic research in the field. GES 105 is required of all GES majors and is the framework upon which all subsequent undergraduate field-related instruction is based.
- GES 190, Research in the Field, gives GES undergraduates additional training in field research. This course provides undergraduates with a team-based experience of collecting data to answer research questions and is directed by faculty and graduate students. Offered in June and/or September.

By taking GES 105 and two iterations of GES 190, GES undergraduates develop the broad experience and confidence necessary to go out and evaluate a geological or environmental geology question by collecting field-based data. The main goal is that, upon graduation, GES undergraduates will be able to plan and execute independent field research.

It is also possible to customize GES 190 or substitute non-Stanford courses to allow flexibility in fulfilling the field requirement. One or two GES 190 requirements can be satisfied through customized courses with two possible approaches:

1. The first approach involves working on a project during the summer with a graduate student or professor. This may fulfill one GES 190 requirement. To receive credit for GES 190, a proposal must be filed at the end of Winter Quarter with the field program committee which evaluates it for suitability.
2. A second approach is to take a modified version of an existing field-based course such as Stanford at Sea/Australia/Hawaii. This may also fulfill one GES 190 requirement.

In both cases, to receive credit for GES 190, a proposal must be filed at the end of Winter Quarter with the field program committee which evaluates it for suitability. Students subsequently enroll in GES 190 with a specific instructor or their faculty mentor who evaluates the final report from the fieldwork.

GES 190 can also be satisfied by enrolling in a single four-to-six week geology field camp offered by another institution. This externally administered experience can substitute for two GES 190 courses, subject to approval by the Undergraduate Curriculum Committee.

COGNATE COURSES

Many courses offered within the School of Earth Sciences, as well as courses in other schools with a significant Earth sciences component, may be used in satisfaction of optional requirements for the Geological and Environmental Sciences degree. Undergraduates should discuss the options available to them with the undergraduate program coordinator; graduate students should discuss options with their advisers.

The following courses outside the School of Earth Sciences are particularly applicable:

- BIO 121. Biogeography
- BIO 136. Evolutionary Paleobiology
- BIOHOPK 182H. Stanford at Sea
- CEE 63. Weather and Storms
- CEE 64. Air Pollution: From Urban Smog to Global Change
- CEE 101A. Mechanics of Materials
- CEE 101B. Mechanics of Fluids
- CEE 101C. Geotechnical Engineering
- CEE 161A. Rivers, Streams, and Canals
- CEE 164. Introduction to Physical Oceanography
- CEE 166A. Watersheds and Wetlands
- CEE 173A. Energy Resources

HONORS PROGRAM

The honors program provides an opportunity for year-long independent study and research on a topic of special interest, culminating in a written thesis. Students select research topics in consultation with the faculty adviser of their choosing. Research undertaken for the honors program may be of a theoretical, field, or experimental nature, or a combination of these approaches. The honors program is open to students with a GPA of at least 3.5 in GES courses and 3.0 in all University course work. Modest financial support is available from several sources to help defray laboratory and field expenses incurred in conjunction with honors research. Interested students must submit an application, including a research proposal, to the department by the end of their junior year.

Upon approval of the research proposal and entrance to the program, course credit for the honors research project and thesis preparation is assigned by the student's faculty adviser within the framework of GES 199; the student must complete a total of 9 units over the course of the senior year. Up to 4 units of GES 199 may be counted towards the elective requirement, but cannot be used as a substitute for regularly required courses.

Both a written and oral presentation of research results are required. The thesis must be read, approved, and signed by the student's faculty adviser and a second member of the faculty. In addition, honors students must participate in the GES Honors Symposium in which they present their research to the broader community. Honors students in GES are also eligible for the Firestone medal, awarded by Undergraduate Advising and Research for exceptional theses.

ENGINEERING GEOLOGY AND HYDROGEOLOGY UNDERGRADUATE SPECIALIZED CURRICULUM

The Engineering Geology and Hydrogeology curriculum is intended for undergraduates interested in the application of geological and engineering data and principles to the study of rock, soil, and water to recognize and interpret geological and environmental factors affecting engineering structures and groundwater resources. Students learn to characterize and assess the risks associated with natural geological hazards, such as landslides and earthquakes, and with groundwater flow and contamination. The curriculum prepares students for graduate programs and professional careers in engineering, environmental geology, geology, geotechnical engineering, and hydrogeology. Students interested in this curriculum should contact a faculty adviser: Professor Loague, Pollard, or Hilley.

GES majors who elect the Engineering Geology and Hydrogeology curriculum are expected to complete a core course sequence and a set of courses in supporting sciences and mathematics. The core courses come from Earth Sciences and Engineering. Any substitutions for core courses must be approved by the faculty adviser and through a formal petition to the undergraduate program director. In addition, four elective courses, consistent with the core curriculum and required of all majors, are to be chosen with the advice and consent of the adviser. Typically, electives are chosen from the list below. Letter grades are required if available.

COURSE SEQUENCE (90-101 UNITS TOTAL)

REQUIRED GEOLOGICAL AND ENVIRONMENTAL SCIENCES (36-38 UNITS)

Subject and Catalog Number	*Units*
GES 1A,B,C. Introduction to Geology	4-5
GES 102. Earth Materials	5
GES 111A. Fundamentals of Structural Geology	3
GES 115. Engineering Geology Practice	3
EESS 164. Fundamentals of GIS	4
GES 150. Senior Seminar: Issues in the Earth Sciences (WIM)	3
EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction	4
or EESS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics	3-4
EESS 220. Physical Hydrogeology	4
GEOPHYS 190. Applied Geophysical Methods	3

REQUIRED ENGINEERING (20 UNITS)

CEE 101A. Mechanics of Materials	4
CEE 101B. Mechanics of Fluids	4
CEE 101C. Geotechnical Engineering	4
CS 106A. Programming Methodology	5
ENGR 14. Applied Mechanics: Statics	3

REQUIRED SUPPORTING SCIENCES AND MATHEMATICS (23-27 UNITS)

CHEM 31A,B. Chemical Principles I/II	8
or CHEM 31X. Chemical Principles	4
MATH 51. Multivariate Mathematics	5
MATH 52. Multivariate Mathematics	5
MATH 53. Multivariate Mathematics	5
PHYSICS 41. Mechanics	4

SUGGESTED ELECTIVES (11-16 UNITS)

Choose four courses from the following list or, with faculty approval, four related courses:

CEE 101D. Computations in Civil and Environmental Engineering	3
CEE 180. Structural Analysis	4
CEE 270. Movement, Fate, and Effects of Contaminants in Surface Waters and Groundwater	3
CEE 293. Foundation Engineering	3
CEE 296. Experimental Soil Mechanics	2
EESS 221. Contaminant Hydrogeology	4
ENGR 30. Engineering Thermodynamics	3
ENGR 50. Introductory Science of Materials	4
GEOPHYS 112. Exploring Geosciences with MATLAB	1-3
GES 111B. Fundamentals of Structural Geology	3
GES 130. Soil Physics and Hydrology	3
GES 131. Hydrologically-Driven Landscape Evolution	3
GES 217. Characterization and Hydraulics of Rock Fracture	3
GES 237. Surface and Near-Surface Hydrologic Response	3
MATH 103. Matrix Theory and its Applications	3
MATHSCI 151. Microstructure and Mechanical Properties	3-4
ME 80. Strength of Materials	3

MINOR IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The minor in GES consists of a small set of required courses plus 12 elective units. A wide variety of courses may be used to satisfy these elective requirements.

REQUIRED COURSES

GES 1A, 1B, or 1C. Introduction to Geology	4-5
GES 4. Evolution and Extinction: Introduction to Historical Geology	4
GES 102. Earth Materials: Introduction to Mineralogy	3
GES 104. Earth Materials: Introduction to Petrology	3

ELECTIVES (12 UNITS)

Students must take a minimum of 12 additional units drawn primarily from the Breadth in the Discipline list in the GES major; a majority of units must be from classes within the GES department. Up to 3 units of Stanford Introductory Seminars in GES may be counted.

Students pursuing a minor in GES are encouraged to participate in the senior seminar (GES 150) and in field research (GES 105).

COTERMINAL B.S. AND M.S. DEGREES IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The coterminal B.S./M.S. program offers students the opportunity to pursue graduate research and an M.S. degree concurrently with or subsequent to their B.S. studies. The M.S. degree can serve as an entrance to a professional degree in subdisciplines within the Earth sciences such as engineering geology and environmental geology, or to graduate course work and research as an intermediate step in pursuit of the Ph.D. Regardless of professional goals, coterminal B.S./M.S. students are treated as members of the graduate community and are expected to meet all of the standards set for regular M.S. students. Applicants must have earned no fewer than 120 units toward graduation, and must submit their application no later than the quarter prior to the expected completion of their undergraduate degree, normally the Winter Quarter prior to Spring Quarter graduation. The application includes a statement of purpose, a current Stanford transcript, official Graduate Record Examination (GRE) scores, letters of recommendation from two members of the Stanford faculty (at least one of whom must be in the GES department), and a list of courses in which they intend to enroll to fulfill the M.S. degree requirements. Specific research interests should be noted in the statement of purpose and discussed with a member of the GES faculty prior to submission of the application. Coterminal students must complete a thesis describing research results.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

Students must meet all requirements for both the B.S. and M.S. degrees. Students may either:

1. complete 180 units required for the B.S. degree and then complete three full-time quarters (45 units at the 100-level or above) for the M.S. degree
2. *or*. complete a total of fifteen quarters during which the requirements of the two degrees are fulfilled concurrently.

At least half of the courses used to satisfy the 45-unit requirement must be designated as being primarily for graduate students, normally at the 200-level or above. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement. Further information about this program may be obtained from the GES office.

GRADUATE PROGRAMS IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Graduate Studies in the Department of Geological and Environmental Sciences (GES) involve academic course work and independent research. Students are prepared for careers as professional scientists in research, education, or the application of the earth sciences to mineral, energy, and water resources. Programs lead to the M.S., Engineer, and Ph.D. degrees. Course programs in the areas of faculty interest are tailored to the student's needs and interests with the aid of his or her research adviser. Students are encouraged to include in their program courses offered in other departments in the School of Earth Sciences as well as in other departments in the University. Diplomas designate degrees in Geological and Environmental Sciences and may also indicate the following specialized fields of study: Geostatistics and Hydrogeology.

Admission—For admission to graduate work in the department, the applicant must have taken the Aptitude Test (verbal, quantitative, and analytical writing assessment) of the Graduate Record Examination. In keeping with University policy, applicants whose first language is not English must submit TOEFL (Test of English as a Foreign Language) scores from a test taken within the last 18 months. Individuals who have completed a B.S. or two-year M.S. program in the U.S. or other English-speaking country are not required to submit TOEFL scores. Previously admitted students who wish to change their degree objective from M.S. to Ph.D. must petition the GES Admissions Committee.

MASTER OF SCIENCE IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Objectives—The purpose of the master's program in Geological and Environmental Sciences is to continue a student's training in one of a broad range of earth science disciplines and to prepare students for either a professional career or doctoral studies.

Procedures—The graduate coordinator of the department appoints an academic adviser during registration with appropriate consideration of the student's background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The student should select a thesis adviser within the first year of residence and submit to the thesis adviser a proposal for thesis research as soon as possible. The academic adviser supervises completion of the department requirements for the M.S. program (as outlined below) until the research proposal has been accepted; responsibility then passes to the thesis adviser. The student may change either thesis or academic advisers by mutual agreement and after approval of the graduate coordinator.

Requirements—The University's requirements for M.S. degrees are outlined in the "Graduate Degrees" section of this bulletin. Practical training (GES 385) may be required by some programs, with adviser approval, depending on the background of the student. Additional department requirements include the following:

1. A minimum of 45 units of course work at the 100 level or above.
   a. Half of the courses used to satisfy the 45-unit requirement must be intended as being primarily for graduate students, usually at the 200 level or above.
   b. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
   c. Some students may be required to make up background deficiencies in addition to these basic requirements.
2. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different GES faculty members.
3. Each student must have a research adviser who is a faculty member in the department and is within the student's thesis topic area or specialized area of study.
4. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence.
5. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis, who must be approved by the graduate coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

ENGINEER DEGREE IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The Engineer degree is offered as an option for students in applied disciplines who wish to obtain a graduate education extending beyond that of an M.S., yet do not have the desire to conduct the research needed to obtain a Ph.D. A minimum of two years (six quarters) of graduate study is required. The candidate must complete 90 units of course work, no more than 10 of which may be applied to overcoming deficiencies in undergraduate training. The student must prepare a substantial thesis that meets the approval of the thesis adviser and the graduate coordinator.

DOCTOR OF PHILOSOPHY IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Objectives—The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and the ability to conduct independent research. To this end, the objectives of the doctoral program are to enable students to develop the skills needed to conduct original investigations in a particular discipline or set of disciplines in the earth sciences, to interpret the results, and to present the data and conclusions in a publishable manner.

Requirements—The University's requirements for the Ph.D. degree are outlined in the "Graduate Degrees" section of this bulletin. Practical training (GES 385) may be required by some programs, with adviser approval, depending on the background of the student. A summary of additional department requirements is presented below:

1. Ph.D. students must complete the required courses in their individual program or in their specialized area of study with a grade point average (GPA) of 3.0 (B) or higher, or demonstrate that they have completed the equivalents elsewhere. Ph.D. students must complete a minimum of four letter-grade courses of at least 3 units each from four different faculty members on the Academic Council in the University. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different GES faculty members.
2. Each student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation of a written research proposal, approval of this proposal by the thesis adviser, selection of a committee for the Ph.D. qualifying examination, and approval of the mem-

bership by the graduate coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal, examination on the research proposal, and examination on subject matter relevant to the proposed research. The exam should be scheduled prior to May 1, so that the outcome of the exam is known at the time of the annual spring evaluation of graduate students.

3. Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a research committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the research committee to present a brief progress report covering the past year.
4. Under the supervision of the research advisory committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research. The format of the dissertation must meet University guidelines. The student is strongly urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.
5. The doctoral dissertation is defended in the University oral examination. The research adviser and two other members of the research committee are determined to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

PH.D. MINOR IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in Geological and Environmental Sciences must complete, with a GPA of 3.0 (B) or better, 20 units in the geosciences in lecture courses intended for graduate students. The selection of courses must be approved by the student's GES adviser and the department chair.

GEOPHYSICS

Emeriti: Jon Claerbout, Antony Fraser-Smith,* Robert Kovach, Amos Nur, George A. Thompson
Chair: Greg Beroza
Associate Chair: Biondo Biondi
Professors: Greg Beroza, Biondo Biondi, Jerry M. Harris, Simon Klemperer, Rosemary J. Knight, Joan Roughgarden,** Paul Segall, Norman H. Sleep, Howard Zebker,* Mark D. Zoback
Assistant Professors: Eric Dunham, Jesse Lawrence
Professor (Research): Gerald M. Mavko
Courtesy Professors: Stephan A. Graham, Wendy Mao, David D. Pollard
Consulting Professors: James Berryman, Dimitri Bevc, Jonathan Glen, Antoine Guitton, Peter Hennings, Shuki Ronen
Consulting Associate Professor: Stewart Levin
Cox Visiting Professor: Lee Slater
Visiting Assistant Professor: Adam Pidlisecky
Senior Research Scientists: Robert Clapp, Jack Dvorkin, Tiziana Vanorio
Research Associate: Youli Quan

* Joint appointment with Electrical Engineering
** Joint appointment with Biological Sciences

Department Offices: Mitchell Building, Third Floor
Mail Code: 94305-2215
Phone: (650) 724-3293
Email: tilich@stanford.edu
Web Site: http://pangea.stanford.edu/GP

Courses offered by the Department of Geophysics are listed under the subject code GEOPHYS on the *Stanford Bulletin's* ExploreCourses web site.

Geophysics is the branch of Earth science concerned with exploring and analyzing active processes of the Earth through physical measurement. The undergraduate and graduate programs are designed to provide a background of fundamentals in science, and courses to coordinate these fundamentals with the principles of geophysics. The program leading to the Bachelor of Science (B.S.) in Geophysics permits many electives and a high degree of flexibility for each student. Graduate programs provide specialized training for professional work in resource exploration, research, and education, and lead to the degrees of Master of Science and Doctor of Philosophy.

The Department of Geophysics is housed in the Ruth Wattis Mitchell Earth Sciences Building. It has numerous research facilities, among which are a state-of-the-art broadband seismic recording station, high pressure and temperature rock properties and rock deformation laboratories, various instruments for field measurements including seismic recorders, nine dual frequency GPS receivers, and field equipment for measuring in-situ stress at great depth. Current research activities include crustal deformation; earthquake seismology and earthquake mechanics; reflection, refraction, and tomographic seismology; rock mechanics, rock physics; seismic studies of the continental lithosphere; remote sensing; environmental geophysics; and synthetic aperture radar studies.

MISSION OF THE UNDERGRADUATE PROGRAM IN GEOPHYSICS

The mission of the undergraduate program in Geophysics is to expose students to a broad spectrum of geophysics, including resource exploration, environmental geophysics, seismology, and tectonics. Students in the major obtain a solid foundation in the essentials of mathematics, physics, and geology, and build upon that foundation with advanced course work in Geophysics to develop the in-depth knowledge they need to pursue advanced graduate study and professional careers in government or the private sector.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. understand the physics and geology that form the basis for geophysical observation and measurement.
2. understand Earth structure and evolution.
3. identify the physical processes governing the behavior of common geophysical systems.
4. be able to explain the principles of applying geophysical methods to societally relevant problems, including natural hazards, resource exploration and management, and environmental issues.
5. be able to quantitatively describe the behavior of natural systems and the principles of geophysical measurement with physics-based mathematical models.
6. investigate these models by solving the governing equations with a combination of analytical and computational methods.
7. make their own observations with a variety of geophysical instruments, and reduce, model, and interpret their data and uncertainties
8. effectively communicate their scientific knowledge through written and oral presentations
9. be able to interpret and evaluate the published literature and oral and poster presentations at national meetings.

GRADUATE PROGRAMS IN GEOPHYSICS

University requirements for the M.S. and Ph.D. are described in the "Graduate Degrees" section of this bulletin. Lecture course units applied to graduate degree program requirements must be taken for a letter grade if the course is offered for a letter grade.

Transfer Credit—An incoming student with a relevant Master of Science degree may apply for a departmental waiver of up to 12

units of the 30 lecture units required for the Ph.D. degree (see the "Doctor of Philosophy in Geophysics" section of this Bulletin), for certain courses as approved by the Departmental Graduate Faculty Adviser. Credit for courses generally requires that students identify an equivalent Stanford course and obtain the signature of the Stanford faculty responsible for that course, stating its equivalence.

BACHELOR OF SCIENCE IN GEOPHYSICS

The following courses are required for the B.S. degree in Geophysics. A written report on original research or an honors thesis is also required through participation in two or three quarters of GEOPHYS 185, Research Seminar Series, typically during the senior year. The departmental program proposal form can be downloaded at http://geo.stanford.edu/GP/undergraduate/major.html. Seniors in Geophysics who expect to do graduate work should take the Graduate Record Examination (GRE) early in their final undergraduate year.

CURRICULUM

GEOPHYSICS CORE COURSES (24-26 UNITS)

Students must take all of the following:

- GEOPHYS 110. Earth in the Balance: Introduction to Geophysics, 3 units
- GEOPHYS 120. Ice, Water, Fire, 3 units
- GEOPHYS 130. Introductory Seismology, 3 units
- GEOPHYS 150. Geodynamics: Our Dynamic Earth , 3 units
- GEOPHYS 160. Introduction to SES Computing, 2 units
  or equivalent knowledge
- GEOPHYS 190. Geophysical Field Methods, 3 units
- GEOPHYS 199. Senior Seminar (WIM), 3 units
- GEOPHYS 200. Undergraduate Research, 5 units
- GEOPHYS 201. Frontiers of Geophysical Research, 1 unit

GEOPHYSICS BREADTH COURSES (12-14 UNITS)

Choose four upper-level courses, one from each of the following four areas:

1. Resources, hazards, and the environment
   - GEOPHYS 182. Reflection Seismology, 3 units
   - GEOPHYS 183. Reflection Seismology Interpretation, 3 units
   - GEOPHYS 185. Rock Physics, 3 units
   - ENERGY 120. Fundamentals of Petroleum Engineering, 3 units
   - GES 131. Hydrologically-Driven Landscape Evolution, 3 units
2. Whole-earth Geophysics
   - GEOPHYS 184. Journey to the Center of the Earth, 3 units
   - GEOPHYS 140. Introduction to Remote Sensing , 3 units
   - GEOPHYS 170. Global Tectonics, 3 units
   - GEOPHYS 186. Tectonophysics, 3 units
3. Numerical and computational methods
   - GEOPHYS 180. Geophysical Inverse Problems, 3 units
   - GEOPHYS 187. Environmental Soundings Image Estimation, 3 units
   - CME 200. Linear Algebra with Applications to Engineering Computations, 3 units
   - CME 204. Partial Differential Equations in Engineering, 3 units
   - CME 206. Introduction to Numerical Methods for Engineering, 3 units
   - CME 211. Computer Programming in C++ for Earth Scientists and Engineers, 3 units
   - EE 102A. Signal Processing and Linear Systems I, 4 units
   - ENERGY 160. Modeling Uncertainty, 3 units
4. Geophysical fluid dynamics
   - GEOPHYS 181. Fluids and Flow, 3 units
   - CEE 164. Introduction to Physical Oceanography, 4 units
   - EESS 146A. Atmosphere, Ocean, and Climate Dynamics: Atmospheric Circulation, 3 units
   - EESS 220. Physical Hydrogeology, 4 units
   - ENERGY 121. Fundamentals of Multiphase Flow, 3 units
   - GES 130. Soil Physics and Hydrogeology, 3 units

SUPPORTING MATHEMATICS COURSES

Students must take all of the following (15-20 units):

- CME 100. Vector Calculus for Engineers, 5 units
- CME 102. Ordinary Differential Equations for Engineers, 5 units
- CME 104. Linear Algebra and Partial Differential Equations for Engineers, 5 units
- (MATH 51 (recommended: 51M), 52, and 53 plus one of CME 104, CME 108, or GEOPHYS 112 may substitute for the CME series)

SUPPORTING SCIENCE COURSES

Students must take all of the following (16-25 units):

- GES 1A, B, or C Introduction to Geology, 4-5units
- CHEM 31A,B Chemical Principles I & II 8
  or CHEM 31X Chemical Principles, 4 units
  or a score of 4-5 on the Chemistry AP exam
- PHYSICS 41. Mechanics, 4 units
- PHYSICS 43. Electricity and Magnetism, 4 units
- PHYSICS 45. Light and Heat, 4 units
- plus one additional PHYSICS class (4 units)
- PHYSICS 110. Intermediate Mechanics, 4 units
  or PHYSICS 120. Intermediate Electricity & Magnetism , 4 units
  or CEE 101A. Mechanics of Materials, 4 units
  or EE 141. Engineering Electromagnetics, 4 units
  or ME 80. Mechanics of Deformable Bodies, 4 units
- plus one additional approved geology class (4 units) typically chosen from among:
  - GES 102. Earth Materials: Mineralogy, 3 units
  - GES 110. Structural Geology and Tectonics, 5 units
  - GES 111A. Structural Geology and Rock Mechanics, 3 units
  - GES 151. Sedimentary Geology, 4 units

HONORS PROGRAM

The department offers a program leading to the B.S. degree in Geophysics with honors. The guidelines are:

1. Select a research project, either theoretical, field, or experimental, that has the approval of an adviser.
2. Submit a proposal to the department, which decides on its suitability as an honors project. Necessary forms are in the department office.
3. Course credit for the project is assigned by the adviser within the framework of GEOPHYS 205.
4. The decision whether a given independent study project does or does not merit an award of honors is made jointly by the department and the student's adviser. This decision is based on the quality of both the honors work and the student's other work in Earth sciences.
5. The work done on the honors program cannot be used as a substitute for regularly required courses.

MINOR IN GEOPHYSICS

The Geophysics minor provides students with a general knowledge of Geophysics in addition to a background in the related fields of physics, mathematics, and geology. The minor consists of one required class (8 units), two electives (6 units), and prerequisites in mathematics and physics. Minors require no fewer than 20 units and no more than 36 units. The departmental program proposal form can be downloaded from http://geo.stanford.edu/GP/undergraduate/major.html.

CURRICULUM

1. GEOPHYS 110

2. Three additional approved upper-level (100 or higher) Geophysics lecture courses, typically chosen from GEOPHYS 120, 130, 140, 150, 170, 184, 190
3. Supporting science:
   a. PHYSICS 20 series (21,22,23,24), *or* 41 and either 43 or 45
   b. GES 1A or 1B or 1C
   c. CME 100 or MATH 51

COTERMINAL B.S./M.S. PROGRAM IN GEOPHYSICS

The Department offers a coterminal M.S. degree for students wishing to obtain more specialized training in Geophysics than is normally possible during study for the B.S. degree alone. An M.S.degree should be considered as the professional degree in Geophysics, and is aimed at students wishing to work in a related industry, or students desiring more focused academic study in the field than the B.S. program allows.

The coterminal M.S. degree in Geophysics is offered in conjunction with any relevant undergraduate program at Stanford. Geophysics students often enter the department with degrees in Earth sciences, mathematics, physics, chemistry, or other natural science or engineering fields. Any of these are suitable for the coterminal Geophysics program, and interested students are encouraged to discuss their own background with a Geophysics faculty member.

The requirements for entry into the coterminal M.S. program are submission of a transcript, a statement of purpose, and at least one letter of recommendation. Applications with a letter of recommendation from a Geophysics faculty are generally considered the strongest. Additional letters from other academic or work-related persons also strengthen the application. There are no specific GPA requirements for entry, but the Department looks for proven performance in a rigorous undergraduate curriculum as a prerequisite for admission.

Undergraduates with at least junior-level standing may apply, and applications should be submitted by the Autumn Quarter of the senior year. The graduation requirements to obtain the degree are identical to those for the regular Geophysics master's degree. Contact the Department of Geophysics student services officer for additional information.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF SCIENCE IN GEOPHYSICS

Objectives—To enhance the student's training for professional work in geophysics through the completion of fundamental courses, both in the major fields and in related sciences, and to begin independent work and specialization.

Requirements for the Degree—The candidate must complete 45 units from the following groups of courses:

1. Complete 15 units of Geophysics lecture courses with at least 9 units numbered 200 or higher.
2. Complete six units numbered 100 or higher and three units of 200-level, non-Geophysics lecture courses in earth sciences.
3. Complete one to four electives selected from courses numbered 100 or higher from mathematics, chemistry, engineering, physics, relevant biology, computer science, ecology, hydrology, or earth science. At least one course must be numbered 200 or higher.
4. At least 9, but not more than 18, of the 45 units must be independent work on a research problem resulting in a written report accepted and archived by the candidate's faculty adviser. Normally, this research is undertaken as part of the candidate's participation in multiple quarters of research seminar (GEOPHYS 385 series). A summer internship is encouraged as a venue for research, but no academic credit is given.
5. Submit a program proposal for approval by a faculty adviser in the first quarter of enrollment.
6. Each candidate must present and defend the results of his or her research at a public oral presentation attended by at least two faculty members; and turn in a thesis/report to adviser.
7. Students are required to attend department seminars.

DOCTOR OF PHILOSOPHY IN GEOPHYSICS

Objectives—The Ph.D. degree is conferred upon evidence of high attainment in Geophysics and ability to conduct an independent investigation and present the results of such research.

Requirements for the Degree—A minimum of 135 units of graduate study at Stanford must be satisfactorily completed. Required courses must be taken for a letter grade, if offered. Students are required to attend the department seminars, and to complete sufficient units of independent work on a research problem to meet the 135-unit University requirement. 12 units must be met by participation in the GEOPHYS 385 series, or equivalent series in other departments with approval of the adviser and graduate coordinator. Students are encouraged to participate in the GEOPHYS 385 series from more than one faculty member or group and relevant equivalent series in other departments. Students with a Master's degree may waive up to 12 units for approved courses.

ENGR 102W/202W, Technical Writing, is recommended but not required.

The student's record must indicate outstanding scholarship, and deficiencies in previous training must be removed. Experience as a teaching assistant (quarter-time for at least two academic quarters) is required for the Ph.D. degree. For more information, see the *Geophysics Administrative Guide*, section 1.4.1.

The student must pass the departmental oral examination by the end of the sixth academic quarter (third academic quarter for students with an M.S. degree); prepare under faculty supervision a dissertation that is a contribution to knowledge and the result of independent work expressed in satisfactory form; and pass the University oral examination.

The Ph.D. dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Upon formal acceptance into a research group, the student and faculty adviser form a supervising committee consisting of at least three members who are responsible for overseeing satisfactory progress toward the Ph.D. degree. At least two committee members must be Geophysics faculty members. The committee conducts the department oral examination, and meets thereafter annually with the student to review degree progress. The Geophysics faculty monitors progress of all students who have not yet passed their department oral examination by carrying out an annual performance appraisal at a closed faculty meeting.

Course requirements—

1. *Geophysics**—12 units, lecture courses numbered 200 and above, from 4 different Geophysics faculty with different research specializations
2. *Additional Geophysics*—3 units, lecture courses numbered 150 and above
3. *School of Earth Sciences (non-Geophysics)*—3 units, lecture courses numbered 100 or above
4. *Mathematics (numbered 100 or above), Science, and Engineering (non-School of Earth Sciences)*—6 units, lecture courses numbered 200 or above
5. *Any of the above categories*—6 units, lecture courses numbered 200 or above
6. *Total:* 30 units

* These units marked cannot be waived.

Ph.D. Department Examination Requirement—

1. One research proposal (10-20 pages) with a completed component that outlines a plan of research for 2 -3 years

2. Second scientific proposal or paper (4-10 pages) with a professor in another area
3. An oral presentation with the student's advising committee on both the research proposal (~30-40 min) and the second proposal/paper (~10 min), with questions by the committee constituting the qualifying exam

The purpose of the second research project is to add breadth to Ph.D. study, and give the student the ability and confidence to teach or advise work in multiple areas. Both research projects must be in Geophysics or related disciplines. The two projects should be clearly distinct: neither the same methodology applied to two different datasets, nor two distinct methodologies applied to the same fundamental problem. The second project should clearly stand alone as a separate piece of work. The two projects must be supervised by different faculty in separate research groups, except in rare cases, as approved by the departmental graduate faculty adviser. The quality of each research project should be consistent with publication of a short journal article (typically achieved by additional work beyond the qualifying exam); although occasionally an extensive term paper deserving of presentation to the second project research group may be approved. The expected level of work on the second project should be about one academic quarter of full time effort.

SCHOOL OF EDUCATION

Emeriti: (Professors) J. Myron Atkin, John Baugh, Edwin M. Bridges, Robert C. Calfee, Larry Cuban, Elliot W. Eisner, James Greeno, Michael W. Kirst, Henry M. Levin, Richard Lyman (President emeritus), James G. March, William F. Massy, Milbrey McLaughlin, Nel Noddings, Ingram Olkin, Denis C. Phillips, Thomas Rohlen, Richard J. Shavelson, Lee S. Shulman, George D. Spindler, Myra H. Strober, Carl E. Thoresen, David B. Tyack, Decker F. Walker, Hans Weiler
Dean: Deborah J. Stipek
Associate Dean for Faculty Affairs: Edward Haertel (on leave)
Interim Associate Dean for Faculty Affairs, 2010-11: Francisco O. Ramirez
Associate Dean for Student Affairs: Eamonn Callan
Senior Associate Dean for Administration: Stephen Olson
Associate Dean for External Relations: Rebecca T. Smith
Assistant Dean for Academic Services: Priscilla Fiden
Assistant Dean for Information Technology and CTO: Paul Kim
Professors: Arnetha Ball, Joanna Boaler, Hilda Borko, Eamonn Callan, Martin Carnoy, Geoffrey Cohen, William Damon, Linda Darling-Hammond, Claude Goldenberg, Pamela Grossman, Patricia J. Gumport, Edward Haertel, Kenji Hakuta, Connie Juel, John D. Krumboltz, David F. Labaree, Susanna Loeb, Teresa D. LaFromboise, Raymond P. McDermott, Jonathan Osborne, Amado M. Padilla, Roy Pea, Walter Powell, Francisco O. Ramirez, Daniel Schwartz, Deborah J. Stipek, Guadalupe Valdés, John Willinsky, Sam Wineburg
Associate Professors: H. Samy Alim, Anthony L. Antonio, Brigid J. Barron, Eric Bettinger, Prudence Carter, Daniel McFarland, Debra Meyerson, Sean Reardon, David Rogosa, Mitchell Stevens
Assistant Professors: Jennifer Adams, Nicole M. Ardoin, Maren Songmy Aukerman, Paulo Blikstein, Bryan Brown, Leah Gordon, Aki Murata, Jelena Obradović
Professors (Teaching): Shelley Goldman, Rachel Lotan
Associate Professors (Teaching): Ira Lit, Susan O'Hara, Christine Min Wotipka
Professor (Research): David Plank
Courtesy Professors: Stephen Barley, Albert Camarillo, Carol Dweck, Paula England, Eric Hanushek, William Koski, Clifford Nass, Brad Osgood, John Rickford, Cecilia Ridgeway, Caroline Winterer
Courtesy Associate Professors: Stephen Cooper, Robert Reich
Courtesy Assistant Professor: Shashank Joshi
Consulting Professor: Michael Kamil
Consulting Associate Professors: Suki Hoagland, Thomas Keating
Acting Assistant Professor: Michelle Reininger
Senior Lecturers: Denise Pope, Ann Porteus
School Offices: School of Education, Room 101
Mail Code: 94305-3096
Phone: (650) 723-2109
Email: info@suse.stanford.edu
Web Site: http://ed.stanford.edu

Courses offered by the School of Education are listed under the subject code EDUC on the *Stanford Bulletin's* ExploreCourses web site.

Aiming towards the ideal of enabling all people to achieve maximum benefit from their educational experiences, the School of Education seeks to continue as a world leader in groundbreaking, cross-disciplinary inquiries that shape educational practices, their conceptual underpinnings, and the professions that serve the enterprise. The School of Education prepares scholars, teachers, teacher educators, policy analysts, evaluators, research-

ers, administrators, and other educational specialists. Two graduate degrees with specialization in education are granted by the University: Master of Arts and Doctor of Philosophy. While no undergraduate majors are offered, the school offers a number of courses for undergraduates, an undergraduate minor and undergraduate honors program, and a variety of tutoring programs.

The School of Education is organized into three program area committees: Curriculum Studies and Teacher Education (CTE); Developmental and Psychological Sciences (DAPS); and Social Sciences, Policy, and Educational Practice (SSPEP).

In addition, several cross-area programs are sponsored by faculty from more than one area. These programs include the doctoral Learning Sciences and Technology Design Program (LSTD); two master's level programs: the Stanford Teacher Education Program (STEP) and the Learning, Design, and Technology Program (LDT); and the undergraduate honors and minor programs.

These program area committees function as administrative units that act on admissions, plan course offerings, assign advisers, and determine program requirements. Various concentrations exist within most of these areas. Faculty members are affiliated primarily with one area but may participate in several programs. While there is a great deal of overlap and interdisciplinary emphasis across areas and programs, students are affiliated with one area committee or program and must meet its degree requirements.

Detailed information about admission and degree requirements, faculty members, and specializations related to these area committees and programs can be found in the publication *School of Education Guide to Graduate Studies* and at http://ed.stanford.edu.

The School of Education offers an eight-week summer session for admitted students only. The school offers no correspondence or extension courses, and in accordance with University policy, no part-time enrollment is allowed. Work in an approved internship or as a research assistant is accommodated within the full-time program of study.

UNDERGRADUATE PROGRAMS IN EDUCATION

The School of Education offers a minor and an honors program at the undergraduate level. Further information about these programs can be found at http://ed.stanford.edu/suse/.

Regardless of whether they are enrolled in one of these undergraduate programs, undergraduates are also welcome in many graduate-level courses.

GRADUATE PROGRAMS IN EDUCATION

The School of Education offers Master of Arts and Doctor of Philosophy degrees in several programs described below. University and School of Education requirements must be met for each degree. The University requirements are detailed in the "Graduate Degrees" section of this bulletin. Students are urged to read this section carefully, noting residency, tuition, and registration requirements. A student who wishes to enroll for graduate work in the School of Education must be admitted to graduate standing by one of the school's area committees and with the approval of the Associate Dean of Student Affairs.

Complete information about admissions procedures and requirements is available at http://gradadmissions.stanford.edu, or at http://ed.stanford.edu/. All applicants, except coterminal applicants, must submit scores from the Graduate Record Examination General Test (verbal, quantitative, and analytical or analytical writing areas); TOEFL scores are also required from those whose first language is not English. Applicants to the Stanford Teacher Education Program are also required to submit specific test scores or acceptable equivalents as required by the California Commission on Teacher Credentialing; see the section on STEP below. Test information is available at http://ed.stanford.edu/ in the admissions section.

HONORS PROGRAM IN EDUCATION (UNDERGRADUATE)

An honors program is available to undergraduates to supplement their regular majors outside the school. This program permits interested undergraduates at Stanford to build on the training received in their major field of study by pursuing additional courses and a research thesis in a related area of education.

Students apply for entry during the junior year. Applications are available at http://ed.stanford.edu/suse/programs-degrees/cross-area-undergrad-honors.html. The current director of the program is Mitchell Stevens, Associate Professor of Education.

At least one course must be taken from each of the following areas:

1. *Educational policy and history in the U.S.*—
   - EDUC 165. History of Higher Education in the U.S.
   - EDUC 201. History of Education in the United States
   - EDUC 202. Introduction to the Study of International Comparative Education
2. *Contemporary problem areas*—courses include:
   - EDUC 149. Theory and Issues in the Study of Bilingualism
   - EDUC 179. Urban Youth and their Institutions: Research and Practice
   - EDUC 197. Education, Gender, and Development
3. *Foundational disciplines*—courses include:
   - EDUC 110. Sociology of Education: Social Organizations of Schools
   - EDUC 204. Introduction to Philosophy of Education

A directed reading course and directed research courses with a faculty member in Education are also required. Students in the program should enroll in EDUC 199A,B,C, Undergraduate Honors Seminar, during their senior year.

Near the end of Spring Quarter, successful candidates for honors orally present brief reports of their work and findings at a mini-conference. All honors students in Education are expected to attend this conference.

MINOR IN EDUCATION (UNDERGRADUATE)

The Stanford University School of Education awards an undergraduate minor in the field of Education. The minor is structured to provide a substantial introduction to education through a broad-based and focused study of educational research, theory and practice. The goals of the minor are to allow undergraduates to develop an understanding of the core issues facing educators and policymakers, to make connections to their major programs of study, and to provide rigorous preparation for graduate studies in education.

Students interested in pursuing an undergraduate minor in Education begin by contacting the minor director (Jennifer Lynn Wolf, jlwolf@stanford.edu), who is responsible for advising all candidates and approving each student's minor plan of study. Applications for the minor are due no later than the second quarter of the junior year.

The Education Minor requires three core courses to ensure coverage of the disciplines of the field, while allowing flexibility for students wanting to pursue specific interests within Education. In order to graduate with a minor in Education, students must complete the minor program of study as described here, for a total of not less than 20 units and not more than 30 units, with a minimum of six courses.

COURSE REQUIREMENTS AND DISTRIBUTION

1. All minor students are required to take the minor core course:

- EDUC 101. Introduction to Teaching and Learning, addressing foundational issues in teaching, learning, and education.

2. All students are also required to take two foundational courses, such as the following:
   - EDUC 103B. Sociocultural Theory and Practices
   - EDUC 110. Sociology of Education
   - EDUC 201. History of Education in the United States
   - EDUC 203. The Anthropology of Education
   - EDUC 204. Introduction to Philosophy of Education
3. Each student identifies a subfield of study in which to take at least three elective courses. Established subfields of study within the School of Education include: Teaching and Learning; Education Research and Policy; and Educational Technology. Suitable elective courses include:
   1. *Subfield 1: Teaching and Learning—*
      - EDUC 103A . Tutoring: Seeing a Child through Literacy
      - EDUC 111. The Young Adult Novel: A Literature for and About Adolescents
      - EDUC 116X. Service Learning as an Approach to Teaching
      - EDUC 149. Theory and Issues in the Study of Bilingualism
      - EDUC 165. History of Higher Education in the U.S.
      - EDUC 171. Early Childhood Education Practicum
      - EDUC 208. Curriculum Construction
      - EDUC 218. Topics in Learning and Cognition
      - EDUC 223. Good Districts and Good Schools: Research, Policy and Practice
      - EDUC 256. Psychological and Educational Resilience Among Children and Youth
      - EDUC 283. Child Development in and Beyond Schools
   2. *Subfield 2: Education Research and Policy—*
      - EDUC 104X. The Conduct of Research with and in Communities
      - EDUC 119X. Writing about Education
      - EDUC 122X. Collaborations for International Environmental Education
      - EDUC 123X. Contexts that Promote Youth Development
      - EDUC 113X. Gender and Sexuality in the Schools
      - EDUC 177. Education of Immigrant Students: Psychological Perspectives
      - EDUC 197. Education, Gender and Development
      - EDUC 223. Good Districts and Good Schools: Research, Policy & Practice
   3. *Subfield 3: Educational Technology—*
      - EDUC 106. Interactive Media and Education
      - EDUC 124. Collaborative Design and Research of Technology: Integrated Curriculum
      - EDUC 208. Curriculum Construction
      - EDUC 218. Topics in Learning and Cognition
      - EDUC 283. Child Development in and Beyond Schools
      - EDUC 303X. Designing Learning Spaces
      - EDUC 333A. Understanding Learning Environments
      - EDUC 333B. Imagining the Future of Learning
      - EDUC 342. Child Development and New Technologies
4. Course work completed for the Education Minor must meet the following criteria:
   - All courses must be taken for a letter grade.
   - All courses must be completed with a minimum GPA of 3.0.
   - Courses used to fulfill the minor may not be used to fulfill any other department degree requirements (major or minor).
   - All courses must be taken at Stanford University.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN EDUCATION

The School of Education admits a small number of students from undergraduate departments within the University into a coterminal bachelor's and master's program. For information about the coterminal option through the Stanford Teacher Education Program (STEP), see the details under STEP below. Students in this program receive the bachelor's degree in their undergraduate major and the master's degree in Education. Approval of the student's undergraduate department and admission to the School of Education M.A. program are required. Undergraduates may apply when they have completed at least 120 units, and must submit their application no later than the quarter prior to the expected completion of their undergraduate degree. The number of units required for the M.A. degree depends on the program requirements within the School of Education; the minimum is 45 units.

Applicants may obtain coterminal degree application materials from the School of Education's Admissions Office in Cubberley, Room 140.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN EDUCATION

The M.A. degree is conferred by the University upon recommendation of the faculty of the School of Education. The minimum unit requirement is 45 quarter units earned at Stanford as a graduate student. Students must maintain a grade point average (GPA) of 3.0 or better in courses applicable to the degree, and a minimum of 27 units must be taken in the School of Education. Students typically enroll in 15 to 18 units per quarter. They must enroll in at least 11 units of work each quarter unless their program makes special provision for a lower quarterly minimum. Master's students should obtain detailed program requirements from the master's program officer, located in the office of academic services in the School of Education. Most programs require a final project, scholarly paper, or monograph. Additional detailed information regarding program content, entrance, and degree requirements is available at http://ed.stanford.edu. Upon admission, each student is assigned a faculty adviser from the appropriate area committee to begin early planning of a coherent program.

Master of Arts degrees are offered for the following specializations:

- Curriculum and Teacher Education. Students may specialize in English, literacy, mathematics, science, or history. (The program in CTE is not a credentialing program; see STEP below.)
- International Comparative Education
- International Educational Administration and Policy Analysis
- Joint Degree Program with Graduate School of Business (M.B.A./M.A.)
- Joint Degree Program with Law School (J.D./M.A.)
- Learning, Design, and Technology
- Policy, Organization, and Leadership Studies

In addition, an M.A. degree with a teaching credential is offered in the Stanford Teacher Education Program.

STANFORD TEACHER EDUCATION PROGRAM (STEP)

STEP is a twelve-month, full-time program leading to a Master of Arts and a preliminary California teaching credential. STEP offers two Master of Arts programs to prepare college graduates for careers as teachers in single- or multiple-subject classrooms. STEP-Secondary prepares humanities and sciences students to become teachers of English, languages (French, German, Japanese, Mandarin, Spanish), mathematics, science (biology, chemistry, earth science, physics), and history/social science. STEP-Elementary prepares students to be teachers in California multiple-subject classrooms. STEP seeks to prepare and support teachers to work with diverse learners to achieve high intellectual, academic, and social standards by creating equitable and successful schools and classrooms.

The 12-month STEP year begins in June with a Summer Quarter of intensive academic preparation and placement in a local summer school. During the academic year, students continue their course work and begin a year-long field placement under the guidance of expert teachers in local schools. The master's degree and teaching credential require a minimum of 45 quarter units, taken during four quarters of continuous residency.

Stanford undergraduates who enroll in STEP through the co-terminal program must have their B.A. conferred prior to commencing the four quarters of the STEP program. Students complete their undergraduate degree prior to beginning in the STEP year, which concludes in a master's degree and a recommendation for a California teaching credential.

Applicants to the secondary program are required to pass the California Basic Educational Skills Test (CBEST) and must demonstrate subject matter competence in one of two ways: (1) by passing the California Subject Examination for Teachers (CSET) in their content area; or (2) by completing a California state-approved subject matter preparation program. Applicants to the elementary program are required to pass the California Basic Educational Skills Test (CBEST), the California Multiple Subject Examination for Teachers (CSET), and the Reading Instruction Competence Assessment Test (RICA) after admission to the program.

Further information regarding admission requirements, course work, and credential requirements is available at http://ed.stanford.edu and in the *School of Education Guide to Graduate Studies.*

DOCTORAL DEGREES IN EDUCATION

The School of Education offers the Doctor of Philosophy (Ph.D.) degree in all program area committees. The degree is conferred by the University upon recommendation by the faculty of the School of Education and the University Committee on Graduate Studies. The Ph.D. requires a minimum of 135 units of course work and research completed at Stanford beyond the baccalaureate degree. Students may transfer up to 45 units of graduate course work. Students must consult with the doctoral programs officer if they intend to transfer prior course work. Students must maintain a grade point average (GPA) of 3.0 (B) or better in courses applicable to the degree.

Students should note that admission to the doctoral program does not constitute admission to candidacy for the degree. Students must qualify and apply for candidacy by the end of their second year of study and should obtain information about procedures and requirements during their first year from the doctoral programs officer in Cubberley 135.

The Ph.D. degree is designed for students who are preparing for research work in public school systems, branches of government, or specialized institutions; teaching roles in education in colleges or universities, and research connected with such teaching; or other careers in educational scholarship and research.

Ph.D. students must complete a minor in another discipline taught outside the school, or hold an acceptable master's degree outside the field of education, or complete an approved individually designed distributed minor that combines relevant advanced work taken in several disciplines outside the school.

Upon admission, the admitting area committee assigns an initial adviser from its faculty who works with the student to establish an appropriate and individualized course of study, a relevant minor, and project research plans. Other faculty members may also be consulted in this process. Details about administrative and academic requirements for each area committee and the School of Education, along with the expected time frame to complete program milestones, are given in the publication *School of Education Doctoral Degree Handbook*, available for download at http://ed.stanford.edu/suse/programs-degrees/publications.html.

The following doctoral specializations, with their sponsoring area and concentration, are offered:

- Administration and Policy Analysis (SSPEP)
- Anthropology of Education (SSPEP)
- Child and Adolescent Development (DAPS)
- Developmental and Psychological Sciences (DAPS)
- Economics of Education (SSPEP)
- Educational Linguistics (SSPEP)
- Educational Psychology (DAPS)
- English Education/Literacy Studies (CTE)
- General Curriculum Studies (CTE)
- Higher Education (SSPEP)
- History/Social Science Education (CTE)
- History of Education (SSPEP)
- Interdisciplinary Studies (SSPEP)
- International Comparative Education (SSPEP)
- Learning Sciences and Technology Design (CTE, DAPS, SSPEP)
- Mathematics Education (CTE)
- Organization Studies (SSPEP)
- Philosophy of Education (SSPEP)
- Science Education (CTE)
- Sociology of Education (SSPEP)
- Teacher Education (CTE)

PH.D. MINOR IN EDUCATION

Candidates for the Ph.D. degree in other departments or schools of the University may elect to minor in Education. Requirements include a minimum of 20 quarter units of graduate course work in Education and a field of concentration. Students choosing to minor in Education should meet with the Associate Dean for Student Affairs to determine a suitable course of study early in their program.

SCHOOL OF ENGINEERING

Dean: James D. Plummer
Senior Associate Deans: Laura L. Breyfogle (External Relations), Anthony J. DiPaolo (Stanford Center for Professional Development), Curtis W. Frank (Faculty and Academic Affairs), Clare Hansen-Shinnerl (Administration), Brad Osgood (Student Affairs)
Associate Dean: Noé P. Lozano (Diversity Programs)
Assistant Dean: Sally Gressens (Graduate Student Affairs)
Faculty Teaching General Engineering Courses
Professors: Stacey F. Bent, Mark Cappelli, Roger Howe, Chaitan Khosla, Thomas Lee, Reginald Mitchell, Parviz Moin, Drew Nelson, Brad Osgood, Channing R. Robertson, Stephen M. Rock, Eric Shaqfeh, Sheri Sheppard, Robert Sinclair, Stuart Thompson
Associate Professors: Samuel S. Chiu, Eric Darve, Ashish Goel, Ellen Kuhl, Sanjay Lall, Paul McIntyre, Beth Pruitt, Benjamin Van Roy
Assistant Professors: Charles E. Eesley, Oliver Fringer, Sarah Heilshorn, Nicolas A. Melosh, Christina Smolke, Clifford L. Wang, Thomas A. Weber, Xiaolin Zheng
Professors (Teaching): Thomas H. Byers, Robert E. McGinn, Eric Roberts
Associate Professor (Teaching): Mehran Sahami
Senior Lecturer: Vadim Khayms, Claude Reichard
Lecturers: Jerry Cain, David Evans, Midge Eisele, Lisa Y. Hwang, David Jaffe, Mary McDevitt, Lauren Rusk, Evelin Sullivan
Consulting Professors: Paul Mitiguy
Consulting Associate Professors: David Baggeroer, William Behrman, Brendan Boyle, Robyn Wright Dunbar
Consulting Assistant Professors: Scott Doorley
Mail Code: 94305-4027
Phone: (650) 723-5984
Web Site: http://soe.stanford.edu

Courses offered by the School of Engineering are listed under the subject code ENGR on the *Stanford Bulletin's* ExploreCourses web site.

The School of Engineering offers undergraduate programs leading to the degree of Bachelor of Science (B.S.), programs leading to both B.S. and Master of Science (M.S.) degrees, other programs leading to a B.S. with a Bachelor of Arts (B.A.) in a field of the humanities or social sciences, dual-degree programs with certain other colleges, and graduate curricula leading to the degrees of M.S., Engineer, and Ph.D.

The school has nine academic departments: Aeronautics and Astronautics, Bioengineering, Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Management Science and Engineering, Materials Science and Engineering, and Mechanical Engineering. These departments and one interdisciplinary program, the Institute for Computational and Mathematical Engineering, are responsible for graduate curricula, research activities, and the departmental components of the undergraduate curricula. In research where faculty interest and competence embrace both engineering and the supporting sciences, there are numerous programs within the school as well as several interschool activities, including the Alliance for Innovative Manufacturing at Stanford, Center for Integrated Systems, Center on Polymer Interfaces and Macromolecular Assemblies, Collaboratory for Research on Global Projects, Center for Position, Navigation, and Time, and the NIH Biotechnology Graduate Training Grant in Chemical Engineering. Energy Resources Engineering (formerly Petroleum Engineering) is offered through the School of Earth Sciences.

The School of Engineering's Institute of Design (http://dschool.stanford.edu) brings together students and faculty in engineering, business, education, medicine, and the humanities to learn design thinking and work together to solve big problems in a human-centered way.

The Woods Institute for the Environment (http://environment.stanford.edu) brings together faculty, staff, and students from the schools, institutes and centers at Stanford to conduct interdisciplinary research, education, and outreach to promote an environmentally sound and sustainable world.

The School of Engineering has a summer internship program in China for undergraduate and graduate students. For more information, see http://soe.stanford.edu/chinaintern. The department also hasan exchange program available to graduate students whose research would benefit from collaboration with Chinese academic institutions.

Instruction in Engineering is offered primarily during Autumn, Winter, and Spring quarters of the regular academic year. During the Summer Quarter, a small number of undergraduate and graduate courses are offered.

UNDERGRADUATE PROGRAMS IN THE SCHOOL OF ENGINEERING

The principal goals of the undergraduate engineering curriculum are to provide opportunities for intellectual growth in the context of an engineering discipline, for the attainment of professional competence, and for the development of a sense of the social context of technology. The curriculum is flexible, with many decisions on individual courses left to the student and the adviser. For a student with well-defined educational goals, there is often a great deal of latitude.

In addition to the special requirements for engineering majors described below, all undergraduate engineering students are subject to the University general education, writing, and foreign language requirements outlined in the first pages of this bulletin. Depending on the program chosen, students have the equivalent of from one to three quarters of free electives to bring the total number of units to 180.

The School of Engineering's *Handbook for Undergraduate Engineering Programs* is the definitive reference for all undergraduate engineering programs. It is available online at http://ughb.stanford.edu and provides detailed descriptions of all undergraduate programs in the school, as well as additional information about extracurricular programs and services. Because it is revised in the summer, and updates are made to the web site on a continuing basis, the handbook reflects the most up-to-date information on School of Engineering programs for the academic year.

Accreditation—The Accreditation Board for Engineering and Technology (ABET) accredits college engineering programs nationwide using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the following undergraduate programs are accredited: Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, and Mechanical Engineering. In ABET-accredited programs, students must meet specific requirements for engineering science, engineering design, mathematics, and science course work. Students are urged to consult the School of Engineering *Handbook for Undergraduate Engineering Programs* and their adviser.

Accreditation is important in certain areas of the engineering profession; students wishing more information about accreditation should consult their department office or the office of the Senior Associate Dean for Student Affairs in 135 Huang Engineering Center.

Policy on Satisfactory/No Credit Grading and Minimum Grade Point Average—All courses taken to satisfy major requirements (including the requirements for mathematics, science, engineering fundamentals, Technology in Society, and engineering depth) for

all engineering students (including both department and School of Engineering majors) must be taken for a letter grade if the instructor offers that option.

For departmental majors, the minimum combined GPA (grade point average) for all courses taken in fulfillment of the Engineering Fundamentals requirement and the Engineering Depth requirement is 2.0. For School of Engineering majors, the minimum GPA on all engineering courses taken in fulfillment of the major requirements is 2.0.

ADMISSION

Any students admitted to the University may declare an engineering major if they elect to do so; no additional courses or examinations are required for admission to the School of Engineering.

RECOMMENDED PREPARATION

FRESHMEN

Students who plan to enter Stanford as freshmen and intend to major in engineering should take the highest level of mathematics offered in high school. (See the "Mathematics" section of this bulletin for information on advanced placement in mathematics.) High school courses in physics and chemistry are strongly recommended, but not required. Additional elective course work in the humanities and social sciences is also recommended.

TRANSFER STUDENTS

Students who do the early part of their college work elsewhere and then transfer to Stanford to complete their engineering programs should follow an engineering or pre-engineering program at the first school, selecting insofar as possible courses applicable to the requirements of the School of Engineering, that is, courses comparable to those described under "Undergraduate Programs." In addition, students should work toward completing the equivalent of Stanford's foreign language requirement and as many of the University's General Education Requirements (GERs) as possible before transferring. Some transfer students may require more than four years (in total) to obtain the B.S. degree. However, Stanford affords great flexibility in planning and scheduling individual programs, which makes it possible for transfer students, who have wide variations in preparation, to plan full programs for each quarter and to progress toward graduation without undue delay.

Transfer credit is given for courses taken elsewhere whenever the courses are equivalent or substantially similar to Stanford courses in scope and rigor. The policy of the School of Engineering is to study each transfer student's preparation and make a reasonable evaluation of the courses taken prior to transfer by means of a petition process. Inquiries may be addressed to the Office of Student Affairs in 135 Huang Engineering Center. For more information, see the transfer credit section of the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

DEGREE PROGRAM OPTIONS

The School of Engineering offers two types of B.S. degrees: Bachelor of Science in Engineering and Bachelor of Science for Individually Designed Majors in Engineering (IDMENs). There are nine Engineering B.S. subplans that have been proposed by cognizant faculty groups and pre-approved by the Undergraduate Council: Aeronautics and Astronautics; Architectural Design; Atmosphere/Energy; Bioengineering; Biomechanical Engineering; Biomedical Computation; Computer Systems Engineering; Engineering Physics; and Product Design. The B.S. for an Individually Designed Major in Engineering has also been approved by the council.

Curricula for majors offered by the departments of Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Management Science and Engineering, Materials Science and Engineering, and Mechanical Engineering have the following components: 36-45 units of mathematics and science (see Basic Requirements 1 and 2 at the end of this section); engineering fundamentals (three course minimum, at least one of which must be unspecified by the department, see Basic Requirement 3); Technology in Society (TIS) (one course minimum, see Basic Requirement 4); engineering depth (courses such that the total number of units for Engineering Fundamentals and Engineering Depth is between 60 and 72). ABET accredited majors must meet a minimum number of Engineering Science and Engineering Design units; (see Basic Requirement 5). Curricular requirements for departmental majors are being revised at the time of publication. Consult the 2010-11 *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu for the most up-to-date listing of curricular requirements.

DUAL AND COTERMINAL PROGRAMS

A Stanford undergraduate may work simultaneously toward two bachelor's degrees or toward a bachelor's and a master's degree, that is, B.A. and M.S., B.A. and M.A., B.S. and M.S., or B.S. and M.A. The degrees may be granted simultaneously or at the conclusion of different quarters. Five years are usually required for a dual or coterminal program or for a combination of these two multiple degree programs. For further information, inquire with the School of Engineering's student affairs office, 135 Huang Engineering Center, or with department contacts listed in the *Handbook for Undergraduate Engineering Programs*, available at http://ughb.stanford.edu.

Dual B.A. and B.S. Degree Program—To qualify for both degrees, a student must:

1. complete the stated University and department requirements for each degree
2. complete 15 full-time quarters, or 3 full-time quarters after completing 180 units
3. complete a total of 225 units (180 units for the first bachelor's degree plus 45 units for the second bachelor's degree)

Coterminal Bachelor's and Master's Degree Program—A Stanford undergraduate may be admitted to graduate study for the purpose of working simultaneously toward a bachelor's degree and a master's degree, in the same or different disciplines. To qualify for both degrees, a student must:

1. complete, in addition to the 180 units required for the bachelor's degree, the number of units required by the graduate department for the master's degree which in no event is fewer than the University minimum of 45 units
2. complete the requirements for the bachelor's degree (department, school, and University) and apply for conferral of the degree at the appropriate time
3. complete the department and University requirements for the master's degree and apply for conferral of the degree at the appropriate time

A student may complete the bachelor's degree before completing the master's degree, or both degrees may be completed in the same quarter.

Admission to the coterminal program requires admission to graduate status by the pertinent department. Admission criteria vary from department to department.

Procedure for Applying for Admission to Coterminal Degree Programs—A Stanford undergraduate may apply to the pertinent graduate department using the University coterminal application form after completing 120 bachelor's degree units. Application deadlines vary by department, but in all cases the student must apply early enough to allow a departmental decision at least one quarter in advance of the anticipated date of conferral of the bachelor's degree.

Students should refer to the University Registrar's Office or its web site for details about when courses begin to count toward the master's degree requirements and when graduate tuition is assessed; this may affect the decision about when to apply for admission to graduate status.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program

rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

BACHELOR OF SCIENCE IN THE SCHOOL OF ENGINEERING

Departments within the School of Engineering offer programs leading to the B.S. degree in the following fields: Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Environmental Engineering, Management Science and Engineering, Materials Science and Engineering, and Mechanical Engineering. The School of Engineering itself offers interdisciplinary programs leading to the B.S. degree in Engineering with specializations in Aeronautics and Astronautics, Architectural Design, Atmosphere/Energy, Bioengineering, Biomechanical Engineering, Biomedical Computation, Computer Systems Engineering, Engineering Physics, and Product Design. In addition, students may elect a B.S. in an Individually Designed Major in Engineering.

The departments of Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, and Mechanical Engineering, as well as the faculty overseeing the Architectural Design, Biomechanical Engineering, Biomedical Computing, Computer Systems Engineering, and Engineering Physics majors, offer qualified students opportunities to do independent study and research at an advanced level with a faculty mentor in order to receive a Bachelor of Science with honors. An honors option is also available to students pursuing an independently designed major, with the guidance and approval of their adviser.

Petroleum Engineering—Petroleum Engineering is offered by the Department of Energy Resource Engineering in the School of Earth Sciences. Consult the "Energy Resources Engineering" section of this bulletin for requirements. School of Engineering majors who anticipate summer jobs or career positions associated with the oil industry should consider enrolling in ENGR 120, Fundamentals of Petroleum Engineering.

Programs in Manufacturing—Programs in manufacturing are available at the undergraduate, master's, and doctorate levels. The undergraduate programs of the departments of Civil and Environmental Engineering, Management Science and Engineering, and Mechanical Engineering provide general preparation for any student interested in manufacturing. More specific interests can be accommodated through Individually Designed Majors in Engineering (IDMENs).

BASIC REQUIREMENTS

Basic Requirement 1 (Mathematics)—Engineering students need a solid foundation in the calculus of continuous functions, linear algebra, an introduction to discrete mathematics, and an understanding of statistics and probability theory. Students are encouraged to select courses on these topics. To meet ABET accreditation criteria, a student's program must include the study of differential equations. Courses that satisfy the math requirement are listed at http://ughb.stanford.edu in the *Handbook for Undergraduate Engineering Programs*.

Basic Requirement 2 (Science)—A strong background in the basic concepts and principles of natural science in such fields as biology, chemistry, geology, and physics is essential for engineering. Most students include the study of physics and chemistry in their programs. Courses that satisfy the science requirement are listed at http://ughb.stanford.edu in the *Handbook for Undergraduate Engineering Programs.*

Basic Requirement 3 (Engineering Fundamentals)—The Engineering Fundamentals requirement is satisfied by a nucleus of technically rigorous introductory courses chosen from the various engineering disciplines. It is intended to serve several purposes. First, it provides students with a breadth of knowledge concerning the major fields of endeavor within engineering. Second, it allows the incoming engineering student an opportunity to explore a number of courses before embarking on a specific academic major. Third, the individual classes each offer a reasonably deep insight into a contemporary technological subject for the interested non-engineer.

The requirement is met by taking three courses from the following list, at least one of which must be chosen by the student rather than by the department:

ENGR 10. Introduction to Engineering Analysis
ENGR 14. Applied Mechanics: Statics
ENGR 15. Dynamics
ENGR 20. Introduction to Chemical Engineering (Same as CHEMENG 20)
ENGR 25. Biotechnology (Same as CHEMENG 25)
ENGR 25E. Energy: Chemical Transformations for Production, Storage, and Use (Same as CHEMENG 25E)
ENGR 30. Engineering Thermodynamics
ENGR 40. Introductory Electronics[1]
ENGR 50/50E/50M. Introduction to Materials Science, Nanotechology/Energy/or Biomaterials Emphasis
ENGR 60. Engineering Economics
ENGR 62. Introduction to Optimization (Same as MS&E 111)
ENGR 70A/CS 106A. Programming Methodology
ENGR 70B *or* X/CS 106B or X. Programming Abstractions (or Accelerated)
ENGR 80. Introduction to Bioengineering (Same as BIOE 80)

1 ENGR 40 and 50 may be taken on video at some of Stanford's Overseas Centers.

Basic Requirement 4 (Technology in Society)—It is important for the student to obtain a broad understanding of engineering as a social activity. To foster this aspect of intellectual and professional development, all engineering majors must take one course devoted to exploring issues arising from the interplay of engineering, technology, and society. Courses that fulfill this requirement are listed online at http://ughb.stanford.edu in the *Handbook for Undergraduate Engineering Programs*.

Basic Requirement 5 (Science and Design)—In order to satisfy ABET (Accreditation Board for Engineering and Technology) requirements, a student majoring in Chemical, Civil, Electrical, Environmental, or Mechanical Engineering must complete one and a half years of engineering topics, consisting of a minimum of 68 units of Engineering Science and Engineering Design appropriate to the student's field of study. In most cases, students meet this requirement by completing the major program core and elective requirements in Fundamentals and Depth. For example, ENGR 40 is a 5-unit course; 3 of these 5 units are assigned to Engineering Science and the remaining 2 units are assigned to Engineering Design. A student may need to take additional courses in Depth in order to fulfill the minimum requirement. The science and design units assigned to each major's depth courses are listed online at http://ughb.stanford.edu in the *Handbook for Undergraduate Engineering Programs.*

Experimentation—Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Materials Science and Engineering, and Mechanical Engineering must include 8 units of experimentation. Lab courses taken in the sciences, as well as experimental work taken in courses within the School of Engineering, can be used in fulfillment of this requirement. By careful planning, the experimentation requirement should not necessitate additional course work beyond that required to meet the other components of an engineering major. A list of courses and their experimentation content (in units) can be found online at http://ughb.stanford.edu in the *Handbook for Undergraduate Engineering Programs*.

BACHELOR OF ARTS AND SCIENCE (B.A.S.) IN THE SCHOOL OF ENGINEERING

This degree is available to students who complete both the requirements for a B.S. degree in engineering and the requirements for a major or program ordinarily leading to the B.A. degree. For more information, see the "Undergraduate Degrees" section of this bulletin.

MINOR IN THE SCHOOL OF ENGINEERING

An undergraduate minor in some Engineering programs may be pursued by interested students; see the *Handbook for Undergraduate Engineering Programs*, or consult with a department's undergraduate program representative or the Office of Student Affairs, Huang Engineering Center, Suite 135.

General requirements and policies for a minor in the School of Engineering are:

1. A set of courses totaling not less than 20 and not more than 36 units, with a minimum of six courses of at least 3 units each.
2. The set of courses should be sufficiently coherent as to present a body of knowledge within a discipline or subdiscipline.
3. Prerequisite mathematics, statistics, or science courses, such as those normally used to satisfy the school's requirements for a department major, may not be used to satisfy the requirements of the minor; conversely, engineering courses that serve as prerequisites for subsequent courses must be included in the unit total of the minor program.

Departmentally based minor programs are structured at the discretion of the sponsoring department, subject only to requirements 1, 2, and 3 above. Interdisciplinary minor programs may be submitted to the Undergraduate Council for approval and sponsorship. A general Engineering minor is not offered.

AERONAUTICS AND ASTRONAUTICS (AA) MINOR

The Aero/Astro minor introduces undergraduates to the key elements of modern aerospace systems. Within the minor, students may focus on aircraft, spacecraft, or disciplines relevant to both. The course requirements for the minor are described in detail below. Courses cannot be double-counted within a major and a minor, or within multiple minors; if necessary, the Aero/Astro adviser can help select substitute courses to fulfill the AA minor core.

The following core courses fulfill the minor requirements:

AA 100. Introduction to Aeronautics and Astronautics	3
ENGR 14. Statics[1]	3
ENGR 15. Dynamics[1]	3
ENGR 30. Thermodynamics[1]	3
ME 70. Introductory Fluids	4
ME 131A. Heat Transfer	4
Two courses from one of the upper-division elective areas below (min. 6 units)	
plus one course from a second area below (min. 3 units):	9-11
Aerospace Systems Synthesis/Design:	
AA 236A,B. Spacecraft Design	8
AA 241A,B. Aircraft Design	6
Dynamics and Controls:	
AA 242A. Classical Dynamics	3
AA 271A. Dynamics and Control of Spacecraft/Aircraft	3
AA 279. Space Mechanics	3
ENGR 105. Feedback Control Design	3
ENGR 205. Introduction to Control Design Techniques	3
Fluids:	
AA 200. Applied Aerodynamics	3
AA 210A. Fundamentals of Compressible Flow	3
AA 214A. Numerical Methods in Fluid Mechanics	3
or AA 283. Aircraft Propulsion	3
Structures:	
AA 240A. Analysis of Structures	3
AA 240B. Analysis of Structure II	3
AA 256. Mechanics of Composites	3

1 ENGR 14, 15, or 30 are waived as minor requirements if already taken as part of the major.

CHEMICAL ENGINEERING (CHE) MINOR

The following core courses fulfill the minor requirements:

ENGR 20/CHEMENG 20. Introduction to Chemical Engineering	3
CHEMENG 100. Chemical Process Modeling, Dynamics, and Control	3
CHEMENG 110. Equilibrium Thermodynamics	3
CHEMENG 120A. Fluid Mechanics	4
CHEMENG 120B. Energy and Mass Transport	4
CHEMENG 140. Micro and Nanoscale Fabrication	3
or CHEMENG 160. Polymer Science and Engineering	3
or CHEMENG 181. Biochemistry I	3
CHEMENG 170. Kinetics and Reactor Design	3
CHEMENG 180. Chemical Engineering Plant Design	3
CHEMENG 185A. Chemical Engineering Lab A	4
CHEM 171. Physical Chemistry	3

CIVIL ENGINEERING (CE) MINOR

The Civil Engineering minor is intended to give students an in-depth introduction to one or more areas of civil engineering. Departmental expertise and undergraduate course offerings are available in the areas of Construction Engineering and Management, Structural Engineering, and Architectural Design. Students interested in an environmental or energy focus should see the Environmental Engineering minor.

The minimum prerequisite for a Civil Engineering minor focusing on construction engineering and management or structural engineering is MATH 42 (or 21); however, many courses of interest require PHYSICS 41 and/or MATH 51 as prerequisites.

The minimum prerequisite for a Civil Engineering minor focusing on architectural design is MATH 41 (or 19) and a course in Statistics.

A minor in Civil Engineering is not an ABET-accredited degree program.

Since civil engineering is a broad field and undergraduates with varying backgrounds may be interested in obtaining a civil engineering minor, no single set of course requirements is appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below; this list must be officially approved by the Civil Engineering (CE) undergraduate minor adviser.

Additional information on preparing a minor program is available in Chapter 6 of the *Handbook for Undergraduate Engineering Programs*.

General guidelines are—

1. A Civil Engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each.
2. The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another.

Professor Anne Kiremidjian (kiremidjian@stanford.edu) is the CE undergraduate minor adviser in Structural Engineering and Construction Engineering and Management. John Barton (jhbarton@stanford.edu), Program Director for Architectural Design, is the undergraduate minor adviser in Architectural Design. Students must consult one of these advisers in developing their minor program, and obtain approval of the finalized study list from them.

COMPUTER SCIENCE (CS) MINOR

The following core courses fulfill the minor requirements. Prerequisites include the standard mathematics sequence through MATH 51.

Introductory Programming (AP Credit may be used to fulfill this requirement):	5
CS 106B. Programming Abstractions	
or CS 106 X. Programming Abstractions (Accelerated)	5
Core:	
CS 103. Mathematical Foundations of Computing[1]	5
CS 107. Computer Organization and Systems[2]	5
CS 109. Introduction to Probability for Computer Scientists[3]	5
Electives (choose two courses from different areas):	
Artificial Intelligence—	
CS 121. Introduction to Artificial Intelligence	3
CS 221. AI: Principles and Techniques	4
Human-Computer Interaction—	
CS 147. Introduction to Human-Computer Interaction Design	4

Software—

CS 108. Object-Oriented Systems Design	4
CS 110. Principles of Computer Systems	5

Systems—

CS 140. Operating Systems	4
CS 143. Compilers	4
CS 144. Networking	4
CS 145. Databases	4
CS 148. Graphics	4

Theory—

CS 154. Automata and Complexity Theory	4
CS 157. Logic and Automated Reasoning	3
CS 161. Design and Analysis of Algorithms	5

Note: for students with no programming background and who begin with CS 106A, the minor consists of seven or eight courses.

1 Students who have taken either CS 103X or CS 103A/B are considered to have satisfied the CS 103 requirement.

2 The name of CS 107 has changed. The previous CS 107 course entitled Programming Paradigms also fulfills this requirement.

3 Students who completed STATS 116, MS&E 120, or CME 106 in Winter 2008-09 or earlier may count that course as satisfying the CS 109 requirement. These same courses taken in Spring 2008-09 or later cannot be used to satisfy the CS 109 requirement.

ELECTRICAL ENGINEERING (EE) MINOR

Courses from any of the following three options, along with four graded EE courses of level 100 or higher (13-21 units), fulfill the minor requirements:

Option I:

ENGR 40. Introductory Electronics	5
EE 101A. Circuits I	4
EE 101B. Circuits II	4
Four graded EE courses numbered 100 or higher	

Option II:

ENGR 40. Introductory Electronics	5
EE 102A. Signal Processing and Linear Systems I	4
EE 102B. Signal Processing and Linear Systems II	4
Four graded EE courses numbered 100 or higher	

Option III:

ENGR 40. Introductory Electronics	5
EE 108A. Digital Systems I	4
EE 108B. Digital Systems II	4
Four graded EE courses numbered 100 or higher	

ENVIRONMENTAL ENGINEERING (ENV) MINOR

The Environmental Engineering minor is intended to give students a broad introduction to one or more areas of Environmental Engineering. Departmental expertise and undergraduate course offerings are available in the areas of environmental engineering and science, environmental fluid mechanics and hydrology, and atmosphere/energy. The minimum prerequisite for an Environmental Engineering minor is MATH 42 (or 21); however, many courses of interest require PHYSICS 41 and/or MATH 51 as prerequisites. Students should recognize that a minor in Environmental Engineering is not an ABET-accredited degree program.

Since undergraduates having widely varying backgrounds may be interested in obtaining an environmental engineering minor, no single set of course requirements is appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below; this list must be officially approved by the Civil and Environmental Engineering (CEE) undergraduate minor adviser. Additional information on preparing a minor program is available in Chapter 6 of the *Handbook for Undergraduate Engineering Programs*.

General guidelines are—

- An Environmental Engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each.
- The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another.

Professor Lynn Hildemann (hildemann@stanford.edu) is the CEE undergraduate minor adviser in Environmental Engineering. Students must consult with Professor Hildemann in developing their minor program, and obtain approval of the finalized study list from her.

MANAGEMENT SCIENCE AND ENGINEERING (MS&E) MINOR

The following courses fulfill the minor requirements:

Background requirement:

MATH 51. Calculus	5

Minor requirements:

ENGR 60. Engineering Economy (prerequisite: MATH 41)	3
MS&E 111. Introduction to Optimization	4
MS&E 120. Probabilistic Analysis (prerequisite: MATH 51)	5
MS&E 121. Introduction to Stochastic Modeling	4
MS&E 130 or 134. Information Networks/Systems	3-4
MS&E 142 or 260. Investment Science or Production	3-4
MS&E 180. Organizations: Theory and Management	4
Elective (any 100- or 200-level MS&E course)	3-4

MATERIALS SCIENCE AND ENGINEERING (MATSCI) MINOR

A minor in Materials Science and Engineering allows interested students to explore the role of materials in modern technology and to gain an understanding of the fundamental processes that govern materials behavior.

The following courses fulfill the minor requirements:

Engineering Fundamentals (choose one of the following)—

ENGR 50. Introduction to Materials Science, Nanotechnology Emphasis	4
ENGR 50E. Introduction to Materials Science, Energy Emphasis	4
ENGR 50M. Introduction to Materials Science, Biomaterials Emphasis	4
Materials Science Fundamentals and Engineering Depth (choose 6 of the following):	24
MATSCI 151. Microstructure and Mechanical Properties	4
MATSCI 152. Electronic Materials Engineering	4
MATSCI 153. Nanostructure and Characterization	4
MATSCI 154. Solid State Thermodynamics	4
MATSCI 155. Nanomaterials Synthesis	4
MATSCI 156. Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	4
MATSCI 157. Quantum Mechanics of Nanoscale Materials	4
MATSCI 160. Nanomaterials Laboratory	4
MATSCI 161. Nanocharacterization Laboratory	4
MATSCI 162. X-Ray Diffraction Laboratory	4
MATSCI 163. Mechanical Behavior Laboratory	4
MATSCI 164. Electronic and Photonic Materials and Devices Laboratory	4
MATSCI 190. Organic and Biological Materials	4
MATSCI 192. Materials Chemistry	4
MATSCI 193. Atomic Arrangements in Solids	4
MATSCI 194. Thermodynamics and Phase Equilibria	4
MATSCI 195. Waves and Diffraction in Solids	4
MATSCI 196. Imperfections in Crystalline Solids	4
MATSCI 197. Rate Processes in Materials	4
MATSCI 198. Mechanical Properties of Materials	4
MATSCI 199. Electronic and Optical Properties of Solids	4

MECHANICAL ENGINEERING (ME) MINOR

The following courses fulfill the minor requirements:

General Minor—This minor aims to expose students to the breadth of ME in terms of topics and analytic and design activities. Prerequisites: MATH 41, 42, and PHYSICS 41.

ENGR 14. Applied Mechanics: Statics	3
ENGR 15. Dynamics	3
ENGR 30. Thermodynamics	3
ME 70. Introductory Fluids Engineering	4
ME 101. Visual Thinking	3

Plus two of the following:

ME 80. Mechanics of Materials	4
ME 131A. Heat Transfer	4
ME 161. Dynamic Systems	4
ME 203. Manufacturing and Design	4

Thermosciences Minor -- Prerequisites: MATH 41, 42, 51 (or CME 100) and PHYSICS 41.

ENGR 14. Applied Mechanics: Statics	3
ENGR 30. Thermodynamics	3
ME 70. Introductory Fluids Engineering	4
ME 131A. Heat Transfer	4
ME 131B. Fluid Mechanics	4
ME 140. Advanced Thermal Systems	5

Mechanical Design—This minor aims to expose students to design activities supported by analysis. Prerequisites: MATH 41, 42, and PHYSICS 41.

ENGR 14. Applied Mechanics: Statics	3
ENGR 15. Dynamics	3
ME 80. Mechanics of Materials	4
ME 101. Visual Thinking	3
ME 112. Mechanical Engineering Design	4
ME 203. Manufacturing and Design	4

Plus one of the following:

ME 113. Engineering Design	4
ME 210. Introduction to Mechatronics	4
ME 220. Introduction to Sensors	4

AERONAUTICS AND ASTRONAUTICS (AA)

Completion of the undergraduate program in Aeronautics and Astronautics leads to the conferral of the Bachelor of Science in Engineering. The subplan "Aeronautics and Astronautics" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN AERONAUTICS AND ASTRONAUTICS

The mission of the undergraduate program in Aeronautics and Astronautics Engineering is to provide students with the fundamental principles and techniques necessary for success and leadership in the conception, design, implementation, and operation of aerospace and related engineering systems. Courses in the major introduce students to engineering principles. Students learn to apply this fundamental knowledge to conduct laboratory experiments and aerospace system design problems. Courses in the major include engineering fundamentals, mathematics, and the sciences, as well as in-depth courses in aeronautics and astronautics, dynamics, mechanics of materials, fluids engineering, and heat transfer. The major prepares students for careers in aircraft and spacecraft engineering, space exploration, air and space-based telecommunication industries, teaching, research, military service, and many related technology-intensive fields.

REQUIREMENTS

Mathematics (24 units):	
MATH 53 *or* CME 102/ENGR 155A	5
MATH electives[1]	
Science (18 units):	
PHYSICS 41. Mechanics	4
PHYSICS 43. Electricity and Magnetism	4
One additional Physics course	3
Science electives[1]	9
Technology in Society[1] (one course required)	3-5
Engineering Fundamentals[1;] three courses minimum, including:	
ENGR 30. Engineering Thermodynamics	3
ENGR 70A. Programming Methodology	3-5
Engineering Depth (39 units):	
AA 100. Introduction to Aeronautics and Astronautics	3
AA 190. Directed Research in Aeronautics and Astronautics (WIM)	3
ENGR 15. Dynamics	3
CEE 101A. Mechanics of Materials *or* ME 80. Strength of Materials	4
ME 161. Dynamic Systems *or* PHYSICS 110. Intermediate Mechanics	4
ME 70. Introductory Fluids Engineering	4
ME 131A. Heat Transfer	4
Depth Area I[2]	6
Depth Area II[2]	6
Engineering Elective(s)[3]	3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Courses that satisfy the Math electives, Science electives, the Technology in Society requirement, and the Engineering Fundamentals requirement are listed in Figures 3-1, 3-2, 3-3, and 3-4 in the *Handbook for Undergraduate Engineering Programs at http://ughb.stanford.edu*,

2 Two of the following areas:
Fluids (AA 200, 210A, 214A, 283; ME 131B)
Structures (AA 240A, 240B, 256)
Dynamics and Controls (AA 242A, 271A, 279; ENGR 105, 205)
Systems Design (AA 241A, 241B, 236A, 236B)

3 Electives are to be approved by the adviser, and might be from the depth area lists or other upper-division Engineering courses.

ARCHITECTURAL DESIGN (AD)

Completion of the undergraduate program in Architectural Design leads to the conferral of the Bachelor of Science in Engineering. The subplan "Architectural Design" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN ARCHITECTURAL DESIGN

The mission of the undergraduate program in Architectural Design is to develop students' ability to integrate engineering and architecture in ways that blend innovative architectural design with cutting-edge engineering technologies. Courses in the program combine hands-on architectural design studios with a wide variety of other courses. Students can choose from a broad mix of elective courses concerning energy conservation, sustainability, building systems, and structures, as well as design foundation and fine arts courses. In addition to preparing students for advanced studies in architecture and construction management, the program's math and science requirements prepare students well for graduate work in other fields such as civil and environmental engineering, law, and business.

REQUIREMENTS

Mathematics and Science (36 units minimum):	
MATH 19, 20, and 21, or 41 and 42 (required)	10
One course in Statistics (required)	3-5
PHYSICS 21 or 41. Mechanics (required)	3-4
Recommended: EARTHSYS 101, 102; GES 1; CEE 64, 70, 101D; CME 100; PHYSICS 23 or 43; or from School of Engineering approved list[1]	
Technology in Society (one course required; see Basic Requirement 4)	3-5
Engineering Fundamentals (three courses minimum; see Basic Requirement 3):	
ENGR 14. Applied Mechanics: Statics	3
ENGR 60. Engineering Economy	3
Fundamentals Elective	3-5
Engineering Depth:	
CEE 31 or 31Q. Accessing Architecture Through Drawing	4
CEE 100. Managing Sustainable Building Projects (WIM)	4
CEE 101A. Mechanics of Materials	4

CEE 110. Building Information Modeling 4
CEE 130. Architectural Design: 3D Modeling, Methodology, and Process 4
CEE 136. Green Architecture 4
CEE 137B. Intermediate Architecture Studio (or one of the 137 series) 5
CEE 156. Building Systems 4
ARTHIST 3. Introduction to the History of Architecture 5
Engineering Depth Electives (with at least 3 units from SoE courses): the number of units of Depth Electives must be such that courses in Engineering Fundamentals and Engineering Depth total at least 60 units.[2]

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 School of Engineering approved list of math and science courses available in the *Handbook for Undergraduate Engineering Programs at* http://ughb.stanford.edu

2 Engineering depth electives: At least one of the following courses: CEE 111, 115, 124, 131, 131A, 132 or 138A; and others from CEE 80N, 101B, 101C, 122A,B, 134B, 135A, 139, 154, 172A, 176A, 180, 181, 182, 183; ENGR 50, 103, 131; ME 101, 110A, 115, 120, 222; ARTSTUDIO 60, 70, 140, 145, 148, 151, 271; ARTHIST 141, 142, 143A, 188A; FILMPROD 114; DRAMA 137; URBANST 110, 113, 163, 171.

ATMOSPHERE/ENERGY (A/E)

Completion of the undergraduate program in Atmosphere/Energy leads to the conferral of the Bachelor of Science in Engineering. The subplan "Atmosphere/Energy" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN ATMOSPHERE/ENERGY

Atmosphere and energy are strongly linked: fossil-fuel energy use contributes to air pollution, climate change, and weather modification; and changes in the atmosphere feed back to renewable energy, including wind, solar, hydroelectric, and wave energy. The mission of the undergraduate program in Atmosphere/Energy (A&E) is to provide students with the fundamental background necessary to solve large- and local-scale climate, air pollution, and energy problems through renewable and efficient energy systems. To accomplish this goal, students learn in detail the causes and proposed solutions to the problems, and learn to evaluate whether the proposed solutions are truly beneficial. A/E students take courses in renewable energy resources, indoor and outdoor air pollution, energy efficient buildings, climate change, renewable energy and clean-vehicle technologies, weather and storm systems, energy technologies in developing countries, electric grids, and air quality management. The curriculum is flexible: depending upon their area of interest, students may take in-depth courses in energy or atmosphere and focus either on science, technology, or policy. The major is designed to provide students with excellent preparation for careers in industry, government, and research, as well as study in graduate school.

REQUIREMENTS

Mathematics (23 units minimum, including at least one course from each group):
Group A:
MATH 53. Ordinary Differential Equations with Linear Algebra 5
CME 102. Ordinary Differential Equations for Engineers 5
Group B:
CME 106. Introduction to Probability and Statistics for Engineers 4
STATS 60. Introduction to Statistical Methods: Pre-Calculus 5
STATS 110. Statistical Methods in Engineering and the Physical Sciences 4-5
GES 160. Statistical Methods for Earth and Environmental Sciences 3-4
Science (22 units minimum, including all of the following):
PHYSICS 41. Mechanics 4
PHYSICS 43. Electricity and Magnetism 4
or 45. Light and Heat
CHEM 31B. Chemical Principles II 4
or CHEM 31X. Chemical Principles *or* ENGR 31
CEE 70. Environmental Science and Technology 3
Technology in Society:
STS 110. Ethics and Public Policy (WIM) 3-5
Engineering Fundamentals (three courses minimum, including the following):
ENGR 25E. Energy: Chemical Transformations for Production, Storage, and Use 3
Plus one of the following courses plus one elective (see Basic Requirement 3):
ENGR 30. Engineering Thermodynamics 3
ENGR 60. Engineering Economy 3
ENGR 70A. Programming Methodology 3-5
Engineering Depth (42 units minimum):
Required:
CEE 64. Air Pollution: From Urban Smog to Global Change 3
CEE 173A. Energy Resources 4-5
At least 34 units from the following with at least four courses from each group:
Group A: Atmosphere
AA 100. Introduction to Aeronautics and Astronautics 3
CEE 63. Weather and Storms 3
CEE 101B. Mechanics of Fluids *or* 4
ME 70. Introductory Fluids Engineering
CEE 164. Introduction to Physical Oceanography *or* EESS 4
146B. Atmosphere, Ocean, Climate Dynamics 3
CEE 172. Air Quality Management 3
CEE 172A. Indoor Air Quality (given alternate years) 2-3
CEE 172S. Greenhouse Gas Mitigation 3-4
CEE 178. Introduction to Human Exposure Analysis 3
EARTHSYS 111. Biology and Global Change 3
EARTHSYS 133. California Climate Change Law and Policy 3
EARTHSYS 144. Fundamentals of GIS 4
or GEOPHYS 140. Introduction to Remote Sensing 3
EARTHSYS 147. Control Climate Change/21st Century (alt years) 3
3
EARTHSYS 148. Cooperage Climate Protocol 3
or EESS 57Q. Climate Change from Past to the Future 2
EESS 146A Atm., Ocean, Clim. Dynamics: Atm. Circ. (alt years) 3
ME 131B. Fluid Mechanics: Compressible Flow and Turbomachinery 4
Group B: Energy
CEE 109. Creating a Green Student Workforce 2
or EARTHSYS 45N. Environmental Issues Confronting the World (alternate years) 3
CEE 115. Goals & Methods for the Sustainable Design of Buildings 3-4
or CEE 177S. Design for a Sustainable World 1-5
CEE 142A. Negotiating Sustainable Development 3
or CEE 156. Building Systems 4
CEE 172P. Distributed Generation and Grid Integration Renewables 3-4
CEE 176A. Energy Efficient Buildings 3-4
CEE 176B. Electric Power: Renewables and Efficiency 3-4
CEE 176F. Energy Systems Field Trips (alternate years) 4
CEE 177S. Design for a Sustainable World 1-5
CHEMENG 35N. Renewable Energy for a Sustainable World 3
EARTHSYS 101. Energy and the Environment 3
EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes 3
EARTHSYS 132. Energy and Climate Cooperation in the Western Hemisphere 4
EE 25Q. Electric Automobiles and Aircraft 3
EESS 37N. Energy and Environment on the Back of an Envelope 3
ENERGY 104. Technology in the Greenhouse *or* MATSCI 11SC. Energy Technologies for a Sustainable Future 3
2
MATSCI 156. Solar Cells, Fuel Cells, and Batteries 4

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

BIOENGINEERING (BIOE)

Completion of the undergraduate program in Bioengineering leads to the conferral of the Bachelor of Science in Engineering.

The subplan "Bioengineering" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN BIOENGINEERING

The mission of the Department of Bioengineering is to create a fusion of engineering and the life sciences that promotes scientific discovery and the development of new biomedical technologies and therapies through research and education. The Bioengineering (BIOE) major enables students to embrace biology as a new engineering paradigm and apply engineering principles to medical problems and biological systems. Students who major in BIOE obtain a solid background in the basic sciences (chemistry, physics, and biology) and mathematics. They take three engineering fundamentals courses including an introductory bioengineering course and computer programming. Starting in the sophomore year, BIOE students take six core classes to gain essential knowledge to pursue a career in bioengineering and then have the opportunity to pursue elective courses suited to their own interests. The major prepares students to continue on to graduate or medical school; work in the biotechnology, medical device, medical imaging, or other medical and non-medical industries; or pursue advanced degrees in business or law.

REQUIREMENTS

Mathematics (21 units minimum; see Basic Requirement 1)[1]	
Science (30 units minimum)[2]	
CHEM 31X *or* A,B. General Chemistry	4-8
CHEM 33. Structure and Reactivity	4
BIO 41,42. Biology Core	10
PHYSICS 41. Mechanics	4
PHYSICS 43. Electricity and Magnetism	4
BIO 44X. Core Experimental Laboratory (WIM)	4
Additional units from School of Engineering approved list	
Technology in Society (one course required; see Basic Requirement 4)	
BIOE 131. Ethics[3]	3
Engineering Topics (Engineering Science and Design):	
Engineering Fundamentals (3 courses required; see Basic Requirement 3):	
ENGR 70A (same as CS 106A). Programming Methodology	5
ENGR 80. Introduction to Bioengineering	3
Fundamentals Elective	3-5
Bioengineering Core (25 units):	
BIOE 41. Physical Biology of Macromolecules	4
BIOE 42. Physical Biology of Cells	4
BIOE 101. Systems Biology	4
BIOE 102. Systems Physiology & Design I	4
BIOE 103. Systems Physiology & Design II	4
BIOE 141. Biodesign Project I	4
BIOE 393. Bioengineering Departmental Research Colloquium	1
Options to complete the BIOE depth (4 courses, minimum 12 units[4]):	
BIOE 44. Synthetic Biology Lab	4
BIOE 121. Tissue Engineering Lab	4
BIOE 122. Optics Lab	4
BIOE 123. Bioinstrumentation and Imaging Lab	4
BIOE 141. Biodesign Project II	4
BIOE 212. Introduction to Biomedical Informatics Research Methodology	3
BIOE 214. Representations and Algorithms for Computational Molecular Biology	3
BIOE 220. Imaging Anatomy	3
BIOE 222A. Multimodality Molecular Imaging in Living Subjects I	4
BIOE 222B. Multimodality Molecular Imaging in Living Subjects II	4
BIOE 222C. Multimodality Molecular Imaging in Living Subjects III	4
BIOE 261. Principles and Practice of Stem Cell Engineering	3
BIOE 281. Biomechanics of Movement	3
BIOE 284A. Cardiovascular Bioengineering	3
BIOE 284B. Cardiovascular Bioengineering	3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs* (UGHB).

1 Mathematics courses must include MATH 53 or CME 102, and STAT 110 or 141 or CME 106; in addition, CME 104 is recommended.

2 Science must include both Chemistry and Physics with two quarters of course work in each, two courses of BIO core, and CHEM 31A and B or X, *or* ENGR 31. CHEM 31A and B are considered one course even though given over two quarters.

3 The first offering of BIOE 131 is planned for 2011-12; see UGHB, Chapter 3, Figure 3-3 for a list of other approved options.

4 Students pursuing a pre-med program will need to take additional courses; see UGHB, Chapter 5, BIOE 4-Year Plan #3.

BIOMECHANICAL ENGINEERING (BME)

Completion of the undergraduate program in Biomechanical Engineering leads to the conferral of the Bachelor of Science in Engineering. The subplan "Biomechanical Engineering" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN BIOMECHANICAL ENGINEERING

The mission of the undergraduate program in Biomechanical Engineering is to help students address health science challenges by applying engineering mechanics and design to the fields of biology and medicine. The program is interdisciplinary in nature, integrating engineering course work with biology and clinical medicine. Research and teaching in this discipline focus primarily on neuromuscular, musculoskeletal, cardiovascular, and cell and tissue biomechanics. This major prepares students for graduate studies in bioengineering, medicine or related areas.

REQUIREMENTS

Mathematics (21 units minimum; see Basic Requirement 1)	
Science (22 units minimum)[1]	
CHEM 31X *or* A,B. (required)	4-8
BIO 44X. Biology Labs (WIM)	4
Biology or Human Biology A/B core courses	10
Additional units from School of Engineering approved list	
Technology in Society (one course required; see Basic Requirement 4)	3-5
Engineering Topics (Engineering Science and Design):	
Engineering Fundamentals (minimum three courses; see Basic Requirement 3):	
ENGR 14. Applied Mechanics: Statics	3
ENGR 25. Biotechnology	3
Fundamentals Elective	3-5
Engineering Depth:	
ENGR 15. Dynamics	3
ENGR 30. Engineering Thermodynamics	3
ME 70. Introductory Fluids Engineering	4
ME 80. Mechanics of Materials	4
ME 389 or BIOE 393. Seminar	1
Options to complete the ME depth sequence (3 courses, minimum 9 units):	
ENGR 105. Feedback Control Design	3
ME 101. Visual Thinking	3
ME 103D. Engineering Drawing and Design	1
ME 112. Mechanical Engineering Design	4
ME 113. Mechanical Engineering Design	4
ME 131A. Heat Transfer	3-4
ME 131B. Fluid Mechanics	4
ME 140. Advanced Thermal Systems	5
ME 161. Dynamic Systems	4
ME 203. Manufacturing and Design	3-4
ME 210. Introduction to Mechatronics	4
ME 220. Introduction to Sensors	3-4
Options to complete the BME depth sequence (3 courses, minimum 9 units):	
BIOE 282. Performance, Development, and Adaptation of Skeletal Muscle	3
ME 280. Skeleton Development and Evolution	3
ME 281. Biomechanics of Movement	3
ME 284A. Cardiovascular Bioengineering	3
ME 284B. Cardiovascular Bioengineering	3
ME 294. Medical Device Design	3
ME 239. Mechanics of the Cell	3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Science must include both Chemistry and Physics with one year of course work (3 courses) in at least one, two courses of HUMBIO core or BIO core, and CHEM 31A and B or X, *or* ENGR 31. CHEM 31A and B are considered one course even though given over two quarters.

BIOMEDICAL COMPUTATION (BMC)

Completion of the undergraduate program in Biomedical Computation leads to the conferral of the Bachelor of Science in Engineering. The subplan "Biomedical Computation" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN BIOMEDICAL COMPUTATION

The mission of the undergraduate program in Biomedical Computation is to prepare students to work at the cutting edge of the interface between computer science, biology, and medicine. Students in the major gain a foundation in the biological and computational disciplines. They learn techniques of informatics and simulation and their countless applications in understanding and analyzing biology at all levels, from individual molecules in cells to entire organisms and populations. Students in the program select an in-depth focus area, and participate in a substantial research project with a faculty member. The Biomedical Computation major prepares students to enter a wide range of cutting-edge fields in academia and industry.

REQUIREMENTS

Mathematics (21 unit minimum; see Basic Requirement 1)
- MATH 41. Calculus 5
- MATH 42. Calculus 5
- STATS 116. Theory of Probability[1] 5
- CS 103. Mathematical Foundations of Computing 5

Science (17 units minimum; see Basic Requirement 2)
- PHYSICS 41. Mechanics 4
- CHEM 31X *or* A/B. Chemical Principles 4
- CHEM 33. Structure and Reactivity 4
- BIO 41. Evolution, Genetics, Biochemistry *or* HUMBIO 2A. Genetics, Evolution, and Ecology 5
- BIO 42. Cell Biology, Dev. Biology, and Neurobiology *or* HUMBIO 3A. Cell and Developmental Biology 5
- BIO 43. Plant Biology, Evolution, and Ecology *or* HUMBIO 4A. The Human Organism 5

Engineering Fundamentals (two different courses required):
- CS 106B (*or* CS 106X). Programming Abstractions (*or* Accelerated) 5

For the second required course, see concentrations

Technology in Society (one course required; see Basic Requirement 4) 3-5

Engineering
- CS 107. Computer Organization and Systems 5
- CS 161. Data Structures and Algorithms 4
- One of CS 270, 273A, 274, 275, 278, 279 3
- Research: 6 units of biomedical computation research in any department[2,3] 6

Engineering Depth Concentration (choose one of the following concentrations):[7]

Cellular/Molecular Concentration (10 courses):
- Mathematics: one of the following courses: 5
  - CME 100. Vector Calculus for Engineers
  - STATS 141. Biostatistics
  - MATH 51. Advanced Calculus
  - One additional Engineering Fundamental[4] 3-5
- Biology (four courses):
  - BIO 129A. Cell Dynamics I 4
  - BIO 129B. Cell Dynamics II 4
  - BIO 188. Biochemistry *or* CHEM 135. Physical Chemistry *or* CHEM 171. Physical Chemistry 3
  - BIO 203. Advanced Genetics *or* BIO 118. Genetic Analysis of Biological Processes 4
- Informatics Electives (two courses)[5,6] 6-10
- Simulation Electives (two courses)[5,6] 6-10
- Simulation, Informatics, or Cell/Mol Elective (one course)[5,6] 3-5

Informatics Concentration:
- Mathematics: One of the following courses:
  - STATS 141. Biostatistics 4
  - STATS 203. Intro to Regression Models and ANOVA 3
  - STATS 205. Intro to Nonparametric Statistic 3
  - STATS 215. Statistical Models in Biology 3
  - STATS 225. Bayesian Analysis 3
  - One additional Engineering Fundamental[4] 3-5
- Informatics Core (three courses)
  - Choose one: CS 145. Databases *or* CS 147. HCI 4
  - Choose one: CS 121/122, CS 228, CS 229 *or* CS 223B 3-4
  - One additional course from the previous two lines 3-4
- Informatics Electives (three courses)[5,6] 9-15
- Cellular Electives (two courses)[5,6] 6-10
- Organs Electives (two courses)[5,6] 6-10

Organs/Organisms Concentration:
- Mathematics (one of the following courses):
  - CME 100. Vector Calculus for Engineers 5
  - STATS 141. Biostatistics 5
  - MATH 51. Advanced Calculus 5
  - One additional Engineering Fundamental[4] 3
- Biology (two courses)
  - BIO 112. Human Physiology 4
  - BIO 188. Biochemistry I *or* BIOE/RAD 220. Introduction to Imaging 3
  - Two additional Organs Electives[5,6] 6-10
- Simulation Electives (two courses)[5,6] 6-10
- Informatics Electives (two courses)[5,6] 6-10
- Simulation, Informatics, or Organs Elective (one course)[5,6] 3-5

Simulation Concentration:
- Mathematics:
  - CME 100 *or* MATH 51. Advanced Calculus I 5
- Engineering Fundamentals:
  - ENGR 30. Engineering Thermodynamics 3
- Simulation Core:
  - CME 102 or MATH 53. Advanced Calculus II 5
  - ENGR 80. Introduction to Biotechnology 3
  - BIOE 101. Systems Biology 4
  - BIOE 102. Systems Physiology & Design I 4
  - BIOE 102. Systems Physiology & Design II 4
- Simulation Electives (two courses)[5,6] 6-10
- Cellular Elective (one course)[5,6] 3
- Organs Elective (one course)[5,6] 3
- Simulation, Cellular, or Organs Elective one course)[5,6] 3-5

These requirements are subject to change; see http://bmc.stanford.edu for the most up-to date program description. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs.*

1 CS 109, MS&E 120, MS&E 220, EE 178, and CME 106 are acceptable substitutes for STATS 116.

2 Research projects require pre-approval of BMC Coordinators.

3 Research units taken as CS 191W or in conjunction with ENGR199W fulfill the Writing in the Major (WIM) requirement. CS 272, which does not have to be taken in conjunction with research, also fulfills the WIM requirement.

4 One 3-5 unit course required; CS 106A may not be used. See Fundamentals list in *Handbook for Undergraduate Engineering Programs*.

5 The list of electives is continually updated to include all applicable courses. For the current list of electives, see http://bmc.stanford.edu.

6 A course may only be counted towards one elective or core requirement; it may not be double-counted.

7 A total of 40 Engineering units must be taken. The core classes only provide 27 Engineering units, so the remaining units must be taken from within the electives.

CHEMICAL ENGINEERING (CHE)

Completion of the undergraduate program in Chemical Engineering leads to the conferral of the Bachelor of Science in Chemical Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN CHEMICAL ENGINEERING

Chemical engineers are responsible for the conception and design of processes for the purpose of production, transformation, and transportation of materials. This activity begins with experimentation in the laboratory and is followed by implementation of

the technology in full-scale production. The mission of the undergraduate program in Chemical Engineering is to develop students' understanding of the core scientific, mathematical, and engineering principles that serve as the foundation underlying these technological processes. The program's core mission is reflected in its curriculum which is built on a foundation in the sciences of chemistry, physics, and biology. Course work includes the study of applied mathematics, material and energy balances, thermodynamics, fluid mechanics, energy and mass transfer, separations technologies, chemical reaction kinetics and reactor design, and process design. The program provides students with excellent preparation for careers in the corporate sector and government, or for graduate study.

REQUIREMENTS

Mathematics:
- MATH 41, 42. 10
- CME 100. Vector Calculus for Engineers 5
  - *or* MATH 51 and 52. Calculus 10
- CME 102. Ordinary Differential Equations for Engineers
  - *or* MATH 53. Ordinary Differential Equations 5
- CME 104. Linear Algebra and Partial Differential Equations for Engineers 5
  - *or* CME 106. Intro to Probability and Statistics for Engineers 4

Science:
- CHEM 31X. Chemical Principles 4
  - *or* CHEM 31A,B. Chemical Principles I,II 8
- CHEM 33. Structure and Reactivity 4
- CHEM 35. Organic Monofunctional Compounds 4
- CHEM 36. Chemical Separations 3
- PHYSICS 41. Mechanics 4
- PHYSICS 43. Electricity and Magnetism 4

Technology in Society (one course required; see Basic Requirement 4) 3-5

Engineering Fundamentals (three courses minimum; see Basic Requirement 3):
- ENGR 20/CHEMENG 20. Introduction to Chemical Engineering 3
- ENGR 25B/CHEMENG 25B. Biotechnology 3
- or ENGR 25E/CHEMENG 25E. Energy:Chemical Transformations for Production, Storage, and Use 3
- Fundamentals Elective 3-5

Chemical Engineering Depth (minimum 68 Engineering Science and Design units; see Basic Requirement 5):
- CHEMENG 10. The Chemical Engineering Profession 1
- CHEMENG 100. Chemical Process Modeling, Dynamics, and Control 3
- CHEMENG 110. Equilibrium Thermodynamics 3
- CHEMENG 120A. Fluid Mechanics 4
- CHEMENG 120B. Energy and Mass Transport 4
- CHEMENG 130. Separation Process 3
- CHEMENG 150. Biochemical Engineering 3
- CHEMENG 170. Kinetics and Reactor Design 3
- CHEMENG 180. Chemical Engineering Plant Design 3
- CHEMENG 185A. Chemical Engineering Laboratory A (WIM) 4
- CHEMENG 185B. Chemical Engineering Laboratory B 4
- CHEMENG 181. Biochemistry I 3
- CHEM 130. Qualitative Organic Analysis 4
- CHEM 131. Organic Polyfunctional Compounds 3
- CHEM 171. Physical Chemistry: Chemical Thermodynamics 3
- CHEM 173. Physical Chemistry: Quantum Chemistry 3
- CHEM 175. Physical Chemistry 3
- Two courses required*:
  - CHEMENG 140. Micro and Nanoscale Fabrication 3
  - CHEMENG 160. Polymer Science and Engineering 3
  - CHEMENG 174. Environmental Microbiology I 3
  - CHEMENG 183. Biochemistry II 3
  - *Any two acceptable except combining 174 and 183

Unit count is higher if program includes one or more of the following: MATH 20 series, MATH 50 series (in lieu of the CME math courses), or CHEM 31A,B (in lieu of CHEM 31X). The above requirements are subject to change. The final requirements are published with representative sequences of courses in the *Handbook for Undergraduate Engineering Programs*. Handbooks are available at http://ughb.stanford.edu or from the department or school.

CIVIL ENGINEERING (CE)

Completion of the undergraduate program in Civil Engineering leads to the conferral of the Bachelor of Science in Civil Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN CIVIL ENGINEERING

The mission of the undergraduate program in Civil Engineering is to provide students with the principles of engineering and the methodology needed for civil engineering practice. This preprofessional program balances the fundamentals common to many specialties in civil engineering and allows for concentration in structures and construction or environmental and water studies. Students in the major learn to apply knowledge of mathematics, science, and civil engineering to conduct experiments, design structures and systems to creatively solve engineering problems, and communicate their ideas effectively. The curriculum includes course work in structural, construction, and environmental engineering. The major prepares students for careers in government and industry, and further graduate study.

REQUIREMENTS

Mathematics and Science (45 units minimum[1]; see Basic Requirements 1 and 2):

Technology in Society (one course; see Basic Requirement 4) 3-5

Engineering Fundamentals (three courses minimum; see Basic Requirement 3)
- ENGR 14. Applied Mechanics: Statics 3
- ENGR 60. Engineering Economy 3
- Fundamentals Elective 3-5

Engineering Depth (minimum of 68 Engineering Science and Design units; see Basic Requirement 5):
- CEE 70. Environmental Science and Technology 3
- CEE 100. Managing Sustainable Building Projects (WIM) 4
- CEE 101A. Mechanics of Materials 4
- CEE 101B. Mechanics of Fluids 4
- CEE 101C. Geotechnical Engineering 4
- Specialty courses in either Environmental and Water Studies[2]
  - *or* Structures and Construction[3] 39-40
- Other School of Engineering Electives 0-4

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Mathematics must include CME 100/102 (or Math 51/53) and a Statistics class. Science must include PHYSICS 41, either CHEM 31A, CHEM 31X or ENGR 31; two additional quarters in either chemistry or physics, and GES 1. For students in the Environmental and Water Studies track, the additional chemistry or physics must include CHEM 33; for students in the Structures and Construction track, it must include PHYSICS 43 or 45.

2 Environmental and Water Studies: ENGR 30; CEE 101D, 160, 161A, 166A, 166B, 171, 172, 177, 179A; and either CEE 169 or 179C. Remaining specialty units from: CEE 63, 64, 109, 129, 164, 166D, 172A, 173A, 176A, 176B, 178, 199.

3 Structures and Construction: ENGR 50 or 50M; CEE 102, 156, 180, 181, 182, 183. Remaining specialty units from: ENGR 15, CME 104; CEE 101D, 111, 115, 122A,B, 129, 141A/B, 142A, 147, 151, 154, 159C, 160, 161A, 171, 176A, 176B, 195A/B, 196, 199, 203, and one of 110, 130, 131A, 134B, or 135A.

COMPUTER SCIENCE (CS)

Completion of the undergraduate program in Computer Science leads to the conferral of the Bachelor of Science in Computer Science.

MISSION OF THE UNDERGRADUATE PROGRAM IN COMPUTER SCIENCE

The mission of the undergraduate program in Computer Science is to develop students' breadth of knowledge across the sub-

ject areas of computer sciences, including their ability to apply the defining processes of computer science theory, abstraction, design, and implementation to solve problems in the discipline. Students take a set of core courses. After learning the essential programming techniques and the mathematical foundations of computer science, students take courses in areas such as programming techniques, automata and complexity theory, systems programming, computer architecture, analysis of algorithms, artificial intelligence, and applications. The program prepares students for careers in government, law, and the corporate sector, and for graduate study.

REQUIREMENTS

Mathematics (26 units minimum):
- CS 103. Mathematical Foundations of Computing[1] — 5
- CS 109. Introduction to Probability for Computer Scientists[2] — 5
- MATH 41, 42. Calculus[3] — 10
- Plus two electives[4]

Science (11 unit minimum):
- PHYSICS 41. Mechanics — 4
- PHYSICS 43. Electricity and Magnetism — 4
- Science Elective[5] — 3

Technology in Society (one course; see Basic Requirement 4) — 3-5

Engineering Fundamentals (13 units; see Basic Requirement 3)
- CS 106B *or* X. Programming Abstractions (or Accelerated) — 5
- ENGR 40. Electronics — 5
- Fundamentals Elective (may not be 70A, B, or X) — 3-5

Writing in the Major (one course):
- CS 181W, 191W, 194W, 210B, 294W

Computer Science Core (15 units):
- CS 107. Computer Organization and Systems[6] — 5
- CS 110. Principles of Computer Systems[7] — 5
- CS 161. Data Structures and Algorithms[8] — 5

Computer Science Depth[9] (choose one of the following tracks; 25 units minimum):

Artificial Intelligence Track—
- CS 221. Artificial Intelligence: Principles and Techniques — 4
- Choose two of: CS 223A, 223B, 224M, 224N, 226, 227, 228, 229 — 6-8
- One additional course from the list above or the following: CS 124, 205A, 222, 224S, 224U, 224W, 225A 225B, 227B, 262, 276, 277, 279, 321, 323, 326A, 327A, 329 (with adviser consent), 374, 379 (with adviser consent); EE 263, 376A; ENGR 205, 209A; MS&E 251, 339, 351; STATS 315A, 315B — 3-4
- Track Electives: at least three additional courses from the lists above, the general CS electives list[10], or the following: CS 275, 278; EE 364A, 364B; ECON 286; MS&E 252, 352, 355; PHIL 152; PSYCH 202, 204A, 204B; STATS 200, 202, 205 — 9-13

Biocomputation Track—the Mathematics, Science, and Engineering Fundamentals requirements are non-standard for this track. See *Handbook for Undergraduate Engineering Programs* for details.)
- One of: CS 121, 221, 223B, 228, 229 — 3-4
- One of: CS 262, 270, 273A, 274, 275, 278, 279 — 3-4
- One additional course from the lists above or the following: CS 124, 145, 147, 148, 248 — 3-4
- One course from either the general CS electives list[10] or the list of Biomedical Computation (BMC) Informatics electives (see http://bmc.stanford.edu and select Informatics from the elective options) — 3-4
- One course from the BMC Informatics elective list — 3-4
- One course from either the BMC Informatics, Cellular/Molecular, or Organs/Organisms electives lists — 3-5
- One course from either the BMC Cellular/Molecular or Organs/Organisms electives lists — 3-5

Graphics Track—
- CS 148, 248 — 8
- One of[11]: CS 205A; CME 104, 108; MATH 52, 113 — 3-5
- Two of: CS 164, 178, 205B, 223B, 268, 348A, 348B, 448 — 6-8
- Track Electives: at least two additional courses from the lists above, the general CS electives list[10], or the following: ARTSTUDI 60, 70, 179; CS 48N, 326A; CME 302, 306, 324; EE 262, 264, 278, 368; ME 101; PSYCH 30, 221; STS 144 — 6-8

Human-Computer Interaction Track—
- CS 147, 247 — 8
- One of: CS 148, 376, 377, 378 — 3-4
- One of: CS 108, 124, 140, 142, 221, 229, 249A — 3-4
- One of: PSYCH 55, 252; MS&E 184; ME 101 — 3-6
- Track Electives: at least two additional courses from the lists above, the general CS electives list[10], or the following: ARTSTUDI 60; COMM 169; CME 340; CS 447 (with consent of undergraduate adviser), 448B (with adviser consent); ME 216A; PSYCH 205, 221 — 6-9

Information Track—
- CS 124, 145 — 8
- Two courses, from different areas: — 6-9
  - *Information-based AI applications*: CS 224N, 224S, 229
  - *Database and Information Systems:* CS 140, 142, 245, 246, 341, 345, 346, 347
  - *Information Systems in Biology:* CS 262, 270, 274
  - *Information Systems on the Web:* CS 224W, 276, 364B
- At least three additional courses from the above areas or the general CS electives list[10] — 9-14

Systems Track—
- CS 140 — 4
- One of: CS 143 or EE 108B — 3-4
- Two additional courses from the list above or the following: CS 144, 145, 149, 155, 240, 242, 243, 244, 245; EE 271, 282 — 6-8
- Track Electives: at least three additional courses selected from the list above, the general CS electives list[10], or the following: CS 240E, 244C, 244E, 315A, 315B, 341, 343, 344, 344E, 345, 346, 347, 349 (with adviser consent), 448; EE 382A, 382C, 384A, 384B, 384C, 384S, 384X, 384Y — 9-12

Theory Track—
- CS 154 — 4
- One of: CS 164, 255, 258, 261, 268, 361A, 361B, 365 — 3
- Two additional courses from the list above or the following: CS 143, 155, 157 or PHIL 151, 205A, 228, 242, 254, 259, 262, 354, 355, 357, 358, 359 (with consent of undergraduate adviser), 364A, 364B, 369 (with advisor consent), 374; MS&E 310 — 6-8
- Track Electives: at least three additional courses from the list above, the general CS electives list[10], or the following: CME 302, 305; PHIL 152 — 9-12

Unspecialized Track—
- CS 154 — 4
- One of: CS 140, 143 — 4
- One additional course from the list above or the following: CS 144, 155, 242, 244; EE 108B — 3-4
- One of: CS 121 or 221, 223A, 223B, 228, 229 — 3-4
- One of: CS 145, 147, 148, 248, 262 — 3-4
- At least two courses from the general CS electives list[10] — 6-8

Individually Designed Track—
- Students may propose an individually designed track. Proposals should include a minimum of seven courses, at least four of which must be CS courses numbered 100 or above. See *Handbook for Undergraduate Engineering Programs* for further information.

Capstone Project (3 units minimum)
- CS 191, 191W, 194, 194W, 210B, 294, 294W[12] — 3

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

1 Students who have taken either CS 103X or CS 103A,B are considered to have satisfied the CS103 requirement. Students who took CS103X are required to complete one additional unit in their track or elective courses (i.e., 26 total units for track and elective courses).

2 Students who completed STATS 116, MS&E 120, or CME 106 in Winter Quarter 2008-09 or earlier may count that course as satisfying the CS 109 requirement. These same courses taken in Spring Quarter 2008-09 or later cannot be used to satisfy the CS 109 requirement.

3 MATH 19, 20, and 21 may be taken instead of MATH 41 and 42 as long as at least 26 MATH units are taken.

4 The math electives list consists of: MATH 51, 103, 104, 108, 109, 110, 113; CS 157, 205A; PHIL 151; CME 100, 102, 104. Completion of MATH 52 and 53 counts as one math elective. Restrictions: MATH 51 and 103, or MATH 103 and 113, or CS 157 and PHIL 151, may not be used in combination to satisfy the math electives requirement. Students who have taken both MATH 51 and 52 may not count CME 100 as an elective. Courses counted as math electives cannot also count as CS electives, and vice versa.

5 The science elective may be any course of 3 or more units from the School of Engineering lists plus PSYCH 30 or 55; AP Chemistry and Physics also may be used to meet this requirement. Either of the PHYSICS sequences 61/63 or 21/23 may be substituted for 41/43 as long as at least 11 science units are taken.

6 The name of CS 107 has changed. The previous CS 107 course entitled Programming Paradigms also fulfills this requirement.

7 Students who completed CS 108 and either CS 140 or CS 143 by Winter Quarter 2008-09 or earlier, may choose to count CS 108 as satisfying the CS 110 requirement. In such a case, CS 108 may not also be counted as an elective and the student is required to complete one additional unit in their track or elective courses (i.e., 26 total units for track and elective courses).

8 Students who took CS 161 for 4 units are required to complete one additional unit in their track or elective courses (i.e., 26 total units for track and elective courses).

9 Students must satisfy the requirements for any one track. Track requirements plus electives should include a minimum of seven courses and total at least 25 units.

10 General CS Electives: CS 108, 121 or 221, 124, 140, 142, 143, 144, 145, 147, 148, 149, 154, 155, 156, 157 or PHIL 151, 164, 205A, 205B, 210A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 225A, 225B, 226, 227, 228, 228T, 229, 240, 241, 242, 243, 244, 244B, 245, 246, 247, 248, 249A, 249B, 254, 255, 256, 257, 258, 261, 262, 270, 271, 272, 273A, 274, 276, 277, 295; CME 108; EE 108B, 282.

11 CS 205A is recommended in this list for the Graphics track. Students taking CME 104 are also required to take its prerequisite, CME 102.

12 Independent study projects (CS 191 or 191W) require faculty sponsorship and must be approved by the adviser, faculty sponsor, and the CS senior project adviser (R. Plummer or P. Young). A signed approval form, along with a brief description of the proposed project, should be filed the quarter before work on the project is begun. Further details can be found in the *Handbook for Undergraduate Engineering Programs*.

COMPUTER SYSTEMS ENGINEERING (CSE)

Completion of the undergraduate program in Computer Systems Engineering leads to the conferral of the Bachelor of Science in Engineering. The subplan "Computer Systems Engineering" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN COMPUTER SYSTEMS ENGINEERING

The mission of the undergraduate program in Computer Systems Engineering is to introduce students to the design, analysis, and application of computers and computer-based systems. Through course and laboratory experiences, students learn the principles essential to defining, designing, and building both general purpose and application-specific computer systems. Course work emphasizes fundamental elements of electrical engineering and computer science as well as underlying circuit and logic technologies. The senior project provides a unique hands-on experience. The program prepares students for careers in industry or for graduate study.

REQUIREMENTS

Mathematics (25 units minimum):
- MATH 41, 42, 51. Calculus — 15
- MATH 52 *or* 53. Multivariable Math — 5
- CS 109. Introduction to Probability for Computer Scientists[1] — 5

Science (12 units):
- PHYSICS 41. Mechanics — 4
- PHYSICS 43. Electricity and Magnetism — 4
- PHYSICS 45. Light and Heat — 4

Technology in Society (one course required; see Basic Requirement 4) — 3-5

Engineering Fundamentals (13 units minimum; see Basic Requirement 3):
- ENGR 40. Introductory Electronics — 5
- ENGR 70B *or* 70X. Programming Abstractions *or* Accelerated (same as CS 106 B *or* X) — 5
- Fundamentals Elective (may not be ENGR 70A, B, *or* X) — 3-5

Writing in the Major (one course):
- CS 181W, 191W, 194W, 210B, 294W — 3-4

Computer Systems Engineering Core (32 units minimum):
- CS 103. Mathematical Foundations of Computing[2] — 5
- CS 107. Computer Organization and Systems[3] — 5
- CS 108. Object-Oriented Systems Design — 4
  - *or* CS 110. Principles of Computer Systems — 5
- EE 108A. Digital Systems I — 3 or 4
- EE 108B. Digital Systems II — 3 or 4
- Senior Project (CS 191, 191W, 194, 194W, 210B, 294, or 294W)[4] — 3

Plus two of the following:[5]
- EE 101A. Circuits I — 4
- EE 101B. Circuits II — 4
- EE 102A. Signals and Systems I — 4
- EE 102B. Signals and Systems II — 4

Computer Systems Engineering Depth:
(19-27 units; choose one of the following specializations):

Digital Systems Specialization:
- CS 140. Operating Systems — 4
  - or CS 143. Compilers
- EE 109. Digital Systems Design Lab — 4
- EE 271. VLSI Systems — 3

Plus three to four of the following:[6]
- CS 140 or 143 (if not counted above) — 4
- CS 144. Introduction to Computer Networking — 4
- CS 149. Parallel Programming — 4
- CS 240E. Embedded Wireless Systems — 3
- CS 244. Advanced Topics in Networking — 4
- CS 244E. Wireless Networking — 3
- EE 273. Digital Systems Engineering — 3
- EE 282. Computer Systems Architecture — 3

Robotics and Mechatronics Specialization
- CS 205A. Math for Robotics, Vision, Graphics — 3
- CS 223A. Introduction to Robotics — 3
- ME 210. Introduction to Mechatronics — 4
- ENGR 105. Feedback Control Design — 3

Plus two to three of the following:[6]
- AA 278. Optimal Control and Hybrid Systems — 3
- CS 223B. Introduction to Computer Vision — 3
- CS 225A. Experimental Robotics — 3
- CS 225B. Robot Programming Lab — 4
- CS 277. Experimental Haptics — 3
- ENGR 205. Introduction to Control Design — 3
- ENGR 206. Control System Design — 3-4
- ENGR 207A. Linear Control Systems I — 3
- ENGR 207B. Linear Control Systems II — 3

Networking Specialization:
- CS 140. Operating Systems — 4
- CS 144. Introduction to Computer Networking — 4

Plus four to five of the following:[6]
- CS 240. Advanced Topics in Operating Systems — 3
- CS 240E. Embedded Wireless Systems — 3
- CS 244. Advanced Topics in Networking — 4
- CS 244B. Distributed Systems — 3
- CS 244E. Wireless Networking — 3
- CS 249A. Object-Oriented Programming — 3
- CS 249B. Advanced Object-Oriented Programming — 3
- EE 179. Introduction to Communications — 3
- EE 276. Introduction to Wireless Personal Communications — 3

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

1 Students who complete STATS 116, MS&E 120, or CME 106 in Winter 2008-09 or earlier may count that course as satisfying the CS109 requirement. These same courses taken in Spring 2008-09 or later cannot be used to satisfy the CS 109 requirement.

2 Students who have taken either CS 103X or CS 103A, B are considered to have satisfied the CS 103 requirement. Students taking CS 103A,B may complete the lower number of elective courses in a given specialization (see footnote 6).

3 The name of CS 107 has changed. The previous CS 107 course entitled Programming Paradigms also fulfills this requirement.

4 Independent study projects (CS 191 or 191W) require faculty sponsorship and must be approved in advance by the adviser, faculty sponsor, and the CSE senior project adviser (R. Plummer or P. Young). A signed approval form and brief description of the proposed project should be filed the quarter before work on the project is begun. Further details can be found in the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

5 Students pursuing the Robotics and Mechatronics or Networking specializations must take EE 102A and B.

6 Students who take CS 103A,B may complete the lower number of elective courses in a given specialization (i.e., one less elective than students taking CS 103X or CS 103).

ELECTRICAL ENGINEERING (EE)

Completion of the undergraduate program in Electrical Engineering leads to the conferral of the Bachelor of Science in Electrical Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN ELECTRICAL ENGINEERING

The mission of the undergraduate program of the Department of Electrical Engineering is to augment the liberal education expected of all Stanford undergraduates, to impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology, and to provide majors in the department with knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals. The program develops students' skills in performing and designing experimental projects and communicating their findings to the scientific community effectively. Students in the major are required to select one subdiscipline for specialization. Choices include computer hardware, computer software, controls, electronics, fields and waves, communication and signal processing, or solid state and photonic devices. The program prepares students for careers in government agencies, the corporate sector, or for future study in graduate or professional schools.

REQUIREMENTS

Mathematics:
- MATH 41, 42 — 10
- MATH 51 and 52, *or* CME 100/ ENGR 154 and CME 104/ENGR 155B — 10
- MATH 53 *or* CME 102/ENGR 155A — 5
- EE 178, STATS 116, MATH 151, *or* CME 106/ENGR 155C — 3-5

Science:
- PHYSICS (41, 43) *or* (61, 63) — 8
- Math or Science electives[1]: — 7-9

Technology in Society (one course; see Basic Requirement 4) — 3-5

Technical Writing: ENGR 102E (WIM corequisite for EE 108A) — 1

EE 100. The Electrical Engineering Profession — 1

Engineering Fundamentals (three courses minimum; see Basic Requirement 3):
- CS 106B *or* CS 106X — 5
- At least two additional courses, at least one of which is not in EE or CS — 6-10

Engineering Depth (minimum 68 Engineering Science and Design units; see Basic Requirement 5):
- Circuits: EE 101A,B — 8
- Signals Processing and Linear Systems: EE 102A,B — 8
- Digital Systems: EE 108A (Laboratory, WIM), 108B — 8
- Physics in Electrical Engineering: EE 41 or EE 141 — 3-5
- Specialty courses[2] — 9-12
- One course in Design[3]
- Electrical Engineering electives[4] — 9-20

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 A minimum of 12 science units must be taken. A minimum of 45 math and science units combined must be taken.

2 Three courses from one of the specialty areas shown below (consultation with an adviser in the selection of these courses is especially important):

Computer Hardware: EE 109, 271, 273, 282; CS 107

Computer Software: CS 107, 108, 140, 143, 145, 148, 194 (CS 144 *or* EE 284)

Controls: ENGR 105, 205, 206, 207A, 207B, 209A, 209B; EE 263

Circuits and Devices: EE 114, 116, 122, 133, 212, 214, 216, 271

Fields and Waves: EE 134, 141, 242, 246, 247, 252, 256

Communications and Signal Processing: EE 124, 133, 168, 179, 261, 263 (264 *or* 265), 276, 278, 279

Solid State and Photonic Devices: EE 116, 134, 136, 141, 216, 222, 223, 228, 235, 268

3 The design course may be part of the specialty sequence. The following courses satisfy this requirement: EE 109, 133, 134, 168, 256, 262, 265; CS 194, ENGR 206.

4 May include up to two additional Engineering Fundamentals. May include up to 10 units of EE 191. May include any CS 193 course.

ENGINEERING PHYSICS (EPHYS)

Completion of the undergraduate program in Engineering Physics leads to the conferral of the Bachelor of Science in Engineering. The subplan "Engineering Physics" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN ENGINEERING PHYSICS

The mission of the undergraduate program in Engineering Physics is to provide students with a strong foundation in physics and mathematics, together with engineering design and problem solving skills. All majors take high-level math and physics courses as well as engineering courses. This background prepares them to tackle complex problems in multidisciplinary areas that are at the forefront of 21st-century technology such as solid state devices, quantum optics and photonics, materials science, nanotechnology, electromechanical systems, energy systems, and any other engineering field that requires a solid background in physics. Because the program emphasizes science, mathematics, and engineering, students are well prepared to pursue graduate work in engineering, physics, or applied physics.

REQUIREMENTS

Mathematics (18 units):
- MATH 51 and 52. Multivariable Calculus *or* CME 100 and 104. Vector Calculus, Linear Algebra, PDE — 10
- MATH 53 or CME 102. Ordinary Differential Equations — 5
- MATH 131P. Partial Differential Equations I — 3

Science (15 units minimum):
- PHYSICS 41and 42. Mechanics and Lab[1] — 5
- PHYSICS 43 and 67[2]. Electricity and Magnetism and Lab — 5
- PHYSICS 45 and 46. Light and Heat and Lab — 5
- PHYSICS 70. Foundations of Modern Physics — 4

  or
- PHYSICS 61 and 62. Mechanics and Special Relativity and Lab[3] — 5
- PHYSICS 63 and 64. Electricity, Magnetism, and Waves and Lab — 5
- PHYSICS 65 and 67. Thermodynamics and Modern Physics and Lab — 6

Technology in Society (one course required; see Basic Requirement 4) — 3-5

Engineering Fundamentals (three courses minimum; CS 106A or X recommended) — 9-14

Engineering Physics Depth (core):
- Advanced Mathematics
- One advanced math elective such as EE 261, PHYSICS 112, CS 109, or CME 106. Also qualified are EE 263, any Math or Statistics course numbered 100 or above, and any CME course numbered 200 or above, except CME 206. — 3-4
- Intermediate Mechanics:
- ENGR 15. Dynamics — 3
  - *or* PHYSICS 110. Intermediate Mechanics — 4
- Intermediate Electricity and Magnetism:
- EE 141 and 242. Engineering Electromagnetics and Electromagnetic Waves — 7
  - *or* PHYSICS 120 and 121. Intermediate Electricity and Magnetism — 8
- Numerical Methods:
- APPPHYS 215. Numerical Methods for Physicists and Engineers — 3
  - *or* CME 108. Introduction to Scientific Computing — 3-4
  - *or* CME 206/ME 300C. Intro to Numerical Methods for Engineering — 3
  - *or* PHYSICS 113. Computational Physics — 4

Electronics Lab:
- ENGR 40. Introductory Electronics — 5
  - *or* EE 101B. Circuits II — 3
  - *or* EE 122A. Analog Circuits Laboratory — 3
  - *or* PHYSICS 105. Analog Electronics — *3*
  - *or* APPPHYS 207. Laboratory Electronics — 3

Writing Lab (WIM):
- EE 108A and ENGR 102E. Digital Systems I — 4-5
  - *or* ME 203 and ENGR 102M. Manufacturing and Design — 5
  - *or* MATSCI 161. Nanocharacterization Laboratory — 4

or MATSCI 164. Electronic and Photonic Materials and Devices Laboratory	4
or PHYSICS 107. Experimental Techniques and Data Analysis	4
Quantum Mechanics:	
EE 222 and 223. Applied Quantum Mechanics I and II	6
or PHYSICS 130 and 131. Quantum Mechanics	8
Thermodynamics and Statistical Mechanics:	
PHYSICS 170 and 171. Thermodynamics, Kinetic Theory, and Statistical Mechanics	8
or ME 346A. Introduction to Statistical Mechanics	3
Design Course (choose one of the following):	
CS 108. Object-Oriented Systems Design	3-4
EE 133. Analog Communications Design Laboratory	3-4
ME 203. Design and Manufacturing	4
ME 210 *or* EE 118. Introduction to Mechatronics	4
PHYSICS 108. Project Laboratory	3
Three courses from one specialty area:	9-12
Solid State Physics:	
APPPHYS 272. Solid State Physics I	3
APPPHYS 273. Solid State Physics II	3
EE 116. Semiconductor Device Physics	3
EE 216. Principles and Models of Semiconductor Devices	3
MATSCI 199. Electronic and Optical Properties of Solids	4
PHYSICS 172. Solid State Physics	3
Photonics:	
EE 216. Principles and Models of Semiconductor Devices	3
EE 231. Introduction to Lasers	3
EE 232. Laser Dynamics	3
EE 234. Photonics Laboratory	3
EE 243. Semiconductor Optoelectronic Devices	3
EE 268. Introduction to Modern Optics	3
MATSCI 199. Electronic and Optical Properties of Solids	4
Materials Science: Any MATSCI courses numbered 151 to 199 (except 159Q) or PHYSICS 172	
Electromechanical System Design:	
ME 80. Mechanics of Deformable Bodies	4
ME 112. Mechanical Systems Design	4
ME 210 or EE 118. Introduction to Mechatronics	4
Energy Systems:	
ME 131A. Heat Transfer	3-4
ME 131B. Fluid Mechanics: Compressible Flow and Turbomachinery	4
ME 140. Advanced Thermal Systems	5
Renewable Energy:	
EE 293A. Fundamentals of Energy Processes	3-4
EE 293B. Fundamentals of Energy Processes	3
MATSCI 156. Solar Cells, Fuel Cells and Batteries	4
MATSCI 302. Solar Cells	3
MATSCI 316. Nanoscale Science, Engineering, and Technology	3
ME 260. Fuel Cell Science Technology	3

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

1 PHYSICS 42, Mechanics Lab (1 unit), recommended in 2010-11; required in 2011-12

2 PHYSICS 67, Electricity and Magnetism Lab (1 unit), recommended in place of PHYSICS 44

3 PHYSICS 62, Mechanics Lab (1 unit), recommended in 2010-11; required in 2011-12

ENVIRONMENTAL ENGINEERING (ENV)

Completion of the undergraduate program in Environmental Engineering leads to the conferral of the Bachelor of Science in Environmental Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN ENVIRONMENTAL ENGINEERING

The mission of the undergraduate program in Environmental Engineering is to equip students with the problem solving skills and knowledge necessary to assess and develop solutions to environmental problems impacting the biosphere, land, water, and air quality. Courses in the program are multidisciplinary in nature, combining fundamental principles drawn from physics, chemistry, geology, engineering, and biology. Students learn about the analytical methods necessary to evaluate environmental changes and to design strategies to prevent or remediate problems that inevitably result from human activities. The program prepares students for careers in consulting, industry, and government, and for graduate school in engineering.

REQUIREMENTS

Mathematics and Science (see Basic Requirement 1 and 2)	45 units[1]
Technology in Society[2] (one course; see Basic Requirement 4)	3-5
Engineering Fundamentals (three courses minimum; see Basic Requirement 3):	
ENGR 30. Engineering Thermodynamics	3
ENGR 60. Engineering Economy	3
Fundamentals Elective	3-5
Engineering Depth (minimum of 68 Engineering Science and Design units; see Basic Requirement 5):	
CEE 64. Air Pollution: From Urban Smog to Global Change	3
CEE 70. Environmental Science and Technology	3
CEE 100. Managing Sustainable Building Projects (WIM)	4
CEE 101B. Mechanics of Fluids	4
CEE 101D. Computations in CEE	3
CEE 160. Mechanics of Fluids Laboratory	2
CEE 161A. Rivers, Streams, and Canals	3
CEE 166A. Watersheds and Wetlands	3
CEE 166B. Floods and Droughts, Dams, and Aqueducts	3
CEE 171. Environmental Planning Methods	3
CEE 172. Air Quality Management	3
CEE 177. Aquatic Chemistry and Biology	4
CEE 179A. Water Chemistry Laboratory	2
Capstone design experience: CEE 169 or 179C	5
CEE Breadth Electives[3]	10
Other School of Engineering Electives	0-4

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

1 Math must include CME 100/102 (or Math 51/53) and a Statistics course. Science must include PHYSICS 41; one of ENGR 31, CHEM 31A *or* CHEM 31X; CHEM 33; GES 1; and one other physics or chemistry class for at least 3 units.

2 Should choose a class that specifically includes an ethics component, such as STS 101, 110 or 115; COMM 169; CS 181; or MS&E 181.

3 Breadth electives currently include CEE 63, 101C, 109, 129, 164, 166D, 169, 172A, 173A, 176A, 176B, 178, and 199.

INDIVIDUALLY DESIGNED MAJORS IN ENGINEERING (IDMENS)

Completion of the undergraduate program in Individually Designed Majors in Engineering (IDMEN) leads to the conferral of the Bachelor of Science in an Individually Designed Major: (approved title). The approved title of the IDMEN also appears on the transcript.

MISSION OF THE UNDERGRADUATE PROGRAM IN INDIVIDUALLY DESIGNED MAJORS IN ENGINEERING

The mission of the undergraduate program in Individually Designed Majors in Engineering (IDMEN) is to provide students with an understanding of engineering principles and the analytical and problem solving, design, and communication skills necessary to be successful in the field. The B.S. for IDMENs is intended for undergraduates interested in pursuing engineering programs that, by virtue of their focus and intellectual content, cannot be accommodated by existing departmental majors or the pre-approved School of Engineering majors. Core courses in the curriculum include engineering fundamentals, mathematics, technology in society, and the sciences. Students then take additional courses pertinent to their IDMEN major. The program prepares students for careers in government and the corporate sector, and for graduate study.

B.S. IN INDIVIDUALLY DESIGNED MAJORS IN ENGINEERING

The B.S. degree for IDMENs is intended for undergraduates interested in pursuing engineering programs that, by virtue of their focus and intellectual content, cannot be accommodated by existing departmental majors or the pre-approved School of Engineering majors. IDMEN curricula are designed by students with the assistance of two faculty advisers of their choice and are submitted to the Undergraduate Council's Subcommittee on Individually Designed Majors. The degree conferred is "Bachelor of Science in Individually Designed Major in Engineering: (approved title)."

Students must submit written proposals to the IDMEN subcommittee detailing their course of study. Programs must meet the following requirements: mathematics (21 unit minimum, see Basic Requirement 1 below), science (17 units minimum, see Basic Requirement 2 below), Technology in Society (one approved course, see Basic Requirement 4 below), engineering (40 units minimum), and sufficient relevant additional course work to bring the total number of units to at least 90 and at most 107. Students may take additional courses pertinent to their IDMEN major, but the IDMEN proposal itself may not exceed 107 units. The student's curriculum must include at least three Engineering Fundamentals courses (choosing from ENGR 10, 14, 15, 20, 25, 30, 40, 50/50E/50M, 60, 62, 70A, 70B, 70X, 80). Students are responsible for completing the prerequisites for all courses included in their majors.

Each proposal should begin with a statement describing the proposed major. In the statement, the student should make clear the motivation for and goal of the major, and indicate how it relates to her or his projected career plans. The statement should specify how the courses to be taken relate to and move the student toward realizing the major's goal. A proposed title for the major should be included. The title approved by the IDMEN Subcommittee is listed on the student's official University transcript and on the diploma in this form: "Individually Designed Major in Subplan", where "Subplan" is the title approved by the IDMEN Subcommittee.

The proposal statement should be followed by a completed Program Sheet listing all the courses comprising the student's IDMEN curriculum, organized by the five categories printed on the sheet (mathematics, science, technology in society, additional courses, and engineering depth). Normally, the courses selected should comprise a well-coordinated sequence or sequences that provide mastery of important principles and techniques in a well-defined field. In some circumstances, especially if the proposal indicates that the goal of the major is to prepare the student for graduate work outside of engineering, a more general engineering program may be appropriate. A four-year study plan, showing courses to be taken each quarter, should also be included in the student's IDMEN proposal.

The proposal must be signed by two faculty members who certify that they endorse the major as described in the proposal and that they agree to serve as the student's permanent advisers. One of the faculty members, who must be from the School of Engineering, acts as the student's primary adviser. The proposal must be accompanied by a statement from that person giving an appraisal of the academic value and viability of the proposed major.

Students proposing IDMENs must have at least four quarters of undergraduate work remaining at Stanford after the quarter in which their proposals are first submitted. Any changes in a previously approved major must be endorsed by the advisers and reapproved by the IDMEN subcommittee. A request by a student to make changes in her or his approved curriculum must be made sufficiently far in advance so that, should the request be denied, adequate time remains to complete the original, approved curriculum. Proposals are reviewed and acted upon once a quarter. Forms may be obtained from the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu. Completed proposals should be submitted to Darlene Lazar in the Office of Student Affairs, Huang Engineering Center, Suite 135. An IDMEN cannot be a student's secondary major.

MANAGEMENT SCIENCE AND ENGINEERING (MS&E)

Completion of the undergraduate program in Management Science and Engineering leads to the conferral of the Bachelor of Science in Management Science and Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN MANAGEMENT SCIENCE AND ENGINEERING

The mission of the undergraduate program in Management Science and Engineering is to provide students with the fundamentals of engineering systems analysis so that they are able to plan, design, and implement complex economic and technical management systems. The program builds on the foundational courses for engineering including calculus, engineering fundamentals, and physics or chemistry as well as management science. Students may select courses in computer science, information, organizational theory, mathematical modeling, optimization, probability, statistics and finance or production. To allow for greater in-depth exploration in a particular area, students then choose a concentration area. The major prepares students for a variety of career paths, including facilities and process management, investment banking, management consulting or for graduate school in industrial engineering, operations research, economics, public policy, medicine, law, or business.

REQUIREMENTS

Mathematics (7 courses and 32 units minimum[1]; see Basic Requirement 1):	
MATH 41. Calculus	5
MATH 42. Calculus	5
MATH 51. Linear Algebra and Differential Calculus of Several Variables	5
MATH 53. Ordinary Differential Equations with Linear Algebra	5
MS&E 120. Probabilistic Analysis	5
MS&E 121. Introduction to Stochastic Modeling	4
STATS 110 *or* 200. Statistical Methods/Inference	3-5
Science (3 courses and 11 units minimum[1]; see Basic Requirement 2):	
One of the following three sequences:	
CHEM 31B *or* X, and 33	8
PHYSICS 21, 22, 23, and 24	8
PHYSICS 41 and 43	8
Science Elective	3
Technology in Society (one course[2]; see Basic Requirement 4)	3-5
Engineering Fundamentals (three courses minimum; see Basic Requirement 3):	
CS 106A. Programming Methodology[3]	5
ENGR 25. Biotechnology *or* ENGR 40. Introduction to Electronics *or* ENGR 80. Introduction to Bioengineering	3-5
Fundamentals Elective[4]	3-5
Engineering Depth (core; all required):	26-29
CS 106B *or* CS 106X. Programming Abstractions	5
or CS 103. Math Foundations of Computing	5
or CME 108. Intro to Scientific Computing	4
ENGR 60. Engineering Economy[4]	3
MS&E 108. Senior Project	5
MS&E 111. Introduction to Optimization[4]	4
MS&E 130 *or* 134. Information[5]	3-4
MS&E 142 *or* 260. Investment Science or Production[6]	3-4
MS&E 180. Organizations: Theory and Management	4
Engineering Depth (concentration: choose one of the following 5 concentrations; 7 courses minimum):[7]	24-30
Financial and Decision Engineering Concentration:	27-30
ECON 50. Economic Analysis I	5
ECON 51. Economic Analysis II	5
MS&E 140. Industrial Accounting	4
MS&E 152. Introduction to Decision Analysis (WIM)	4
MS&E 245G *or* 247S. Finance	3-4

Two of the following courses:	
ENGR 145. Technology Entrepreneurship[8]	4
FINANCE 323. International Financial Management	4
MS&E 107. Interactive Management Science	3
MS&E 223. Simulation	3
MS&E 250A. Engineering Risk Analysis	3
MS&E 260. Production/Operating Systems[6]	4
Operations Research Concentration:	24-27
MATH 113. Linear Algebra and Matrix Theory[8]	3
MATH 115. Functions of a Real Variable[8]	3
MS&E 112. Network and Integer Optimization	3
MS&E 142 *or* 260. Investment Science or Production[6]	3-4
MS&E 152. Introduction to Decision Analysis (WIM)	3-4
MS&E 241. Economic Analysis	3-4
MS&E 251. Stochastic Decision Models	3
STATS 202. Data Analysis[8]	3
Organization, Technology, and Entrepreneurship Concentration	24-29
At least one of the following courses:	
ECON 50. Economic Analysis I	5
PSYCH 70. Introduction to Social Psychology	4
SOC 114. Economic Sociology	5
At least two of the following courses:	
ENGR 145. Technology Entrepreneurship[8]	4
MS&E 175. Innovation, Creativity, and Change	4
MS&E 181. Issues in Technology and Work[8]	4
At least four of the following courses (may also include omitted courses from above: ENGR 145, MS&E 175, or MS&E 181):	
Organizations and Technology:	
CS 147. Intro Human Computer Interaction	4
ENGR 130. Science, Technology, and Contemporary Society[8]	4-5
MS&E 134. Organizations and Info Systems[5]	3-4
MS&E 185. Global Work	4
MS&E 189. Social Networks	3-4
Entrepreneurship and Innovation:	
MS&E 140. Industrial Accounting	3-4
MS&E 178. The Spirit of Entrepreneurship	3
MS&E 266. Management of New Product Development	4
Policy and Strategy Concentration:	25-30
ECON 50. Economic Analysis I	5
ECON 51. Economic Analysis II	5
MS&E 190. Policy and Strategy Analysis	3
At least four of the following courses, including at least one course in policy and at least one course in strategy:	
Policy:	
MS&E 193. Technology and National Security[8]	3
MS&E 197. Ethics and Public Policy (WIM)[8]	5
MS&E 243. Energy and Environmental Policy Analysis	3
MS&E 248. Economics of Natural Resources	3-4
MS&E 292. Health Policy Modeling	3
Strategy:	
ENGR 145. Technology Entrepreneurship[8]	4
MS&E 175. Innovation, Creativity, and Change	3-4
MS&E 266. Mgmt. of New Product Development	3-4
Production and Operations Management Concentration:	26-30
ECON 50. Economic Analysis I	5
ECON 51. Economic Analysis II	5
MS&E 140. Industrial Accounting	3-4
MS&E 152. Introduction to Decision Analysis (WIM)	4
and three of the following courses:	
MS&E 142 *or* 245G. Investment Science/Finance	3-4
MS&E 262. Supply Chain Management	3
MS&E 263. Internet-Enabled Supply Chains	3
MS&E 264. Sustainable Product Development and Manufacturing	3
MS&E 265. Supply Chain Logistics	4
MS&E 266. Management of New Product Development	3-4
MS&E 268. Operations Strategy	3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Math and Science must total a minimum of 45 units. Electives must come from the School of Engineering approved list, or PHYSICS 21, 22, 23, 24, 25, 26; PSYCH 55, 70. AP credit for Chemistry, Mathematics, and Physics may be used.

2 Technology in Society course must be one of the following MS&E approved courses: COMM 120, 169, CS 201, MS&E 181, 193 (WIM), STS 101/ENGR 130, STS 110/MS&E 197 (WIM), STS 115/ENGR 131, STS 160, 163, 170, 279.

3 Students may petition to place out of CS 106A.

4 Students may not count ENGR 60 or 62 for engineering fundamentals as those courses count toward engineering depth (core) and cannot be double counted.

5 Students may not count 134 for both core and the Organization, Technology, and Entrepreneurship concentration.

6 Students may not count 142 or 260 for both core and concentration. Students doing the Financial and Decision Engineering concentration must take 142, students doing the Operations Research concentration must take both 142 and 260, and students doing the Production and Operations Management concentration must take 260.

7 Engineering fundamentals, engineering depth (core), and engineering depth (concentration) must total a minimum of 60 units.

8 Courses used to satisfy the Math, Science, Technology in Society, or Engineering Fundamental requirement may not also be used to satisfy an engineering depth requirement.

MATERIALS SCIENCE AND ENGINEERING (MATSCI)

Completion of the undergraduate program in Materials Science and Engineering leads to the conferral of the Bachelor of Science in Materials Science and Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN MATERIALS SCIENCE AND ENGINEERING

The mission of the undergraduate program in Materials Science and Engineering is to provide students with a strong foundation in materials science and engineering with emphasis on the fundamental scientific and engineering principles which underlie the knowledge and implementation of material structure, processing, properties, and performance of all classes of materials used in engineering systems. Courses in the program develop students' knowledge of modern materials science and engineering, teach them to apply this knowledge analytically to create effective and novel solutions to practical problems, and develop their communication skills and ability to work collaboratively. The program prepares students for careers in industry and for further study in graduate school.

REQUIREMENTS

Mathematics (20 units minimum; see Basic Requirement 1):	
MATH 51 and 52, *or* CME 100/ENGR 154 and CME 104/ENGR 155B	10
MATH 53 *or* CME 102/ENGR 155A	5
Science (20 units minimum; see Basic Requirement 2):	
Must include a full year of physics or chemistry, with one quarter of study in the other subject.	
Technology in Society (one course; see Basic Requirement 4)	3-5
Engineering Fundamentals (three courses minimum; see Basic Requirement 3)	
ENGR 50. Intro to Materials Science, Nanotechnology[1]	4
or ENGR 50E. Intro to Materials Science, Energy[1]	4
or ENGR 50M. Intro to Materials Science, Biomaterials[1]	4
At least two additional courses	6-9
Materials Science and Engineering Depth:	
Materials Science Fundamentals[2]	24
MATSCI 153. Nanostructure and Characterization	4
MATSCI 154. Solid State Thermodynamics	4
MATSCI 155. Nanomaterials Synthesis	4
MATSCI 157. Quantum Mechanics of Nanoscale Materials	4
And two additional courses	8
Engineering Depth: Choose four of the following lab courses:	16
MATSCI 160. Nanomaterials Laboratory	4
MATSCI 161. Nanocharacterization Laboratory (WIM)	4
MATSCI 162. X-Ray Diffraction Laboratory	4
MATSCI 163. Mechanical Behavior Laboratory	4
MATSCI 164. Electronic & Photonic Materials & De-	4

vices Lab (WIM)
Focus Area Options[3] 10

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 If both ENGR 50, 50E, and/or ENGR 50M are taken, one may be used for the Materials Science Fundamentals requirement.

2 Materials Science Fundamentals; 24 units (6 courses): MATSCI 153, 154, 155 and 157 are required, and choose 2 courses from ENGR 50, 50E, or 50M MATSCI 151,152, 156, 190, 192, 193, 194, 195, 196, 197, 198, 199. The MATSCI 150 series is designed specifically for undergraduates, while the 190 series represents more advanced courses.

3 Focus Area Options; 10 units from one of the following areas:

Bioengineering: BIOE 220, 281, 284A, 284B, 333, 381; MATSCI 190, 380, 381, 382

Chemical Engineering: CHEM 171; CHEMENG 130, 140, 150, 160

Chemistry: CHEM 151, 153, 171, 173, 175, 181, 183, 185

Electronics and Photonics: EE 101A, 101B, 102A, 102B, 116, 134, 136, 141

Energy Technology: EE 293A, 293B; MATSCI 302, 303; ME 260

Materials Characterization Techniques: MATSCI 320, 321, 323, 325, 326.

Mechanical Behavior and Design: AA 240A, 240B, 256; MATSCI 198, 358; ME 80 or CEE 101A, ME 203, 294

Nanoscience: BIOE 333, EE 136, ENGR 240, MATSCI 316, 320, 346, 347, 380

Physics: PHYSICS 70, 110, 120, 121,130, 131, 134 170, 171, 172.

Self-Defined Option: petition for a self-defined cohesive program, minimum of 10 units.

MECHANICAL ENGINEERING (ME)

Completion of the undergraduate program in Mechanical Engineering leads to the conferral of the Bachelor of Science in Mechanical Engineering

MISSION OF THE UNDERGRADUATE PROGRAM IN MECHANICAL ENGINEERING

The mission of the undergraduate program in Mechanical Engineering is to provide students with a balance of intellectual and practical experiences that enable them to address a variety of societal needs. The curriculum encompasses elements from a wide array of disciplines built around the themes of biomedicine, computational engineering, design, energy, and multiscale engineering. Course work may include mechatronics, computational simulation, solid and fluid dynamics, microelectromechanical systems, biomechanical engineering, energy science and technology, propulsion, sensing and control, and nano- and micro- mechanics, and design. The program prepares students for entry-level work as mechanical engineers and for graduate studies in either an engineering discipline or another field where a broad engineering background is useful.

REQUIREMENTS

Mathematics (24 units minimum[1]; see Basic Requirement 1) must include:
CME 102/ENGR 155A. Ordinary Differential Equations for Engineers
or MATH 53. Ordinary Differential Equations with Linear Algebra 5
and
CME 106/ENGR 155C. Introduction to Probability and Statistics for Engineers
or STATS 110. Statistical Methods in Engineering
or STATS 116. Theory of Probability 3-5
Science (21 units minimum[1]; see Basic Requirement 2):
CHEM 31X *or* ENGR 31 (recommended)
Technology in Society (one course from approved ME list;[2] see Basic Requirement 4) 3-5
Engineering Fundamentals: (three courses minimum; see Basic Requirement 3)
ENGR 40. Introductory Electronics (required) 5
ENGR 70A (same as CS 106A). Programming Methodology (required) 3-5
Fundamentals Elective[3] 3-5
Engineering Depth (minimum of 68 Engineering Science and Design ABET units; see Basic Requirement 5):
ENGR 14. Applied Mechanics: Statics 3
ENGR 15. Dynamics 3
ENGR 30. Engineering Thermodynamics 3
ENGR 102M. Technical Writing* 1
ME 70. Introductory Fluids Engineering 4
ME 80. Mechanics of Materials 4
ME 101. Visual Thinking 3
ME 103D. Engineering Drawing* 1
ME 112. Mechanical Engineering Design 4
ME 113. Mechanical Engineering Design 4
ME 131A. Heat Transfer 4
ME 131B. Fluid Mechanics 4
ME 140. Advanced Thermal Systems 5
ME 161. Dynamic Systems 4
ME 203. Manufacturing and Design* 4

*All three courses (ENGR 102M, ME 103D, ME 203) must be taken concurrently in order to fulfill the Writing in the Major (WIM) requirement.

Options to complete the ME depth sequence: see the list of options in the ME major section of the *Handbook for Undergraduate Engineering Programs*.

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Math and science must total 45 units. Math: 24 units required and must include a course in differential equations (CME 102/ENGR 155A or MATH 53; one of these required) and Statistics (CME 106/ENGR 155C or STATS 110 or 116 is required—STATS 60/160 do not fulfill statistics requirement). Science: 21 units minimum and requires courses in Physics and Chemistry, with at least a full year (3 courses) in one or the other. CHEM 31A/B are considered one course because they cover the same material as CHEM 31X but at a slower pace. CHEM 31X or ENGR 31 are recommended.

2 ME majors must choose their TIS course from the following list: ME 190 (recommended; offered every other year), STS 101, 110, or 115; POLISCI 114S, or CS 281.

3 ME Fundamental elective may not be a course counted for other requirements. Students may opt to use ENGR 14, 15, or 30 from the required depth courses as the third fundamental class. However, total units for Engineering Topics (Fundamentals + Depth) must be a minimum of 68 units; additional options courses may be required to meet unit requirements.

PRODUCT DESIGN (PD)

Completion of the undergraduate program in Product Design leads to the conferral of the Bachelor of Science in Engineering. The subplan "Product Design" appears on the transcript and on the diploma.

MISSION OF THE UNDERGRADUATE PROGRAM IN PRODUCT DESIGN

The mission of the undergraduate program in Product Design is to graduate designers who can synthesize technology and aesthetics in the service of human need. The program teaches a design process that encourages creativity, craftsmanship, and personal expression, and emphasizes brainstorming and need finding. Students studying product design follow the basic mechanical engineering curriculum and are expected to meet the University requirements for a Bachelor of Science degree. The program emphasis is placed on conceptual thinking, creativity, risk taking, and aesthetics. Students are taught to use design processes to resolve constraints arising from technical, human, aesthetic, and business concerns. The course work provides students with the skills necessary to carry projects from initial concept to completion of working prototypes. The program prepares students for careers in industry and for graduate study.

REQUIREMENTS

Mathematics (20 units minimum)
Recommended: one course in Statistics
Science (22 units minimum):15 units must be from School of Engineering approved list[1]
One year of PHYSICS 40 series (required)
Behavioral Science[1] (8 units minimum):
PSYCH 1. Introduction to Psychology (required) 5
PSYCH elective from courses numbered 20-952 3-5
Mathematics and Science (maximum combined total of 45 units)
Technology in Society (one course):
ME 120. History of Philosophy of Design (required) 3-4
Engineering Fundamentals (three courses minimum): 13-15
ENGR 40 (required), 70A (required), plus one course from ENGR 10, 15, 20, 25, 30, 50, 50M, 60, 62
Product Design Engineering Depth (48 units minimum):
ARTSTUDI 60. Design I: Fundamental Visual Language 3

ARTSTUDI 160. Design II: The Bridge	3
One additional Art Studio course (ARTSTUDI 70 recommended)	3
ENGR 14. Applied Mechanics	3
ENGR 102M*. Technical/Professional Writing for ME Majors[3]	1
ME 80. Mechanics of Materials	4
ME 101. Visual Thinking	3
ME 103D*. Engineering Drawing	1
ME 110A. Design Sketching	1
ME 112. Mechanical Systems	4
ME 115A. Human Values in Design[2]	3
ME 115B. Introduction to Design Methods[2]	3
ME 115C. Design and Business Factors[2]	3
ME 116. Advanced Product Design: Formgiving	4
ME 203*. Manufacturing and Design[3]	4
ME 216A. Advanced Product Design: Needfinding	4
ME 216B. Advanced Product Design: Implementation	4

*These three courses (ENGR 102M, ME 103D, ME 203) must be taken concurrently in order to fulfill the Writing in the Major (WIM) requirement.

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

1 School of Engineering approved science list available at http://ughb.stanford.edu.

2 One quarter abroad may substitute for one of the ME 115-series classes.

3 Must be taken concurrently to fulfill the Writing in the Major requirement.

GRADUATE PROGRAMS IN THE SCHOOL OF ENGINEERING

ADMISSION

Application for admission with graduate standing in the school should be made to the graduate admissions committee in the appropriate department or program. While most graduate students have undergraduate preparation in an engineering curriculum, it is feasible to enter from other programs, including chemistry, geology, mathematics, or physics.

For further information and application instructions, see the department sections in this bulletin or http://gradadmissions.stanford.edu. Stanford undergraduates may also apply as coterminal students; details can be found under “Degree Program Options” in the "Undergraduate Programs in the School of Engineering" section of this bulletin.

FELLOWSHIPS AND ASSISTANTSHIPS

Departments and divisions of the School of Engineering award graduate fellowships, research assistantships, and teaching assistantships each year.

CURRICULA IN THE SCHOOL OF ENGINEERING

For further details about the following programs, see the department sections in this bulletin.

Related aspects of particular areas of graduate study are commonly covered in the offerings of several departments and divisions. Graduate students are encouraged, with the approval of their department advisers, to choose courses in departments other than their own to achieve a broader appreciation of their field of study. For example, most departments in the school offer courses concerned with nanoscience, and a student interested in an aspect of nanotechnology can often gain appreciable benefit from the related courses given by departments other than her or his own.

Departments and programs of the school offer graduate curricula as follows:

AERONAUTICS AND ASTRONAUTICS

- Aeroelasticity
- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Computational Aero-Acoustics
- Computational Fluid Dynamics
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Structures/Materials
- Direct and Large Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hybrid Propulsion
- Hypersonic and Supersonic Flow
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPNetworked and Hybrid Control
- Optimal Control, Estimation, System Identification
- Spacecraft Design and Satellite Engineering
- Turbulent Flow and Combustion

BIOENGINEERING

- Biomedical Computation
- Biomedical Devices
- Biomedical Imaging
- Cell and Molecular Engineering
- Regenerative Medicine

CHEMICAL ENGINEERING

- Applied Statistical Mechanics
- Biocatalysis
- Biochemical Engineering
- Bioengineering
- Biophysics
- Computational Materials Science
- Colloid Science
- Dynamics of Complex Fluids
- Energy Conversion
- Functional Genomics
- Hydrodynamic Stability
- Kinetics and Catalysis
- Microrheology
- Molecular Assemblies
- Nanoscience and Technology
- Newtonian and Non-Newtonian Fluid Mechanics
- Polymer Physics
- Protein Biotechnology
- Renewable Fuels
- Semiconductor Processing
- Soft Materials Science
- Solar Utilization
- Surface and Interface Science
- Transport Mechanics

CIVIL AND ENVIRONMENTAL ENGINEERING

- Atmosphere/Energy
- Construction Engineering and Management
- Design/Construction Integration
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Environmental and Water Studies
- Geomechanics
- Structural Engineering
- Sustainable Design and Construction

COMPUTATIONAL AND MATHEMATICAL ENGINEERING

- Applied and Computational Mathematics
- Computational Fluid Dynamics
- Computational Geometry and Topology

- Discrete Mathematics and Algorithms
- Numerical Analysis
- Optimization
- Partial Differential Equations
- Stochastic Processes

COMPUTER SCIENCE

See http://forum.stanford.edu/research/areas.php for a comprehensive list.

- Algorithmic Game Theory
- Analysis of Algorithms
- Artificial Intelligence
- Autonomous Agents
- Biomedical Computation
- Compilers
- Complexity Theory
- Computational Biology
- Computational Geometry
- Computational Logic
- Computational Photography
- Computational Physics
- Computer Architecture
- Computer Graphics
- Computer Security
- Computer Science Education
- Computer Vision
- Cryptography
- Database Systems
- Data Mining
- Digital Libraries
- Distributed and Parallel Computation
- Electronic Commerce
- Formal Verification
- Haptic Display of Virtual Environments
- Human-Computer Interaction
- Image Processing
- Information Management and Mining
- Machine Learning
- Mathematical Theory of Computation
- Mobile Computing
- Multi-Agent Systems
- Natural Language and Speech Processing
- Networks, Internet Infrastructure, and Distributed Systems
- Operating Systems
- Parallel Computing
- Probabilistic Models and Methods
- Programming Systems/Languages
- Robotics
- Robust System Design
- Scientific Computing and Numerical Analysis
- Sensor Networks
- Social Computing
- Social Networking
- Ubiquitous and Pervasive Computing
- Web Application Infrastructure

ELECTRICAL ENGINEERING

- Computer Hardware
- Computer Software Systems
- Control and Systems Engineering
- Communication Systems
- Dynamic Systems and Optimization
- Electronic Circuits
- Electronic Devices, Sensors, and Technology
- Fields, Waves, and Radioscience
- Image Systems
- Lasers, Optoelectronics, and Quantum Electronics
- Network Systems
- Signal Processing
- Solid State Materials and Devices
- VLSI Design

ENGINEERING

- Interdepartmental Programs
- Interdisciplinary Programs

MANAGEMENT SCIENCE AND ENGINEERING

- Decision and Risk Analysis
- Dynamic Systems
- Economics
- Entrepreneurship
- Finance
- Information
- Marketing
- Optimization
- Organization Behavior
- Organizational Science
- Policy
- Production
- Stochastic Systems
- Strategy

MATERIALS SCIENCE AND ENGINEERING

- Biomaterials
- Ceramics and Composites
- Computational Materials Science
- Electrical and Optical Behavior of Solids
- Electron Microscopy
- Fracture and Fatigue
- Imperfections in Crystals
- Kinetics
- Magnetic Behavior of Solids
- Magnetic Storage Materials
- Nanomaterials
- Photovoltaics
- Organic Materials
- Phase Transformations
- Physical Metallurgy
- Solid State Chemistry
- Structural Analysis
- Thermodynamics
- Thin Films
- X-Ray Diffraction

MECHANICAL ENGINEERING

- Biomechanics
- Combustion Science
- Computational Mechanics
- Controls
- Design of Mechanical Systems
- Dynamics
- Environmental Science
- Experimental Stress and Analysis
- Fatigue and Fracture Mechanics
- Finite Element Analysis
- Fluid Mechanics
- Heat Transfer
- High Temperature Gas Dynamics
- Kinematics
- Manufacturing
- Mechatronics

- Product Design
- Robotics
- Sensors
- Solids
- Thermodynamics
- Turbulence

MASTER OF SCIENCE IN THE SCHOOL OF ENGINEERING

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the "Graduate Degrees" section of this bulletin, and is described in the various department listings. A minimum of 45 units is usually required in M.S. programs in the School of Engineering. The presentation of a thesis is not a school requirement. Further information is found in departmental listings.

MASTER OF SCIENCE IN ENGINEERING

The M.S. in Engineering is available to students who wish to follow an interdisciplinary program of study that does not conform to a normal graduate program in a department. There are three school requirements for the M.S. degree in Engineering:

1. The student's program must be a coherent one with a well-defined objective and must be approved by a department within the school.
2. The student's program must include at least 21 units of courses within the School of Engineering with catalog numbers of 200 or above in which the student receives letter grades.
3. The program must include a total of at least 45 units.

Each student's program is administered by the particular department in which it is lodged and must meet the standard of quality of that department. Transfer into this program is possible from any graduate program within the school by application through the appropriate department; the department will then recommend approval to the Office of Student Affairs in the School of Engineering.

ENGINEER IN THE SCHOOL OF ENGINEERING

The degree of Engineer is intended for students who want additional graduate training beyond that offered in an M.S. program. The program of study must satisfy the student's department and must include at least 90 units beyond the B.S. degree. The presentation of a thesis is required. The University regulations for the Engineer degree are stated in the "Graduate Degrees" section of this bulletin, and further information is available in the individual departmental sections of this bulletin.

DOCTOR OF PHILOSOPHY IN THE SCHOOL OF ENGINEERING

Programs leading to the Ph.D. degree are offered in each of the departments of the school. University regulations for the Ph.D. are given in the "Graduate Degrees" section of this bulletin. Further information is found in departmental listings.

HONORS COOPERATIVE PROGRAM

Industrial firms, government laboratories, and other organizations may participate in the Honors Cooperative Program (HCP), a program that permits qualified engineers, scientists, and technology professionals admitted to Stanford graduate degree programs to register for Stanford courses and obtain the degree on a part-time basis. In many areas of concentration, the master's degree can be obtained entirely online.

Through this program, many graduate courses offered by the School of Engineering on campus are made available through the Stanford Center for Professional Development (SCPD). SCPD delivers more than 250 courses a year on television and online. For HCP employees who are not part of a graduate degree program at Stanford, courses and certificates are also available through a non-degree option (NDO) and a non-credit professional education program. Non-credit short courses may be customized to meet a company's needs. For a full description of educational services provided by SCPD, see http://scpd.stanford.edu; call (650) 725-3000; fax (650) 725-2868; or email scpd-registration@stanford.edu.

OVERSEAS STUDIES COURSES IN ENGINEERING

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

OSPBER 40B. Introductory Electronics. 5 units, Roger Howe, GER:DB:EngrAppSci

OSPBER 50B. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

FLORENCE

OSPFLOR 50F. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

PARIS

OSPPARIS 40P. Introductory Electronics. 5 units, Roger Howe, GER:DB:EngrAppSci

OSPPARIS 50P. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

WINTER QUARTER

BERLIN

OSPBER 40B. Introductory Electronics. 5 units, Roger Howe, GER:DB:EngrAppSci

OSPBER 50B. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

FLORENCE

OSPFLOR 50F. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

PARIS

OSPPARIS 50P. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

SPRING QUARTER

BERLIN

OSPBER 40B. Introductory Electronics. 5 units, Simon Wong, GER:DB:EngrAppSci

OSPBER 50B. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

FLORENCE

OSPFLOR 50F. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

KYOTO

OSPKYOTO 40K. Introductory Electronics. 5 units, Simon Wong, GER:DB:EngrAppSci

PARIS

OSPPARIS 40P. Introductory Electronics. 5 units, Simon Wong, GER:DB:EngrAppSci

OSPPARIS 50P. Introductory Science of Materials. 4 units, Staff, GER:DB:EngrAppSci

AERONAUTICS AND ASTRONAUTICS

Emeriti: (Professors) Peter Bradshaw, Arthur E. Bryson, Robert H. Cannon, Richard Christensen,* Daniel B. DeBra,* Bradford W. Parkinson,* J. David Powell,* Charles R. Steele, Stephen W. Tsai,* Walter G. Vincenti

Chair: Charbel Farhat

Professors: Brian J. Cantwell, Fu-Kuo Chang, Per Enge, Charbel Farhat, Antony Jameson, Ilan Kroo, Sanjiva Lele, Robert W. MacCormack, Stephen Rock, George S. Springer, Claire Tomlin

Associate Professors: Juan Alonso, Sanjay Lall

Assistant Professor: Sigrid Close

Courtesy Professors: C. W. Francis Everitt, J. Christian Gerdes, Ronald K. Hanson, Lambertus Hesselink

Consulting Professors: G. Scott Hubbard, Arif Karabeyoglu, Stanley Weiss, Gregory Zilliac

Consulting Assistant Professor: Steven Murray

* Recalled to active duty.

Phone: (650) 723-3317

Web Site: http://aa.stanford.edu

Courses offered by the Department of Aeronautics and Astronautics are listed under the subject code AA on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Aeronautics and Astronautics prepares students for professional positions in industry, government, and academia by offering a comprehensive program of graduate teaching and research. In this broad program, students have the opportunity to learn and integrate multiple engineering disciplines. The program emphasizes structural, aerodynamic, guidance and control, and propulsion problems of aircraft and spacecraft. Courses in the teaching program lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Undergraduates and doctoral students in other departments may also elect a minor in Aeronautics and Astronautics.

Requirements for all degrees include courses on basic topics in Aeronautics and Astronautics, as well as in mathematics, and related fields in engineering and the sciences.

The current research and teaching activities cover a number of advanced fields, with emphasis on:

- Aeroelasticity and Flow Simulation
- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Computational Aero-Acoustics
- Computational Fluid Dynamics
- Computational Mechanics and Dynamical Systems
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Materials and Structures
- Direct and Large-Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hybrid Propulsion
- Hypersonic and Supersonic Flow
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPS)
- Optimal Control, Estimation, System Identification
- Spacecraft Design and Satellite Engineering
- Turbulent Flow and Combustion

MISSION OF THE UNDERGRADUATE PROGRAM IN AERONAUTICS AND ASTRONAUTICS

The mission of the undergraduate program in Aeronautics and Astronautics Engineering is to provide students with the fundamental principles and techniques necessary for success and leadership in the conception, design, implementation, and operation of aerospace and related engineering systems. Courses in the major introduce students to engineering principles. Students learn to apply this fundamental knowledge to conduct laboratory experiments and aerospace system design problems. Courses in the major include engineering fundamentals, mathematics, and the sciences, as well as in-depth courses in aeronautics and astronautics, dynamics, mechanics of materials, fluids engineering, and heat transfer. The major prepares students for careers in aircraft and spacecraft engineering, space exploration, air and space-based telecommunication industries, teaching, research, military service, and many related technology-intensive fields.

GRADUATE PROGRAMS IN AERONAUTICS AND ASTRONAUTICS

Admission—To be eligible to apply for admission to the department, a student must have a bachelor's degree in engineering, physical science, mathematics, or an acceptable equivalent. Students who have not yet received a master's degree in a closely allied discipline will be admitted to the master's program; eligibility for the Ph.D. program is considered after the master's year (see "Doctor of Philosophy" below). Applications for admission with financial aid (fellowships or assistantships) or without financial aid must be received and completed by December 7 for the next Autumn Quarter.

Information about admission to the Honors Cooperative Program is included in the "School of Engineering" section of this bulletin. The department may consider HCP applications for Winter or Spring quarters as well as for Autumn Quarter; prospective applicants should contact the department's student services office.

Further information and application forms for all graduate degree programs may be obtained from Graduate Admissions, the Registrar's Office, http://gradadmissions.stanford.edu.

Waivers and Transfer Credits—Students may receive departmental waivers of required courses for the M.S. degree in Aeronautics and Astronautics by virtue of substantially equivalent and satisfactorily performed course work at other institutions. A waiver petition (signed by the course instructor and adviser) should be submitted to the student services office indicating (1) the Stanford University course number and title, and (2) the institution, number(s), and title(s) of the course(s) wherein substantially equivalent material was treated. If a waiver is granted, the student must take an additional technical elective, chosen in consultation with their adviser, from graduate courses in Aeronautics and Astronautics. The total 45-unit requirement for the master's degree is not reduced by course waivers.

A similar procedure should be followed for transfer credits. The number of transfer credits allowed for each degree (Engineer and Ph.D.) is delineated in the "Graduate Degrees" section of this bulletin; transfer credit is not accepted for the M.S. degree. Transfer credit is allowed only for courses taken as a graduate student, after receiving a bachelor's degree, in which equivalence to Stanford courses is established and for which a grade of 'B' or better has been awarded. Transfer credits, if approved, reduce the total number of Stanford units required for a degree.

Fellowships and Assistantships—Fellowships and course or research assistantships are available to qualified graduate students. Fellowships sponsored by Gift Funds, Stanford University, and Industrial Affiliates of Stanford University in Aeronautics and Astronautics provide grants to several first-year students for the nine-month academic year to cover tuition and living expenses. Stanford Graduate Fellowships, sponsored by the University, provide grants for three full years of study and research; each year, the department is invited to nominate several outstanding doctoral or predoctoral students for these prestigious awards. Students who have excelled in their master's-level course work at Stanford are eligible for course assistantships in the department; those who have demonstrated research capability are eligible for research assistantships from individual faculty members. Students may also hold assistantships in other departments if the work is related to their

academic progress; the criteria for selecting course or research assistants are determined by each hiring department. A standard, 20 hours/week course or research assistantship provides a semi-monthly salary and an 8-10 unit tuition grant per quarter. Research assistants may be given the opportunity of additional summer employment. They may use their work as the basis for a dissertation or Engineer's thesis.

AERONAUTICS AND ASTRONAUTICS FACILITIES

The work of the department is centered in the William F. Durand Building for Space Engineering and Science. This 120,000 square foot building houses advanced research and teaching facilities and concentrates in one complex the Department of Aeronautics and Astronautics as well as some of the activities of the Mechanical Engineering Department.

The Durand Building also houses faculty and staff offices and several conference rooms. Attached to the building is a modern classroom building equipped for televising lectures; it contains a lecture auditorium.

Through the department's close relations with nearby NASA-Ames Research Center, students and faculty have access to one of the best and most extensive collections of experimental aeronautical research facilities in the world, as well as the latest generation of supercomputers.

GENERAL INFORMATION

Further information about the facilities and programs of the department is available at http://aa.stanford.edu, or from the department's student services office.

The department has a student branch of the American Institute of Aeronautics and Astronautics, which sponsors programs and speakers covering aerospace topics and social events. It also conducts visits to nearby research, government, and industrial facilities, and sponsors a Young Astronauts Program in the local schools.

BACHELOR OF SCIENCE IN ENGINEERING (AERONAUTICS AND ASTRONAUTICS)

Although primarily a graduate-level department, the program offers an undergraduate major in Aeronautics and Astronautics (AA) leading to the B.S. degree in Engineering and an undergraduate minor in Aeronautics and Astronautics. For further information, see the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

Undergraduates interested in aerospace are encouraged to combine either a minor or a coterminal M.S. in Aeronautics and Astronautics with a major in a related discipline (such as Mechanical or Electrical Engineering). Students considering these options are encouraged to contact the department's student services office.

COTERMINAL DEGREES PROGRAM IN AERONAUTICS AND ASTRONAUTICS

This special program allows Stanford undergraduates an opportunity to work simultaneously toward a B.S. in another field and an M.S. in Aeronautics and Astronautics. General requirements for this program and admissions procedures are described in the "School of Engineering" section of this bulletin. Admission is granted or denied through the departmental faculty Admissions and Awards Committee. A coterminal student must meet the course and scholarship requirements detailed for the M.S. below.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

MASTER OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS

The University's basic requirements for the master's degree are outlined in the "Graduate Degrees" section of this bulletin. Students with an aeronautical engineering background should be able to qualify for the master's degree in three quarters of work at Stanford. Students with a bachelor's degree in Physical Science, Mathematics, or other areas of Engineering may find it necessary to take certain prerequisite courses, which would lengthen the time required to obtain the master's degree. The following are departmental requirements.

Grade Point Averages—A minimum grade point average (GPA) of 2.75 is required to fulfill the department's M.S. degree requirements; a minimum GPA of 3.4 is required for eligibility to attempt the Ph.D. qualifying examination. It is incumbent upon both M.S. and potential Ph.D. candidates to request letter grades in all courses except those that do not offer a letter grade option and those that fall into the categories of colloquia and seminars (for example, AA 297 and ENGR 298). Insufficient grade points on which to base the GPA may delay expected degree conferral or result in refusal of permission to take the qualifying examinations. Candidates with GPAs of 3.0 through 3.4 may request the permission of the candidacy committee to attempt the qualifying examinations.

The master's program (45 units) in Aeronautics and Astronautics (AA) is designed to provide a solid grounding in the basic disciplines. All candidates for this degree are expected to meet the basic course requirements in experimentation in aeronautics and astronautics, fluid mechanics, guidance and control, propulsion, and structural mechanics (category A below), in addition to work in applied mathematics (category B) and technical electives (category C).

A. *Basic Courses*—Candidates choose eight courses as follows:

1. One course in each basic area of Aeronautics and Astronautics:
   a. Experimentation: 241X, 236A, 257, 284B, or 290; or ENGR 205, 206, or 207A
   b. Fluids: one of 200 or 210A
   c. Guidance and Control: ENGR 105
   d. Propulsion: 283
   e. Structures: 240A
2. Three courses, one each from three of the areas below:
   a. Fluids: 200 (if 210A was taken or waived in item 1); or 210A (if 200 was taken or waived in item 1)
   b. Structures: 240B or 256
   c. Guidance and Control: 242A, 271A, or 279
   d. Aero/Astro elective: AA course numbered 200 and above, excluding seminars and independent research.

Candidates who believe they have satisfied a basic course requirement in previous study may request a waiver of one or more courses (see "Waivers and Transfer Credits" in the "Graduate Programs in Aeronautics and Astronautics" section of this bulletin).

B. *Mathematics Courses*—During graduate study, each candidate is expected to develop a competence in the applied mathematics pertinent to his or her major field. This requirement can be met by matriculating in a minimum of 6 units in either (1) applied mathematics (for example, complex variables, linear algebra, partial differential equations, probability), or (2) technical electives that strongly emphasize applied mathematics. A list of courses approved for the mathematics requirement is available in the departmental student services office. (Calculus, ordinary differential equations, and vector analysis are fundamental mathematics prerequisites, and do not satisfy the master's mathematics requirement.) Students planning to continue to the Ph.D. should note that 25 percent of the major-field Ph.D. qualifying examination is devoted to pertinent mathematics.

C. *Technical Electives*—Candidates, in consultation with their advisers, select at least four courses (totaling at least 12 units) in their major field from among the graduate-level courses offered by the departments of the School of Engineering and related science departments. This requirement increases by one course, taken in

either the major or peripheral fields, for each basic course that is waived. Normally, one course (3 units) in this category may be directed research. Courses taken in satisfaction of the other master's requirements (categories A, B, and D) may not also be counted as technical electives.

D. *Other Electives*—It is recommended that all candidates enroll in at least one humanities or social science course. Language classes qualify in this category, but practicing courses in, for example, art, music, and physical education do not qualify.

When planning their programs, candidates should check course descriptions carefully to ensure that all prerequisites have been satisfied. A course that is taken to satisfy a prerequisite for courses in category A (basic courses) or B (mathematics) cannot be counted as a technical elective, but can count toward the M.S. degree in category D (other electives).

MASTER OF SCIENCE IN ENGINEERING (AA)

Students whose career objectives require a more interdepartmental or narrowly focused program than is possible in the M.S. program in Aeronautics and Astronautics (AA) may pursue a program for an M.S. degree in Engineering (45 units). This program is described in the "Graduate Programs in the School of Engineering" section of this bulletin.

Sponsorship by the Department of Aeronautics and Astronautics in this more general program requires that the student file a proposal before completing 18 units of the proposed graduate program. The proposal must be accompanied by a statement explaining the objectives of the program and how the program is coherent, contains depth, and fulfills a well-defined career objective. The proposed program must include at least 12 units of graduate-level work in the department and meet rigorous standards of technical breadth and depth comparable to the regular AA Master of Science program. The grade and unit requirements are the same as for the M.S. degree in Aeronautics and Astronautics.

ENGINEER IN AERONAUTICS AND ASTRONAUTICS

The degree of Engineer represents an additional year (or more) of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master's degree alone. It is expected that fulltime students will be able to complete the degree within two years of study after the master's degree.

The University's basic requirements for the degree of Engineer are outlined in the "Graduate Degrees" section of this bulletin. The following are department requirements.

The candidate's prior study program should have fulfilled the department's requirements for the master's degree or a substantial equivalent. Beyond the master's degree, a total of 45 units of work is required, including a thesis and a minimum of 30 units of courses chosen as follows:

1. 24 units of approved technical electives, of which 9 are in mathematics or applied mathematics. (A list of courses approved for the mathematics requirement is available in the departmental student services office.) The remaining 15 units are chosen in consultation with the adviser, and represent a coherent field of study related to the thesis topic. Suggested fields include: (a) acoustics, (b) aerospace structures, (c) aerospace systems synthesis and design, (d) analytical and experimental methods in solid and fluid mechanics, (e) computational fluid dynamics, and (f) guidance and control.
2. 6 units of free electives.
3. The remaining 15 units may be thesis, research, technical courses, or free electives.

Candidates for the degree of Engineer are expected to have a minimum grade point average (GPA) of 3.0 for work in courses beyond those required for the master's degree. All courses except seminars and directed research should be taken for a letter grade.

DOCTOR OF PHILOSOPHY IN AERONAUTICS AND ASTRONAUTICS

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees" section of this bulletin. Department requirements are stated below.

Qualifications for candidacy for the doctoral degree are contingent on:

1. Having fulfilled department requirements for the master's degree or its substantial equivalent.
2. Maintaining a high scholastic record for graduate course work.
3. Completing 3 units of a directed research problem (AA 290 or an approved alternative).
4. In the first year of doctoral study, passing an oral Ph.D. qualifying examination given by the department during Autumn and Spring quarters.

Detailed information about the deadlines, nature, and scope of the Ph.D. qualifying examination can be obtained from the department. Research on the doctoral dissertation may not be formally started before passing this examination.

Beyond the master's degree, a total of 90 additional units of work is required, including a minimum of 36 units of approved formal course work (excluding research, directed study, and seminars). The courses should consist primarily of graduate courses in engineering and related sciences, and should form a strong and coherent doctoral program. At least 12 units must be from graduate-level courses in mathematics or applied mathematics (a list of approved courses is available from the department student services office). University requirements for continuous registration apply to doctoral students for the duration of the degree.

Dissertation Reading Committee—Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. Qualifying exams. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

A dissertation reading committee consists of the principal dissertation adviser and at least two other readers. Reading committees in Aeronautics and Astronautics often include faculty from another department. It is expected that at least two members of the AA faculty be on each reading committee. If the principal research adviser is not within the AA department, then the student's AA academic adviser should be one of those members. The initial committee, and any subsequent changes, must be officially approved by the department Chair.

University Oral and Dissertation—The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing), but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four selected faculty members, plus a chair from another department). Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the University oral scheduling and a one-page dissertation abstract should be submitted to the department student services office at least three weeks prior to the date of the oral for departmental review and approval.

PH.D. MINOR IN AERONAUTICS AND ASTRONAUTICS

A student who wishes to obtain a Ph.D. minor in Aeronautics and Astronautics should consult the department office for designation of a minor adviser. A minor in Aeronautics and Astronautics may be obtained by completing 20 units of graduate-level courses in the Department of Aeronautics and Astronautics, following a program (and performance) approved by the department's candidacy chair.

The student's Ph.D. reading committee and University oral committee must each include at least one faculty member from Aeronautics and Astronautics.

BIOENGINEERING

Chair: Russ B. Altman
Co-Chair: Stephen R. Quake
Professors: Russ B. Altman, Annelise E. Barron, Dennis R. Carter, Scott L. Delp, Norbert J. Pelc, Stephen R. Quake, Matthew Scott, James R. Swartz, Paul Yock
Associate Professors: Kwabena Boahen, Karl Deisseroth, Charles Taylor
Assistant Professors: Zev David Bryant, Jennifer R. Cochran, Markus Willard Covert, Andrew Endy, Kerwyn C. Huang, Michael Lin, Manu Prakash, Ingmar Riedel-Kruse, Christina D. Smolke, Fan Yang
Courtesy Professors: Daniel S. Fisher, Sanjiv Sam Gambhir, Thomas Krummel, Michael T. Longaker, Stefanos Zenios
Courtesy Associate Professors: Jeffrey A. Feinstein, Garry E. Gold, Kim Butts Pauly
Affiliated Faculty: Serafim Batzoglou, Atul J. Butte, Rebecca Fahrig, Stuart B. Goodman, Sarah Heilshorn, Ellen Kuhl, Marc E. Levenston, Craig Levin, Sylvia K. Plevritis, Mark J. Schnitzer, Krishna V. Shenoy, Daniel Mark Spielman
Student Services: Clark Center, Room S-166
Mail Code: 94305-5444
Student Services Phone: (650) 736-2254
Web Site: http://bioengineering.stanford.edu

Courses offered by the Department of Bioengineering are listed under the subject code BIOE on the *Stanford Bulletin's* ExploreCourses web site.

Bioengineering is jointly supported by the School of Engineering and the School of Medicine. The facilities and personnel of the Department of Bioengineering are housed in the James H. Clark Center, the William F. Durand Building for Space Engineering and Science, the William M. Keck Science Building, the Jerry Yang and Akiko Yamazaki Environment and Energy Building, and the Richard M. Lucas Center for Magnetic Resonance Spectroscopy and Imaging.

The departmental headquarters is in the James H. Clark Center for Biomedical Engineering and Sciences, along with approximately 600 faculty, staff, and students from more than 40 University departments. The Clark Center is also home to Stanford's Bio-X program, a collaboration of the Schools of Engineering, Medicine, Humanities and Sciences, and Earth Sciences.

Courses in the teaching program lead to the degrees of Master of Science and Doctor of Philosophy. The department collaborates in research and teaching programs with faculty members in Chemical Engineering, Mechanical Engineering, Electrical Engineering, and departments in the School of Medicine. Quantitative biology is the core science base of the department. The research and educational thrusts are in biomedical computation, biomedical imaging, biomedical devices, regenerative medicine, and cell/molecular engineering. The clinical dimension of the department includes cardiovascular medicine, neuroscience, orthopedics, cancer care, neurology, and environment.

MISSION OF THE UNDERGRADUATE PROGRAM IN BIOENGINEERING

The mission of the Department of Bioengineering is to create a fusion of engineering and the life sciences that promotes scientific discovery and the development of new biomedical technologies and therapies through research and education. The Bioengineering (BIOE) major enables students to embrace biology as a new engineering paradigm and apply engineering principles to medical problems and biological systems. Students who major in BIOE obtain a solid background in the basic sciences (chemistry, physics, and biology) and mathematics. They take three engineering fundamentals courses including an introductory bioengineering course and computer programming. Starting in the sophomore year, BIOE students take six core classes to gain essential knowledge to pursue a career in bioengineering and then have the opportunity to pursue elective courses suited to their own interests. The major prepares students to continue on to graduate or medical school; work in the biotechnology, medical device, medical imaging, or other medical and non-medical industries; or pursue advanced degrees in business or law.

The department offers an undergraduate major in Bioengineering (BIOE) leading to the B.S. degree in Engineering. An undergraduate major in Biomechanical Engineering and an undergraduate major in Biomedical Computation, both of which lead to the B.S. degree in Engineering, are available through the School of Engineering. For further information, see the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

GRADUATE PROGRAMS IN BIOENGINEERING

The University's requirements for the M.S. and Ph.D. degrees are outlined in the "Graduate Degrees" section of this bulletin.

Admission—Students are expected to enter with a series of core competencies in mathematics, biology, chemistry, physics, computing, and engineering. Students entering the program are assessed by the examination of their undergraduate transcripts and research experiences. Specifically, the department requires that students have completed mathematics through multivariable calculus and differential equations, completed a series of undergraduate biology courses (equivalent to the BIO 41,42,43 series) and completed physics, chemistry, and computer sciences courses required of all undergraduate majors in engineering.

Qualified applicants are encouraged to apply for predoctoral national competitive fellowships, especially those from the National Science Foundation. Applicants to the Ph.D. program should consult with their financial aid officers for information and applications.

The deadline for receiving applications is December 7, 2010.

Further information and application forms for all graduate degree programs may be obtained from Graduate Admissions, the Registrar's Office, http://gradadmissions.stanford.edu.

BACHELOR OF SCIENCE IN ENGINEERING (BIOENGINEERING)

The department offers an undergraduate major in Bioengineering (BIOE) leading to the B.S. degree in Engineering. For additional information, see the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

COTERMINAL B.S./M.S. PROGRAM IN BIOENGINEERING

This option is available to outstanding Stanford undergraduates who wish to work simultaneously toward a B.S. in another field and an M.S. in Bioengineering. The degrees may be granted simultaneously or at the conclusion of different quarters, though the bachelor's degree cannot be awarded after the master's degree has been granted. The University minimum requirements for the coterminal bachelor's/master's program are 180 units for the bachelor's degree plus 45 unduplicated units for the master's degree. Students may apply for the coterminal B.S. and M.S. program after 120 undergraduate units have been completed, and they must be accepted into our program one quarter before receiving the B.S. degree. Students should apply directly to the Bioengineering Student Service Office by December 7, 2010. Students interested in the coterminal degree must take the Graduate Record Examination (GRE); applications may be obtained at http://www.gre.org. Prospective applicants should see the application form, instructions, and supporting documents at http://bioengineering.stanford.edu/education/coterminal.html. University regulations and forms concerning coterminal degree programs are available at http://registrar.stanford.edu/shared/ publications.htm#Coterm.

The application must provide evidence of potential for strong academic performance as a graduate student. The application is evaluated and acted upon by the graduate admissions committee of

the department. Students are expected to enter with a series of core competencies in mathematics, biology, chemistry, physics, computing, and engineering. Typically, a GPA of at least 3.5 in engineering, science, and math is expected.

MASTER OF SCIENCE IN BIOENGINEERING

The Master of Science in Bioengineering requires 45 units of course work. The curriculum consists of core bioengineering courses, technical electives, seminars and unrestricted electives. Core courses focus on quantitative biology and biological systems analysis. Approved technical electives are chosen by the student in consultation with his/her graduate adviser, and can be selected from graduate course offerings in mathematics, statistics, engineering, physical sciences, life sciences, and medicine. Seminars highlight emerging research in bioengineering and provide training in research ethics. Unrestricted electives can be freely chosen by the student in association with his/her adviser.

The department's requirements for the M.S. in Bioengineering are:

1. *Core Bioengineering courses* (9 units)—the following courses are required:
   BIOE 300A. Molecular and Cellular Bioengineering
   BIOE 300B. Physiology and Tissue Engineering
   BIOE 301A. Molecular and Cellular Bioengineering Lab
   BIOE 301B. Clinical Needs and Technology
   These courses, together with the approved technical electives, should form a cohesive course of study that provides depth and breadth.
2. *Approved Technical Electives* (27 units)—these units must be selected from graduate courses in mathematics, statistics, engineering, physical science, life science, and medicine. They should be chosen in concert with the bioengineering courses to provide a cohesive degree program in a bioengineering focus area. Students are required to take at least one course in some area of device or instrumentation. Up to 9 units of directed study and research may be used as approved electives.
3. *Seminars* (3 units)—the seminar units should be fulfilled through BIOE 390, Introduction to Bioengineering Research, BIOE 393, Bioengineering Departmental Research Colloquium, or BIOE 459, Frontiers in Interdisciplinary Biosciences. Other relevant seminar units may also be used with the approval of the faculty adviser. One of the seminar units must be MED 255, The Responsible Conduct of Research.
4. *Unrestricted Electives* (6 units).

Students are assigned an initial faculty adviser to assist them in designing a plan of study that creates a cohesive degree program with a concentration in a particular bioengineering focus area. These focus areas include, but are not limited to: Biomedical Computation, Regenerative Medicine/Tissue Engineering, Molecular and Cell Bioengineering, Biomedical Imaging, and Biomedical Devices.

To ensure that an appropriate program is pursued by all M.S. candidates, students who first matriculate at Stanford at the graduate level must:

1. submit an adviser-approved Program Proposal for a Master's Degree form to the student services office during the first month of the first quarter of enrollment
2. obtain approval from the M.S. adviser and the Chair of Graduate Studies for any subsequent program change or changes.

It is expected that the requirements for the M.S. in Bioengineering can be completed within approximately one year. There is no thesis requirement for the M.S.

Due to the interdisciplinary nature of Bioengineering; a number of courses are offered directly through the Bioengineering Department, but many are available through other departments. See respective ExploreCourses for course descriptions.

COGNATE COURSES

BIOC 218. Computational Molecular Biology (same as BIOMEDIN 231)
BIOMEDIN 210. Modeling Biomedical Systems: Ontology, Terminology, Problem Solving (same as CS 270)
BIOMEDIN 217. Translational Bioinformatics (same as CS 275)
CHEMENG 450. Advances in Biotechnology
EE 369A,B. Medical Imaging Systems I,II
EE 369C. Medical Image Reconstruction
ME 280. Skeletal Development and Evolution
ME 287. Soft Tissue Mechanics
ME 381. Orthopaedic Bioengineering
ME 382A,B. Medical Device Design
RAD 226. In Vivo Magnetic Resonance Spectroscopy and Imaging

DOCTOR OF PHILOSOPHY IN BIOENGINEERING

A student studying for the Ph.D. degree must complete a master's degree (45 units) comparable to that of the Stanford M.S. degree in Bioengineering. Up to 45 units of master's degree residency units may be counted towards the degree. The Ph.D. degree is awarded after the completion of a minimum of 135 units of graduate work as well as satisfactory completion of any additional University requirements. Students admitted to the Ph.D. program with an M.S. degree must complete at least 90 units of work at Stanford. The maximum number of transfer units is 45.

On the basis of the research interests expressed in their application, students are assigned an initial faculty adviser who assists them in choosing courses and identifying research opportunities. The department does not require formal lab rotations, but students are encouraged to explore research activities in two or three labs during their first academic year.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of bioengineering fundamentals and a potential for research by passing a qualifying oral examination.

Typically, the exam is taken shortly after the student earns a master's degree. The student is expected to have a nominal graduate Stanford GPA of 3.25 to be eligible for the exam. Once the student's faculty sponsor has agreed that the exam is to take place, the student must submit an application folder containing items including a curriculum vitae, research project abstract, and preliminary dissertation proposal to the student services office. Information about the exam may be obtained from the student services office.

In addition to the course requirements of the M.S. degree, doctoral candidates must complete a minimum of 15 additional units of approved formal course work (excluding research, directed study, and seminars).

Dissertation Reading Committee—Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. qualifying exams. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

A dissertation reading committee consists of the principal dissertation adviser and at least two other readers. Reading committees in Bioengineering may include faculty from another department. It is expected that at least one member of the Bioengineering faculty be on each reading committee. The initial committee, and any subsequent changes, must be officially approved by the department Chair.

University Oral and Dissertation—The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing), but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four selected faculty members, plus a chair from another department). Once the oral has been passed, the stu-

dent finalizes the dissertation for reading committee review and final approval. Forms for the University oral scheduling and a one-page dissertation abstract should be submitted to the department student services office at least three weeks prior to the date of the oral for departmental review and approval.

PH.D. MINOR IN BIOENGINEERING

Doctoral students pursuing a Ph.D. degree in a major other than Bioengineering may apply for the Ph.D. minor in Bioengineering. A minor is a not a requirement for any degree, but is available when agreed upon by the student and the major and minor department.

Application forms, including the University's general requirements, can be found at http://registrar.stanford.edu/shared/forms.htm.

A student desiring a Ph.D. minor in Bioengineering must have a minor program advisor who is a regular Bioengineering faculty member. This advisor must be a member of the student's reading committee for the doctoral dissertation, and the entire reading committee must meet at least one year prior to the date of the student's dissertation defense.

The Ph.D. minor program must include at least 20 units of course work in Stanford Bioengineering or Bioengineering cognate courses at or above the 200 level. Of these 20 units, no more than 10 can be in cognate courses. All courses listed to fulfill the 20-unit requirement must be taken for a letter grade and the GPA must be at least 3.25. Courses used for a minor may not be used to also meet the requirements for a master's degree.

M.D./PH.D. DUAL DEGREE PROGRAM

Students interested in a career oriented towards bioengineering and medicine can pursue the combined M.D./Ph.D. degree program. Stanford has two ways to do an M.D./Ph.D. U.S. citizens and permanent residents can apply to the Medical Scientist Training Program and can be accepted with funding from both M.D. and Ph.D. programs for stipend and tuition. They can then select a bioengineering laboratory for their Ph.D. Students not admitted to the Medical Scientist Training Program must apply to be admitted separately to the M.D. program and the Ph.D. program of their choice.

The Ph.D. is administered by the Department of Bioengineering. To be formally admitted as a Ph.D. degree candidate in this combined degree program, the student must apply through normal departmental channels and must have earned or have plans to earn an M.S. in bioengineering or other engineering discipline at Stanford or another university. The M.S. requires 45 units of course work which consists of core bioengineering courses, technical electives, seminars, and 6 unrestricted units. Students must also pass the Department of Bioengineering Ph.D. qualifying examination.

For students fulfilling the full M.D. requirements who earned their master’s level engineering degree at Stanford, the Department of Bioengineering waives the normal departmental requirement of 15 units applied towards the Ph.D. degree beyond the master’s degree level through formal course work. Consistent with the University Ph.D. requirements, the department accepts 15 units comprised of courses, research, or seminars approved by the student’s academic adviser and the department chair. Students not completing their M.S. engineering degree at Stanford are required to take 15 units of formal course work in engineering-related areas as determined by their academic adviser.

JOINT DEGREE PROGRAMS IN BIOENGINEERING AND THE SCHOOL OF LAW

The School of Law and the Department of Bioengineering offer joint programs leading to either a J.D. degree combined with an M.S. degree in Bioengineering or to a J.D. degree combined with a Ph.D. in Bioengineering.

The J.D./M.S. and J.D./Ph.D. degree programs are designed for students who wish to prepare themselves intensively for careers in areas relating to both law and bioengineering. Students interested in either joint degree program must apply and gain entrance separately to the School of Law and the Department of Bioengineering and, as an additional step, must secure permission from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or the Bioengineering Department may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or the Department of Bioengineering. Faculty advisers from each academic unit will participate in the planning and supervising of the student's joint program. Students must be enrolled full time in the Law School for the first year of law school, and, at some point during the joint program, may be required to devote one or more quarters largely or exclusively to studies in the Bioengineering program regardless of whether enrollment at that time is in the Law School or in the Department of Bioengineering. At all other times, enrollment may be in the graduate school or the Law School, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the M.S. or Ph.D. degrees as specified in the *Stanford Bulletin* or elsewhere.

The Law School shall approve courses from the Bioengineering Department that may count toward the J.D. degree, and the Bioengineering Department shall approve courses from the Law School that may count toward the M.S. or Ph.D. degree in Bioengineering. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The lists may differ depending on whether the student is pursuing an M.S. or a Ph.D. in Bioengineering.

In the case of a J.D./M.S. program, no more than 45 units of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 units of approved courses may be counted toward both degrees. In either case, no more than 36 units of courses that originate outside the Law School may count toward the law degree. To the extent that courses under this joint degree program originate outside of the Law School but count toward the law degree, the law school credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of law school credits that may be counted toward the M.S. or Ph.D. in Bioengineering is the greater of: (i) 15 units; or (ii) the maximum number of units from courses outside of the department that M.S. or Ph.D. candidates in Bioengineering are permitted to count toward the applicable degree under general departmental guidelines or in the case of a particular student's individual program. Tuition and financial aid arrangements will normally be through the school in which the student is then enrolled.

CHEMICAL ENGINEERING

Emeriti: (Professors) Andreas Acrivos, Michel Boudart, George M. Homsy, Robert J. Madix
Chair: Chaitan Khosla
Professors: Stacey F. Bent, Curtis W. Frank, Gerald G. Fuller, Chaitan Khosla, Jens K. Nørskov, Channing R. Robertson, Eric S. G. Shaqfeh, Alfred M. Spormann, James R. Swartz
Associate Professor: Zhenan Bao
Assistant Professors: Alexander R. Dunn, Thomas F. Jaramillo, Elizabeth S. Sattely (Jan. 2011), Andrew J. Spakowitz, Clifford L. Wang
Courtesy Professors: Annelise E. Barron, Gordon E. Brown, Christopher E. D. Chidsey, Daniel Herschlag, Jeffrey R. Koseff, Franklin M. Orr, Jr., Robert M. Waymouth
Lecturers: Lisa Y. Hwang, Shari B. Libicki, Sara Loesch-Frank, John E. Moalli, Anthony Pavone, Howard B. Rosen
Consulting Professors: Jae Chun Hyun, Kay Kanazawa, Wolfgang Knoll, Jaan Noolandi, Conrad Schadt, Do Yeung Yoon
Visiting Professors: Sung-Hyeon Baeck, Dong-Myung Kim
Administrative Office: Stauffer III, Room 113
Student Services Office: Keck Science Building, Room 189
Mail Code: 94305-5025
S*tudent Services Phone:* (650) 723-1302
Web Site: http://cheme.stanford.edu

Courses offered by the Department of Chemical Engineering are listed under the subject code CHEMENG on the *Stanford Bulletin's* ExploreCourses web site.

Research investigations are currently being carried out in the following fields: applied statistical mechanics, biocatalysis, bioengineering, biophysics, colloid science, computational materials science, electronic materials, hydrodynamic stability, kinetics and catalysis, Newtonian and non-Newtonian fluid mechanics, polymer science, renewable energy, rheo-optics of polymeric systems, and surface and interface science. Additional information may be found at http://cheme.stanford.edu.

The Department of Chemical Engineering offers opportunities for both undergraduates and graduate students to pursue course work in interdisciplinary biosciences, which include the chemical, biological, physical, mathematical, and engineering sciences. Courses include CHEMENG 25B, 150, 181/281, 183/283, 185B, 355, 450, 454, 456, and 457. In addition, students seeking a broad introduction to current topics in the interdisciplinary biosciences and engineering should consider CHEMENG 459, Frontiers in Interdisciplinary Biosciences, which covers emerging technologies and other subject matter at the intersection of engineering and biology, ranging from molecular to complex systems; see http://biox.stanford.edu. Students are encouraged to review course offerings in all departments of the School of Engineering.

Further information about the department may be found at http://cheme.stanford.edu. Undergraduates considering majoring in Chemical Engineering are encouraged to talk with faculty and meet with staff in the departmental student services office. Students interested in pursuing advanced work in chemical engineering, including coterminal degrees, should contact the department as well. Admission to the Master of Science program for an active undergraduate Stanford student is by approval of an Application for Admission to Coterminal Master's Program. Admission to an advanced degree program for an active Stanford graduate student by approval of the Graduate Authorization Petition. All other students should go to http://studentaffairs.stanford.edu/gradadmissions for general and departmental information about the requirements and processes for applying for admission to a graduate degree program.

MISSION OF THE UNDERGRADUATE PROGRAM IN CHEMICAL ENGINEERING

Chemical engineers are responsible for the conception and design of processes for the purpose of production, transformation, and transportation of materials. This activity begins with experimentation in the laboratory and is followed by implementation of the technology in full-scale production. The mission of the undergraduate program in Chemical Engineering is to develop students' understanding of the core scientific, mathematical, and engineering principles that serve as the foundation underlying these technological processes. The program's core mission is reflected in its curriculum which is built on a foundation in the sciences of chemistry, physics, and biology. Course work includes the study of applied mathematics, material and energy balances, thermodynamics, fluid mechanics, energy and mass transfer, separations technologies, chemical reaction kinetics and reactor design, and process design. The program provides students with excellent preparation for careers in the corporate sector and government, or for graduate study.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able to demonstrate:

1. proficiency in and ability to apply knowledge of engineering and mathematics through differential equations, probability and statistics, and science including physics, chemistry, and biology.
2. ability to design and to conduct experiments, as well as to analyze and to interpret data.
3. ability to design a system, component, or process to meet desired needs.
4. ability to function on multidisciplinary teams.
5. ability to identify, formulate, and solve engineering problems.
6. professional and ethical responsibility.
7. ability to communicate effectively.
8. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
9. recognition of the need for and an ability to engage in life-long learning.
10. knowledge of contemporary issues.
11. ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. the background for admission to engineering or other professional graduate programs.

GRADUATE PROGRAMS IN CHEMICAL ENGINEERING

The University's requirements, including residency requirements, for the M.S., Engineer, and Ph.D. degrees are summarized in the "Graduate Degrees" section of this bulletin.

Current research and teaching activities cover a number of advanced topics in chemical engineering, including applied statistical mechanics, biocatalysis, biochemical engineering, bioengineering, biophysics, computational materials science, colloid science, dynamics of complex fluids, energy conversion, functional genomics, hydrodynamic stability, kinetics and catalysis, microrheology, molecular assemblies, nanoscience and technology, Newtonian and non-Newtonian fluid mechanics, polymer physics, protein biotechnology, renewable fuels, semiconductor processing, soft materials science, solar utilization, surface and interface science, and transport mechanics.

Fellowships and Assistantships—Qualified predoctoral applicants are encouraged to apply for nationally competitive fellowships, for example, those from the National Science Foundation. Applicants to the Ph.D. program should consult with their financial aid officers for application information and advice. In the absence of other awards, incoming Ph.D. students normally are awarded departmental fellowships. Matriculated Ph.D. students are primarily supported by fellowship awards and assistantship appointments. All students are encouraged to apply for external, competitive fellowships and may obtain information about various awarding

agencies from faculty advisers and student services. Assistantships are paid positions for graduate students that, in addition to a salary, provide the benefit of a tuition allocation. Individual faculty members appoint students to research assistantships; the department chair appoints doctoral students to teaching assistantships. Contact departmental student services for additional information.

COGNATE COURSES FOR ADVANCED DEGREES IN CHEMICAL ENGINEERING

In addition to core CHEMENG graduate courses in the 300 series and elective CHEMENG graduate courses in the 200 and 400 series, students pursuing advanced degrees in chemical engineering include elective courses offered by other departments. The following list is a partial list of the more frequently chosen courses and is subdivided into five focus areas.

Broadly Applicable—
APPPHYS 207. Laboratory Electronics (3 units)
CHEM 221. Advanced Organic Chemistry (3 units)
CHEM 271. Advanced Physical Chemistry (Quantum Mechanics) (3 units)
CHEM 273. Advanced Physical Chemistry (Angular Momentum, etc.) (3 units)
EE 261. The Fourier Transform and its Applications (3 units)
EE 268. Introduction to Modern Optics (3 units)
MS&E 234. Organizations and Information Systems (4 units)
STATS 200. Statistical Inference (3 units)

Biochemistry and Bioengineering focus, e.g., with CHEMENG 281, 283, 454, 456—
BIO 203. Advanced Genetics (human)
BIO 217. Neuronal Biophysics (4 units)
BIOC 133. Genetics of Prokaryotes (3 units; needs approval of chair)
BIOE 331. Protein Engineering (3 units)
BIOPHYS/SBIO 228. Computational Structural Biology (3 units)
BIOPHYS/SBIO 241. Biologic Macromolecules (3-5 units)
CBIO 241. Molecular, Cellular, and Genetics Basis of Cancer (3 units)
CEE 274. Environmental Microbiology I & II (3 units each)
MCP 256. How Cells Work: Energetics, Compartments, and Coupling in Cell Biology (4 units)
MPHA 210. Signal Transduction Pathways and Networks (4 units)
MPHA 240. Drug Discovery (4 units)
MPHA 260. Quantitative Chemical Biology (4 units)
SBIO 228. Computational Structural Biology (3 units)
SBIO 241. Biological Macromolecules (3-5 units)

Fluid Mechanics, Applied Mathematics, and Numerical Analysis focus, e.g., with CHEMENG 462—
AA 218. Introduction to Symmetry Analysis (3 units)
CME 200. Linear Algebra with Application to Engineering Computations (3 units)
CME 204. Partial Differential Equations in Engineering (3 units)
CME 206. Introduction to Numerical Methods for Engineering (3 units)
CME 212. Introduction to Large-Scale Computing in Engineering (3 units)
CME 332. Computational Methods for Scientific Reasoning and Discovery (3 units)
CME 340. Computational Methods in Data Mining (3 units)
ME 338A. Continuum Mechanics (3 units)
ME 351A. Fluid Mechanics (3 units)
ME 457. Fluid Flow in Microdevices (3 units)
ME 469A. Computational Methods in Fluid Mechanics (3 units)

Materials Science focus, e.g., with CHEMENG 260, 442, 460, 461, 464, 466—
MATSCI 210. Organic and Biological Materials (3 units)
MATSCI 251. Microstructure and Mechanical Properties (3 units)
MATSCI 316. Nanoscale Science, Engineering, and Technology (3 units)
MATSCI 343. Organic Semiconductors for Electronics and Photonics (3 units)
MATSCI 380. Molecular Biomaterials (3 units)

Microelectronics focus, e.g., with CHEMENG 240—
AA 218. Introduction to Symmetry Analysis (3 units)
CME 200. Linear Algebra with Application to Engineering Computation (3 units)
CME 204. Partial Differential Equations in Engineering (3 units)
CME 206. Introduction to Numerical Methods for Engineering (3 units)
CME 212. Introduction to Large-Scale Computing in Engineering (3 units)
CME 332. Computational Methods for Scientific Reasoning and Discovery (3 units)
CME 340. Computational Methods in Data Mining
ME 338A. Continuum Mechanics (3 units)
ME 351. Fluid Mechanics (3 units)
ME 457. Fluid Flow in Microdevices (3 units)
ME 469A. Computational Methods in Fluid Mechanics (3 units)

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

The University's basic requirements for the bachelor's degree and coterminal bachelor's and master's degrees are discussed in the "Undergraduate Degrees" section of this bulletin.

The Chemical Engineering B.S. program requires basic courses in biology, chemistry, engineering, mathematics, and physics. The depth sequence of courses required for the major in chemical engineering provides training in applied chemical kinetics, biochemical engineering, electronic materials, engineering thermodynamics, plant design, polymers, process analysis and control, separation processes, and transport phenomena. Undergraduates who wish to major in the department should consult the curriculum outlined in the "Undergraduate Program in Chemical Engineering" section of this bulletin. Courses taken to fulfill the requirements for the major (courses in mathematics; science; technology and society; engineering fundamentals; and engineering depth) must be taken for a letter grade if this option is offered.

Representative sequences of courses leading to a B.S. in Chemical Engineering, in both flow chart and 4-year, quarter-by-quarter formats, can be found in the *Handbook for Undergraduate Engineering Programs*, available at http://ughb.stanford.edu. These are explanatory examples, with each sequence starting at a different level and demonstrating how a student, based on his or her precollege preparation, can complete the major in four years. These typical course schedules are available from departmental student services and faculty advisers for undergraduates, as well as the Office of Student Affairs in the School of Engineering. It is recommended that students discuss their prospective programs with Chemical Engineering faculty advisers, especially if transferring from another major such as Biology, Chemistry, Physics, or another Engineering major. With advance planning, students can usually arrange to attend one of the overseas campuses.

Students interested in a minor in Chemical Engineering should consult the requirements for a "Minor in Chemical Engineering" section of this bulletin.

HONORS PROGRAM

The Department of Chemical Engineering offers a program leading to the degree of Bachelor of Science in Chemical Engineering with Honors. Qualified undergraduate majors conduct independent study and research at an advanced level with faculty mentors, graduate students, and fellow undergraduates. This three quarter sequential program requires concurrent participation each quarter in the CHEMENG 191H seminar; completion of a faculty-approved thesis; and participation in the Chemical Engineering Honors Poster Session held annually during the Mason Lecture Series Spring Quarter. The last requirement may also be fulfilled through an alternative, public, oral presentation with the approval

of the department chair. Work should begin at least four quarters prior to graduation.

Admission to the honors program is by application and submission of a research proposal and is subject to approvals by faculty advisers, sponsors, and the chair of the department. Declared Chemical Engineering majors with a cumulative grade point average (GPA) of 3.5 or higher are encouraged to apply. Students should submit their applications by Winter Quarter of their junior year; applications must be submitted no later than the end of the first week of Autumn Quarter of the senior year. An application includes a research proposal, approved by both the student's research thesis adviser and a faculty reader. The faculty adviser or, alternatively, a faculty sponsor, must be a faculty member in the Department of Chemical Engineering. Students should start their research no later than Spring Quarter their junior year and are encouraged to consider incorporating research opportunities such as those sponsored by Undergraduate Academic Life into their honors research proposal; see http://ual.stanford.edu/OO/research_opps/Grants http://ual.stanford.edu/OO/research_opps/Grants). See departmental student services staff in Keck 189 for more information about the application process, a proposal template, and other assistance.

In order to receive departmental honors, students admitted to the honors program must:

1. Maintain an overall grade point average (GPA) of at least 3.5 as calculated on the unofficial transcript.
2. Complete at least three quarters of research with a minimum of 9 units of CHEMENG 190H for a letter grade. All quarters must focus on the same topic. The same faculty adviser and faculty reader should be maintained throughout if feasible.
3. Enroll in CHEMENG 191H, Undergraduate Honors Seminar, concurrently with each quarter of CHEMENG 190H.
4. Participate with a poster and oral presentation of thesis work at the Chemical Engineering Honors Poster Session held during Spring Quarter or, at the Undergraduate Program Committee's discretion, at a comparable public event.
5. Submit final drafts of a thesis simultaneously to the adviser and the reader and, if appropriate, to the Chemical Engineering faculty sponsor, no later than April 11th, or the first school day of the third week of the quarter in which the degree is to be conferred.
6. Complete all work and thesis revisions and obtain indicated faculty approvals on the Certificate of Final Reading of Thesis forms by the end of the first week of May, or the second month of the graduation quarter.
7. Submit to departmental student services five (5) final copies of the honors thesis, as approved by the appropriate faculty. Include in each thesis an original, completed, faculty signature sheet immediately following the title page. The 2010-11 deadline is May 10, 2011, or the Tuesday at the beginning of the second week of the second month of the graduation quarter.
8. Submit to student services one copy of the honors thesis in electronic format at the same time as the final copies of the thesis or no later than May 10, 2011.
9. Submit one copy of the thesis, upon departmental approval, to the School of Engineering.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN CHEMICAL ENGINEERING

Undergraduates with strong academic records may apply to study for a master's degree while at the same time completing their bachelor's degree(s). Interested students should discuss their educational goals with their faculty advisers before applying and should talk with departmental student services about the departmental requirements and deadlines for applications.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF SCIENCE IN CHEMICAL ENGINEERING

A range of M.S. programs comprising appropriate course work is available to accommodate students wishing to obtain further academic preparation before pursuing a professional chemical engineering career. This degree is lecture course based; there are no research or thesis requirements. It is a terminal M.S. degree. It is not a prerequisite for nor does it lead into the department's Ph.D. program. For conferral of an M.S. degree in chemical engineering the following departmental requirements must be met.

Unit and Course Requirements—Students terminating their graduate work with the M.S. degree in Chemical Engineering must develop a graduate-level, thematic M.S. program consisting of a minimum of 45 completed units of academic work that includes (1) four Chemical Engineering lecture courses selected from the 300 series; (2) 3 units of 699 Colloquia; (3) an additional 30 units, selected from graduate-level science or engineering lecture courses in any department and, by petition to the Chair of the Department of Chemical Engineering, from upper-division undergraduate lecture courses in science and engineering. Alternatively, up to 6 units of research may be used in lieu of up to 6 units of the additional 30 lecture units to partially satisfy the 45 unit minimum requirement. Another option is an up-to-six-unit combination of research units and 1, 2, or 3 units of 459 or other similar 1- or 2-unit graduate seminar courses, with faculty developed curricula, used in lieu of up to 6 units of the required additional 30 lecture units. Credit toward the M.S. degree is not given for Chemical Engineering special topics courses numbered in the 500 series nor for similar courses in other departments.

To ensure that an appropriate Chemical Engineering graduate program is pursued by each M.S. candidate, students who first matriculate at Stanford at the graduate level must, during the first quarter, no later than the eighth week, (a) complete a Program Proposal for a Master's Degree form, that is approved by the M.S. adviser; (b) submit this petition to departmental student services, for review by the department chair; and (c) obtain approval for any subsequent program change or changes from the M.S. adviser and the department chair. Stanford undergraduates admitted to the coterminal master's program must (a) submit an adviser-approved Program Proposal for a Master's Degree (a graduate degree progress form) either during their first quarter of graduate standing or upon the completion of 9 units of graduate work (whichever occurs first), and (b) document with student services their M.S. adviser's review and approval of their graduate program when they have accrued 30 units toward the M.S. degree in Chemical Engineering. Each M.S. candidate must obtain approvals for the final M.S. program no later than the eighth week of the quarter preceding the quarter of degree conferral, in order to permit amendment of the final quarter's study list if the faculty deem this necessary. Students with questions should contact departmental student services.

Minimum Grade Requirement—Any course used to satisfy the 45-unit minimum for the M.S. degree must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

Research Experience—Students in the M.S. program wishing to obtain research experience should work with the M.S. faculty adviser on the choice of research adviser as early as feasible and in advance of the anticipated quarter(s) of research. Once arrangements are mutually agreed upon, including the number of units, students enroll in the appropriate section of CHEMENG 600. A written report describing the results of the research under taken must be submitted to and approved by the research adviser. CHEMENG 600 may not be taken in lieu of any of the required four 300-level lecture courses.

ENGINEER IN CHEMICAL ENGINEERING

The degree of Engineer is awarded after completion of a minimum of 90 units of graduate work beyond the B.S. degree and satisfactory completion of all University requirements plus the following departmental requirements. This degree is not a prerequisite for the Ph.D. program.

Unit and Course Requirements—A minimum of 90 total units (including research) within which 45 units of lecture course work are required for the Engineer degree, including (1) CHEMENG 310, 320, 340, 345, 355 and (2) 3 units of CHEMENG 699. The remaining lecture courses, to total at least 45 completed units, may be chosen from the basic sciences and engineering according to the guidelines given in the Master of Science section and with the consent of the graduate curriculum committee chair and the department chair. In fulfilling the required 45-unit requirement for lecture course units, an aggregate of 6 units maximum of the required 45-unit minimum of course work may include such courses as CHEMENG 459 and 699, but not 500 level seminar courses or research units. Students seeking the Engineer degree may petition to add a M.S. program and apply for the M.S. degree once the requirements for that degree have been fulfilled (see General Requirements in the "Graduate Degrees" section of this bulletin and Chemical Engineering's "Master of Science" section).

Minimum Grade Requirement—Any course intended to satisfy the degree requirements must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

Reading Committee Requirement—All candidates are required to have an initial meeting with their reading committees, consisting of two members of the Chemical Engineering faculty, by the end of their seventh quarter. Following this initial meeting, additional committee meetings must occur no less than once a year until all the requirements for the degree are satisfied. Students are encouraged to hold meetings on a more frequent basis to help focus and guide the thesis project. It is each student's responsibility to schedule meetings and to assist in the keeping of accurate degree progress records by informing student services when meetings have occurred.

Thesis Requirement—The thesis must represent a substantial piece of research equivalent to nine months of full-time effort and must be approved by the student's reading committee.

Qualification for the Ph.D. Program by Students Ready to Receive the Degree of Engineer—After completing the requirements for the Engineer degree, a student may request to be examined on the research work completed for that degree, for the purpose of qualifying for the Ph.D. degree. If the request is granted, the student's thesis must be approved by the reading committee and available in its final form for inspection by the entire faculty at least two weeks prior to the scheduled date of said examination.

DOCTOR OF PHILOSOPHY IN CHEMICAL ENGINEERING

The Ph.D. degree is awarded after the completion of a minimum of 135 units of graduate work as well as satisfactory completion of any additional University requirements and the following departmental requirements. Completion of a M.S. degree is not a prerequisite for beginning, pursuing, or completing doctoral work.

Unit and Course Requirements—A minimum of 135 completed units, including a minimum of 45 units of lecture course work, is required for the Ph.D. degree. The following courses are required: CHEMENG 310, 320, 340, 345, and 355, plus two courses in the CHEMENG 440, 450, or 460 series. These are to be taken at Stanford, and any petition to substitute another graduate-level course for any of these core courses must be approved by the department chair. The remaining lecture courses may be chosen from graduate-level science and engineering lecture courses in any department and, by petition to the department chair, from upper-division undergraduate lecture courses in the sciences and engineering. 3 units of CHEMENG 699 must be completed and may be included in the required 45 units of lecture courses. Additionally, 1, 2, or 3 units of seminar courses with faculty developed curricula, such as CHEMENG 459, may be substituted for up to 3 units of the unspecified lecture courses, but not for any of the specified CHEMENG courses above. All proposals for Ph.D. course work must be approved by the student's adviser and the department chair or his designee. Students admitted to Ph.D. candidacy should enroll each quarter in the 500 series, 600, and 699 as appropriate and as study list unit limits permit. Predoctoral students may petition for a M.S. degree program to be added to their university record. When the petition is approved, students may apply in Axess for M.S. degree conferral once the requirements for that degree have been fulfilled (see the "Master of Science in Chemical Engineering" section in this bulletin). The M.S. degree must be awarded within the University's candidacy period for completion of a master's degree.

Minimum Grade Requirement—Any course intended to satisfy the Ph.D. degree requirements must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

Qualifying Examination—To be advanced to candidacy for the Ph.D. degree, the student must pass both parts of the qualifying examination. The first part is held at the beginning of Spring Quarter, or the third quarter of study, and the first-year student is asked to make an oral presentation to the faculty of a critical review of a published paper. This preliminary examination, in addition to performance in courses and during research rotations, is the basis for determining whether or not a first-year student is to be allowed by faculty to choose a research adviser and to begin doctoral research work immediately. Failure in this first part of the qualifying examination normally leads to termination of a student's study towards the Ph.D. degree; however, the student may continue to work toward an M.S. degree (see the "Master of Science in Chemical Engineering" section of this bulletin). It also precludes any financial aid beyond that already awarded. Students who pass the preliminary examination take the second part of the qualifying examination at the beginning of their second year, or the fifth quarter. This second examination before the faculty is an oral presentation and defense of their current research work. Students who pass both parts of the qualifying examination must promptly submit to students services an Application for Candidacy for Doctoral Degree form that has been approved by their research adviser(s), and at the same time establish their doctoral dissertation reading committees.

Reading Committee Requirement—All Ph.D. candidates are required to assemble reading committees and to have an initial meeting with the full committee by the end of their seventh quarter. Reading committee meetings are not examinations; they are intended to be discussion sessions to help focus and guide the dissertation project. Following the initial committee meeting, additional meetings must take place no less than once per year until all the requirements for the Ph.D. degree are satisfied. The department encourages students to take advantage of the benefits of more frequent meetings with their full reading committee. It is the student's responsibility to schedule committee meetings and to assist in the maintenance of degree progress records by reporting the meeting dates to the student services manager.

Teaching Requirement—Teaching experience is considered an essential component of doctoral training because it assists in the further development and refinement of candidates' skills in conveying what they know, think, and conclude, based on articulated assumptions and knowledge. All Ph.D. candidates, regardless of the source of their financial support, are required to assist in the teaching of a minimum of two chemical engineering courses.

Dissertation and Oral Defense Requirements—A dissertation based on a successful investigation of a fundamental problem in chemical engineering is required. Within approximately five calendar years after enrolling in the Ph.D. program, a student is expected to have fulfilled all the requirements for this degree, including the completion of a dissertation approved by his or her research

adviser(s). Upon adviser approval, copies of the final draft of a dissertation must be distributed to each reading committee member. No sooner than three weeks after this distribution, a student may schedule an oral examination. This examination is a dissertation defense, based on the candidate's dissertation research, and is in the form of a public seminar followed by a private examination by the faculty members on the student's oral examination committee. Satisfactory performance in the oral examination and acceptance of an approved dissertation by Graduate Degree Progress, Office of the University Registrar, leads to Ph.D. degree conferral.

PH.D. MINOR IN CHEMICAL ENGINEERING

The University's general requirements for the Ph.D. minor are specified in the "Graduate Degrees" section of this bulletin. An application for a Ph.D. minor must be approved by both the major and minor departments.

A student desiring a Ph.D. minor in Chemical Engineering must have a minor program adviser who is a regular Chemical Engineering faculty member. At a minimum, this adviser must be a member of the student's reading committee for the doctoral dissertation, and the entire reading committee must meet at least once and at least one year prior to the scheduling of the student's oral examination. The department strongly prefers that regular meetings of the full reading committee start in the second year of graduate study or when the student is admitted to Ph.D. candidacy. In addition, the Chemical Engineering faculty member who is the minor adviser must be a member of the student's University oral examination committee.

The Ph.D. minor program must include at least 20 units of graduate-level lecture courses (numbered at the 200 level or above), but may not include any 1-2 unit lecture courses in the 20-unit minimum. The list of courses must form a coherent program and must be approved by the minor program adviser and the chair of this department. All courses for the minor must be taken for a letter grade, and a GPA of at least 3.0 must be earned for these courses.

CIVIL AND ENVIRONMENTAL ENGINEERING

Emeriti: (Professors) James Douglas, Joseph B. Franzini, En Y. Hsu, Helmut Krawinkler*, Paul Kruger, Gilbert M. Masters*, Perry L. McCarty*, Henry W. Parker, George A. Parks, Haresh C. Shah, Robert L. Street*, Clyde B. Tatum* (on leave Winter), Paul M. Teicholz

Chair: Stephen G. Monismith

Associate Chair: Sarah Billington

Professors: Ronaldo I. Borja, Craig S. Criddle, Gregory G. Deierlein, Martin A. Fischer, Mark Z. Jacobson, Anne S. Kiremidjian, Peter K. Kitanidis (on leave Winter, Spring), Jeffrey R. Koseff, Kincho H. Law, James O. Leckie (on leave Winter, Spring), Raymond E. Levitt (on leave Winter), Richard G. Luthy, Stephen G. Monismith, Leonard Ortolano, Alfred M. Spormann

Associate Professors: Alexandria B. Boehm (on leave Winter), Sarah L. Billington, David L. Freyberg, Lynn M. Hildemann, Eduardo Miranda

Assistant Professors: Jack W. Baker, Jennifer Davis, Oliver B. Fringer, Michael D. Lepech

Professor (Research): Martin Reinhard

Courtesy Professors: Peter M. Pinsky, David D. Pollard

Courtesy Associate Professor: Margot G. Gerritsen

Lecturers: John H. Barton II, Cathrine D. Blake, Stan Christensen, Derek Fong, Renate Fruchter, Robert R. Groves, Eric Haesloop, Stefan Hastrup, Andrew G. Hudacek, Glenn Katz, Karl Knapp, Nelson A. Koen Cohen, Eric Kolderup, Royal J. Kopperud, John C. Kunz, Amy Larimer, Ryan J. Orr, Alexander P. Robertson, Peter Rumsey, Raphael Sperry, Patti J. Walters

Consulting Professors: Vladimir Bazjanac, James E. Cloern, Angelos N. Findikakis, Gary Griggs, Robert F. Hickey, Michael C. Kavanaugh, Mark R. Kroll, Michael E. London, Francis L. Ludwig, Douglas M. MacKay, Martin W. McCann, Jr., Paul K. Meyer, Piotr D. Moncarz, Wayne R. Ott, Ingo Pinnau, Harry E. Ridgway, Benedict R. Schwegler, Jr, Avram S. Tucker, Antonio L. Vives, Michael W. Walton

Consulting Associate Professors: William J. Behrman, Curtis R. Cook, Edward S. Gross, Charles S. Han, Thomas L. Holzer, Jonathan G. Koomey, Lisa V. Lucas, Colin Ong, Azadeh Tabazadeh, Joel N. Swisher, Jie Wang, Jane Woodward

Consulting Assistant Professors: Cristina L. Archer, Murray D. Einarson, Calvin K. Kam, Neil E. Klepeis, Gloria T. Lau, Michael L. MacWilliams, Pooya Sarabandi

Shimizu Visiting Professors: Nicholas Jenkins, Ning Lu, George W. Scherer

Shimizu Visiting Associate Professor: S. Ping Ho

UPS Visiting Associate Professor: Riyad Manasrah

* Recalled to active duty.

Department Offices: Yang and Yamazaki (Y2E2), Rooms 314/316

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Web Site: http://cee.stanford.edu

Courses offered by the Department of Civil and Environmental Engineering are listed under the subject code CEE on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Civil and Environmental Engineering (CEE) at Stanford conducts basic and applied research that advances the civil and environmental engineering professions, educates future academic and industry leaders, and prepares students for careers in professional practice. Civil and environmental engineers work to sustain the natural environment while creating and maintaining the built environment. Civil and environmental engineers are essential to providing the necessities of human life, including water, air, shelter, the infrastructure, energy, and food in increasingly more efficient and renewable ways.

The department focus is on the theme of engineering for sustainability, including three core areas: the Built environment, Environmental and Water studies, and Atmosphere and Energy. The built environment includes creating processes, techniques, materials, and monitoring technologies for planning, design, construction and operation of environmentally sensitive, economically efficient, performance-based built systems, and managing associated risks from natural and man-made hazards. The water environment includes creating plans, policies, science-based assessment models and engineered systems to manage water in ways that protect human health, promote human welfare, and provide freshwater and coastal ecosystem services. Atmosphere and Energy includes studying fundamental energy and atmospheric engineering and science, assessing energy-use effects on atmospheric processes and air quality, and analyzing and designing energy-efficient generation and use systems with minimal environmental impact.

The department also hosts the School of Engineering undergraduate major in Architectural Design and the undergraduate major in Atmosphere/Energy; both of these programs lead to a B.S. in Engineering.

MISSION OF THE UNDERGRADUATE PROGRAM IN CIVIL ENGINEERING

The mission of the undergraduate program in Civil Engineering is to provide students with the principles of engineering and the methodology needed for civil engineering practice. This preprofessional program balances the fundamentals common to many specialties in civil engineering and allows for concentration in structures and construction or environmental and water studies. Students in the major learn to apply knowledge of mathematics, science, and civil engineering to conduct experiments, design structures and systems to creatively solve engineering problems,

and communicate their ideas effectively. The curriculum includes course work in structural, construction, and environmental engineering. The major prepares students for careers in government and industry, and further graduate study.

MISSION OF THE UNDERGRADUATE PROGRAM IN ENVIRONMENTAL ENGINEERING

The mission of the undergraduate program in Environmental Engineering is to equip students with the problem solving skills and knowledge necessary to assess and develop solutions to environmental problems impacting the biosphere, land, water, and air quality. The Environmental Engineering major offers a more focused program in Environmental and Water Studies than the Environmental and Water Studies concentration in the Civil Engineering degree program. Courses in the program are multidisciplinary in nature, combining fundamental principles drawn from physics, chemistry, geology, engineering, and biology. Students learn about the analytical methods necessary to evaluate environmental changes and to design strategies to remediate problems that inevitably may have resulted from human activities. The program prepares students for careers in consulting, industry, and government, and for graduate school in engineering.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of engineering principles as well as the analytical, problem solving, design, and communication skills necessary to succeed and continue learning in diverse careers.
2. preparation for successful engineering practice with a longer term perspective that takes into account new tools such as advanced information technology and biotechnology, and increasingly complex professional and societal expectations.
3. sufficient breadth and depth for graduate study in engineering or other professional fields.
4. the awareness, background, and skills necessary to become responsible citizens and leaders in service to society.

GRADUATE PROGRAMS IN CIVIL AND ENVIRONMENTAL ENGINEERING

The Department of Civil and Environmental Engineering (CEE), in collaboration with other departments, offers graduate degrees structured in three degree programs.

- The Atmosphere and Energy Program offers degrees with the designation of Atmosphere/Energy.
- The Built Environment Program offers degrees with five designations:
  - Construction Engineering and Management
  - Design/Construction Integration
  - Structural Engineering
  - Geomechanics
  - Sustainable Design Construction.
- The Environmental and Water Studies Program offers degrees with two designations:
  - Environmental Engineering and Science
  - Environmental Fluid Mechanics and Hydrology

For detailed information on these programs and degree designations, see the "Programs of Graduate Study in Civil and Environmental Engineering" section of this bulletin.

ADMISSIONS AND FINANCIAL AID

Applications require online submission of the application form and statement of purpose, followed by three letters of recommendation, results of the General Section of the Graduate Record Examination, and transcripts of courses taken at colleges and universities. See http://gradadmissions.stanford.edu. Policies for each of the department's programs are available by referring to http://cee.stanford.edu. Successful applicants are advised as to the degree and program for which they are admitted. If students wish to shift from one CEE program to another after being accepted, an application for the intradepartmental change must be filed within the department; they will then be advised whether the change is possible. If, after enrollment at Stanford, students wish to continue toward a degree beyond the one for which they were originally admitted, a written application must be made to the Department of Civil and Environmental Engineering.

The department maintains a continuing program of financial aid for graduate students. Applications for financial aid and assistantships should be filed by December 7, 2010; it is important that Graduate Record Examination scores be available at that time. Applicants not requesting financial assistance have until February 1, 2011 for the online submission. Teaching assistantships carry a salary for as much as half- time work to assist with course offerings during the academic year. Up to half-time research assistantships also are available. Engineer and Ph.D. candidates may be able to use research results as a basis for the thesis or dissertation. Fellowship and scholarship awards or loans may supplement assistantships and other basic support. Continued support is generally provided for further study toward the Engineer or Ph.D. degree based on the student's performance, the availability of research funds, and requisite staffing of current research projects.

FACILITIES

Research work and instruction under the three programs are carried out in these facilities: Building Energy Laboratory; Environmental Engineering and Science Laboratory; Environmental Fluid Mechanics Laboratory (EFML); Geotechnical Engineering Laboratory; Structural Engineering Laboratory; and water quality control research and teaching laboratories. The John A. Blume Earthquake Engineering Center conducts research on earthquake engineering including advanced sensing and control, innovative materials, and risk hazard assessment. Research and advanced global teamwork education is conducted in the Project Based Learning (PBL) Laboratory. In collaboration with the Department of Computer Science, the Center for Integrated Facility Engineering (CIFE) employs advanced CAD, artificial intelligence, communications concepts, and information management to integrate participants in the facility development process and to support design and construction automation. The Collaboratory for Research on Global Projects (CRGP) is a multi-school, multi-university research program aimed at improving the performance of global engineering and construction projects, with a special focus on sustainable infrastructure in developing countries.

BACHELOR OF SCIENCE IN CIVIL AND ENVIRONMENTAL ENGINEERING

The B.S. in Civil Engineering and the B.S. in Environmental Engineering are ABET accredited programs, which place high priority on integrating research with engineering education. Four major objectives structure both degree programs:

1. To provide an understanding of engineering principles and the analytical, problem solving, design, and communication skills to continue succeeding and learning in diverse careers.
2. To prepare for successful engineering practice with a longer term perspective that takes into account new tools such as advanced information technology and biotechnology, and increasingly complex professional and societal expectations.
3. To prepare for possible graduate study in engineering or other professional fields.
4. To develop the awareness, background, and skills necessary to become responsible citizens and leaders in service to society.

Students who major in Civil Engineering or in Environmental Engineering must complete the appropriate requirements for the B.S. degree listed. Each student has elective units, which may be used in any way the student desires, including additional studies in

Civil and Environmental Engineering or any other school or department in the University. Because the undergraduate engineering curriculum provides breadth of study, students who intend to enter professional practice in civil or environmental engineering should plan to obtain their professional education at the graduate level.

A number of undergraduate programs at Stanford may be of interest to students seeking to specialize in environmental studies. In addition to the two majors offered in the department, students should examine related programs such as Earth Systems, Geological and Environmental Sciences, Urban Studies, and Human Biology.

HONORS PROGRAM

This program leads to a B.S. with honors for undergraduates majoring in Civil Engineering or in Environmental Engineering. It is designed to encourage qualified students to undertake a more intensive study of civil and environmental engineering than is required for the normal majors through a substantial, independent research project.

The program involves an in-depth research study in an area proposed to and agreed to by a Department of Civil and Environmental Engineering faculty adviser and completion of a thesis of high quality. A written proposal for the research to be undertaken must be submitted and approved by the faculty advisor in the fourth quarter prior to graduation. At the time of application, the student must have an overall grade point average (GPA) of at least 3.3 for course work at Stanford; this GPA must be maintained to graduation. The thesis is supervised by a CEE faculty adviser and must involve input from the School of Engineering writing program by means of ENGR 202S or its equivalent. The written thesis must be approved by the thesis adviser. Students are encouraged to present their results in a seminar for faculty and students. Up to 10 units of CEE 199H, Undergraduate Honors Research in Civil and Environmental Engineering, may be taken to support the research and writing (not to duplicate ENGR 202S). These units are beyond the normal Civil Engineering or Environmental Engineering major program requirements.

MINOR IN CIVIL ENGINEERING OR ENVIRONMENTAL ENGINEERING

The department offers a minor in Civil Engineering and a minor in Environmental Engineering. Departmental expertise and undergraduate course offerings are available in the areas of architectural design, construction engineering, construction management, structural/geotechnical engineering, environmental engineering and science, environmental fluid mechanics and hydrology, and atmosphere/energy. The courses required for the minors typically have prerequisites. Minors are not ABET-accredited programs.

PROGRAMS OF GRADUATE STUDY IN CIVIL AND ENVIRONMENTAL ENGINEERING

ATMOSPHERE AND ENERGY PROGRAM

The Atmosphere and Energy program in Civil and Environmental Engineering combines atmospheric science with energy science and engineering. The main goals of the program are to educate students and the public, through courses, research, and public outreach, about the causes of climate, air pollution, and weather problems and methods of addressing these problems through renewable and efficient energy systems. In addition, students learn about feedbacks between the atmosphere and renewable energy systems and the effects of the current energy infrastructure on the atmosphere.

Major focus areas of energy research include examining the resource availability of renewable energies, such as wind, solar, and wave, and studying optimal methods of combining renewable energies together to match energy supply with instantaneous demand. This type of work is generally done through a combination of data analysis, three-dimensional atmospheric computer modeling of wind, solar, wave, and hydroelectric power resources, and transmission load flow computer modeling. Other energy research, performed through three-dimensional computer modeling, focuses on the effects, for example, of hydrogen fuel cell vehicles on air pollution and the ozone layer and the effects of ethanol and diesel vehicles on air quality and climate. Studies also examine the feedback of wind turbines to the atmosphere and the effects of climate change on wind and solar energy resources.

Atmospheric research in the program generally involves laboratory work, field measurements, or three-dimensional computer modeling of the combined atmosphere, ocean, and land surface. An example of laboratory work includes measuring the properties of organic particulate matter that forms in the atmosphere. Examples of fieldwork include measuring exposures to secondhand smoke, allergens, and emissions from building materials.

Computer modeling is performed at a variety of spatial scales, from the globe down to the size of a building or smaller. Some examples of modeling studies include examining the effects of air pollution particles on clouds, rainfall, water supply, ultraviolet radiation, the stratospheric ozone layer, and climate, simulating the dispersion of toxic contaminants in an urban street canyon, studying the effects of aircraft exhaust and biomass burning on climate, studying the effects of carbon dioxide domes over cities on air pollution mortality, and studying the leading causes of global warming and their impacts.

ENVIRONMENTAL AND WATER STUDIES PROGRAMS

Environmental and water studies include subprograms in environmental engineering and science and environmental fluid mechanics and hydrology, which includes environmental planning. Course offerings permit study in a single area or interrelated study between areas. Programs are flexible to foster interaction among students and encourage the development of individual programs. The Stanford laboratories for water quality control and environmental fluid mechanics are well equipped for advanced research and instruction.

Courses from other programs and departments complement our programs' course offerings. Examples include Computer Science (numerical methods), Geological and Environmental Sciences (geostatistics, hydrogeology), Mechanical Engineering (applied math, experimental methods, fluid mechanics, heat transfer), Energy Resources Engineering (reservoir engineering, well-test analysis), and Statistics (probability and statistics).

The major areas of specialization in the two subprograms, environmental engineering and science, and environmental fluid mechanics and hydrology, are described following. Admission to these subprograms are handled separately; prospective students should indicate their preference on their application.

ENVIRONMENTAL ENGINEERING AND SCIENCE

The Environmental Engineering and Science (EES) subprogram emphasizes the chemical and biological processes involved in water quality engineering, pollution treatment, remediation, and environmental protection.

Course offerings include: the biological, chemical, and engineering aspects of water supply; the movement and fate of pollutants in surface and ground waters, soil, and the atmosphere; hazardous substance control; molecular environmental biotechnology; and water and air pollution. Companion courses in the Environmental Fluid Mechanics and Hydrology Program (EFMH) include environmental planning and impact assessment, and environmental fluid mechanics, hydrology, and transport modeling.

ENVIRONMENTAL FLUID MECHANICS AND HYDROLOGY

The Environmental Fluid Mechanics and Hydrology (EFMH) subprogram focuses on understanding the physical processes controlling the movement of mass, energy, and momentum in the water environment and the atmosphere. The subprogram also consid-

ers environmental and institutional issues involved in planning water resources development projects.

Environmental fluid mechanics courses address: experimental methods; fluid transport and mixing processes; the fluid mechanics of stratified flows; natural flows in coastal waters, estuaries, lakes, and open channels; and turbulence and its modeling. Hydrology courses consider flow and transport in porous media, stochastic methods in both surface and subsurface hydrology, and watershed hydrology and modeling. Atmosphere courses deal with climate, weather, storms and air pollution and their modeling. Planning courses emphasize environmental policy implementation and sustainable water resources development.

The research of this group is focused in the Environmental Fluid Mechanics Laboratory, which includes the P. A. McCuen Environmental Computer Center.

SUSTAINABLE BUILT ENVIRONMENT PROGRAMS

The Sustainable Built Environment programs include subprograms in construction engineering and management, design-construction integration, structural engineering and geomechanics, and sustainable design and construction. These programs focus on educating practitioners and researchers to plan, design, build, and operate more sustainable buildings and infrastructure.

The Construction Engineering and Management (CEM) subprogram prepares students for careers with progressive construction firms worldwide, interested in building more sustainable buildings and infrastructure using advanced modeling and visualization methods and tools known as virtual design and construction.

The Structural Engineering and Geomechanics (SEG) subprogram educates designers and researchers who want to progress beyond traditional life safety code-based design, to develop and disseminate performance-based structural and geotechnical engineering methods and tools that maximize the lifecycle economic value of facilities.

The Design-Construction Integration (DCI) subprogram combines courses from CEM and SEG to educate and prepare students for design construction firms that provide integrated design-build project delivery, construction management, and pre-construction services.

The Sustainable Design and Construction (SDC) subprogram provides courses in sustainable, multi-stakeholder design methods and tools that incorporate lifecycle cost analysis, green architectural design, lighting, and energy analysis, to educate students interested in promoting more sustainable development of buildings and infrastructure.

Admission to these programs are handled separately; prospective students should indicate their preference on their application.

CONSTRUCTION ENGINEERING AND MANAGEMENT

The Construction Engineering and Management (CEM) subprogram prepares technically qualified students for responsible engineering and management roles in all phases of the development of major constructed facilities. It emphasizes management techniques useful in organizing, planning, and controlling the activities of diverse specialists working within the unique project environment of the construction industry, and it covers construction engineering aspects of heavy, industrial and building construction.

The CEM subprogram offers courses in: building systems, construction administration, construction law, project finance, accounting, real estate development, structural design, HVAC design and construction, equipment and methods, estimating, international construction, labor relations, managing human resources, planning and control techniques, productivity improvement, and project and company organizations. Additional related course work is available from other programs within the department, from other engineering departments, and from other schools in the University such as Earth Sciences and the Graduate School of Business.

The CEM program allows students substantial flexibility to tailor their program of study for careers with general contractors, specialty contractors, real estate, or infrastructure developers or facility owners and operators.

DESIGN-CONSTRUCTION INTERGRATION

The Design-Construction Integration (DCI) subprogram prepares students for multidisciplinary collaborative teamwork in an integrated design and construction process. The subprogram extends a student's design or construction background with core courses in each of these areas and develops the background needed to understand the concerns and expertise of the many project stakeholders. It includes a comprehensive project-based learning experience.

The subprogram in Design-Construction Integration is open to applicants with backgrounds in engineering and science. Applicants should also have a background in the planning, design, or construction of facilities by virtue of work experience and/or their undergraduate education. Knowledge in subjects from the traditional areas of civil engineering is necessary for students to receive the degree and to satisfy prerequisite requirements for some of the required graduate courses.

Students with an undergraduate degree in Civil Engineering, and who expect to pursue careers with design or construction firms that emphasize design-build, EPC, or turnkey projects should consider DCI.

STRUCTURAL ENGINEERING AND GEOMECHANICS

The Structural Engineering and Geomechanics (SEG) subprogram encompasses teaching and research in structural design and analysis, structural materials, earthquake engineering and structural dynamics, advanced sensing and structural health monitoring, risk and reliability analysis, computational science and engineering, and geotechnical engineering including geomechanics. The SEG subprogram prepares students for industrial or academic careers.

Students can balance engineering fundamentals with modern computational and experimental methods to customize programs to launch careers as consultants on large and small projects, designers, and engineering analysts.

Structural design and analysis focuses on the conceptual design of structural systems and on computational methods for predicting the static and dynamic, linear and nonlinear responses of structures.

Structural materials research and teaching focuses on the design and analysis of high-performance as well as low-environmental impact materials.

Earthquake engineering and structural dynamics addresses earthquake phenomena, ground shaking, and the behavior, analysis, and design of structures under seismic and other dynamic forces.

Reliability and risk analysis focuses on advanced methods for structural safety evaluation and design, including methods for loss estimation from damage and failures of structures and lifeline systems.

Computational science and engineering emphasizes the application of modern computing methods to structural engineering and geomechanics and encompasses numerical, structural, and geotechnical analysis, including finite element analysis and boundary element methods.

In the area of geomechanics, students focus on the application of the principles of applied mechanics to problems involving geologic materials including theoretical soil and rock mechanics, computational methods, and analysis and design of foundations and earth structures.

SUSTAINABLE DESIGN CONSTRUCTION

The Sustainable Design and Construction (SDC) subprogram prepares students for careers in planning, designing, building, and operating sustainable buildings and infrastructure to maximize their lifecycle economic value, their net contribution to environmental functions and services, and their social equity.

The subprogram offers courses in: project finance; sustainable multidisciplinary, multi-stakeholder planning and design proc-

esses; green architecture; performance-based structural design; building energy systems; and sustainable construction processes and materials. Classes on strategy, economics and organization design for new businesses, and corporate or governmental initiatives focusing on enhancing the sustainability of buildings and infrastructure round out the subprogram.

This subprogram is intended for students with undergraduate degrees in architecture, engineering, science, construction management, economics or business who wish to pursue careers that enhance the sustainability of the built environment.

Potential employers include architectural or engineering design firms, sustainability consultants, construction firms focusing on green buildings, green-tech start-ups, and green-tech venture funds.

COTERMINAL B.S./M.S. PROGRAM IN CIVIL AND ENVIRONMENTAL ENGINEERING

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program at Stanford must have earned a minimum of 120 units towards graduation. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree and and are expected to meet the Department of Civil and Environmental Engineering application deadlines for all applicants for graduate study (December 7, 2010 to be considered for financial aid, or February 1, 2011 if no financial aid is requested). Applications are considered once a year near the beginning of Winter Quarter. An application must display evidence of potential for strong academic performance as a graduate student.

It is recommended that students who contemplate advanced study at Stanford discuss their plans with their advisers in the junior year.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF SCIENCE IN CIVIL AND ENVIRONMENTAL ENGINEERING

The following programs are available leading to the M.S. degree in Civil and Environmental Engineering:

- Atmosphere/Energy
- Construction Engineering and Management
- Design/Construction Integration
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Geomechanics
- Structural Engineering and Sustainable Design Construction

Students admitted to graduate study with a B.S. in Civil Engineering, or equivalent, from an accredited curriculum can satisfy the requirements for the M.S. degree in Civil and Environmental Engineering by completing a minimum of 45 units beyond the B.S. All 45 units must be taken at Stanford. A minimum 2.75 grade point average (GPA) is required for candidates to be recommended for the M.S. degree. No thesis is required.

The program of study must be approved by the faculty of the department and should include at least 45 units of courses in engineering, mathematics, science, and related fields unless it can be shown that other work is pertinent to the student's objectives. Additional program area requirements are available from the department's student services office (Y2E2 room 316).

Candidates for the M.S. in Civil and Environmental Engineering who do not have a B.S. in Civil Engineering may, in addition to the above, be required to complete those undergraduate courses deemed important to their graduate programs. In such cases, more than three quarters is often required to obtain the degree.

ENGINEER IN CIVIL AND ENVIRONMENTAL ENGINEERING

A student with an M.S. in Civil Engineering may satisfy the requirements of the degree of Engineer in Civil and Environmental Engineering by completing 45 unduplicated course work and research units for a total of 90 units. Engineer candidates must submit an acceptable thesis (12 to 15 units) and maintain a minimum GPA of 3.0. The program of study must be approved by a faculty member in the department.

This degree is recommended for those desiring additional graduate education, especially those planning a career in professional practice. The thesis normally should be started in the first quarter of graduate study after the M.S. degree. Programs are offered in the fields of specialization mentioned for the M.S. degree. The Engineer thesis topic, for students who will continue study toward a CEE Ph.D., must be significantly different from their doctoral research.

DOCTOR OF PHILOSOPHY IN CIVIL AND ENVIRONMENTAL ENGINEERING

The Ph.D. is offered under the general regulations of the University as set forth in the "Graduate Degrees" section of this bulletin. This degree is recommended for those who expect to engage in a professional career in research, teaching, or technical work of an advanced nature. The Ph.D. program requires a total of 135 units of graduate study, at least 90 units of which must be at Stanford. Up to 45 units of graduate study can be represented by the M.S. program described above. Students must maintain a minimum GPA of 3.0 in post-M.S. course work. All candidates for the Ph.D. degree are required to complete CEE 200 in conjunction with a one-quarter teaching assistantship/course assistantship to gain training and instructional experience. Further information on Ph.D. requirements and regulations is found in the department handbook.

The program of study is arranged by the prospective candidate at the beginning of the second year with the advice of a faculty committee whose members are nearest in the field of interest to that of the student. The chair of the committee serves as the student's interim adviser until such time as a member of the faculty has agreed to direct the dissertation research. Insofar as possible, the program of study is adapted to the interests and needs of the student within the framework of the requirements of the department and the University.

By the end of the second year of graduate study (or by the end of the first year for students who enroll at Stanford with an M.S.), the student is expected to pass the department's General Qualifying Examination (GQE) to be admitted to candidacy for the doctoral degree. The purpose of the GQE is to ensure that the student is adequately prepared to undertake doctoral research and has a well planned research topic. The exam may take the form of (1) a written and/or oral general examination of the candidate's major field, (2) a presentation and defense of the candidate's doctoral research dissertation proposal, or (3) a combination research proposal and general examination. The GQE is administered by an advisory committee consisting of at least three Stanford faculty members, including a chair who is a faculty member in Civil and Environmental Engineering. All members are normally on the Stanford Academic Council. A petition for appointment of one advisory committee member who is not on the Academic Council may be made if the proposed person contributes an area of expertise that is not readily available from the faculty. Such petitions are subject to approval by the department chair. When the primary research adviser is not a member of the CEE Academic Council faculty, the committee must consist of four examiners, with two members from the CEE department.

PH.D. MINOR IN CIVIL AND ENVIRONMENTAL ENGINEERING

A Ph.D. minor is a program outside a major department. Requirements for a minor are established by the minor department.

Acceptance of the minor as part of the total Ph.D. program is determined by the major department. Application for the Ph.D. minor must be approved by both the major and the minor department, and the minor department must be represented at the University oral examination.

A student desiring a Ph.D. minor in Civil and Environmental Engineering (CEE) must have a minor program adviser who is a regular CEE faculty member in the program of the designated subfield. This adviser must be a member of the student's University oral examination committee and the reading committee for the doctoral dissertation.

The program must include at least 20 units of graduate-level course work (courses numbered 200 or above, excluding special studies and thesis) in CEE completed at Stanford University. The list of courses must form a coherent program and must be approved by the minor program adviser and the CEE chair. A minimum GPA of 3.0 must be achieved in these courses.

OVERSEAS STUDIES COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

AUSTRALIA

- OSPAUSTL 10. Coral Reef Ecosystems. 3 units, Kevin Arrigo, Sophie Dove, Selina Ward, GER:DB:EngrAppSci
- OSPAUSTL 20. Coastal Resource Management. 3 units, Ron Johnstone, GER:DB:EngrAppSci
- OSPAUSTL 30. Coastal Forest Ecosystems. 3 units, Norman Duke, John Hall, GER:DB:EngrAppSci

FLORENCE

- OSPFLOR 38. Water Resources Engineering in Italy: An Historical Perspective. 4-5 units, Leonard Ortolano, GER:DB:EngrAppSci

WINTER QUARTER

CAPETOWN

- OSPCPTWN 26. Managing Global Projects. 3-4 units, Raymond Levitt

INSTITUTE FOR COMPUTATIONAL AND MATHEMATICAL ENGINEERING

Emeritus: (Professor) Joe Keller (Mathematics, Mechanical Engineering)
Director: Peter Glynn (Management Science and Engineering)
Director of Student Affairs: Walter Murray (Management Science and Engineering)
Professors: Stephen Boyd (Electrical Engineering), Emanuel Candes (Mathematics, Statistics), Gunnar Carlsson (Mathematics), Persi Diaconis (Mathematics, Statistics), David Donoho (Statistics), Charbel Farhat (Aeronautics and Astronautics, Mechanical Engineering), Peter Glynn (Management Science and Engineering), Leonidas Guibas (Computer Science), Pat Hanrahan (Computer Science, Electrical Engineering), Jerry Harris (Geophysics), Peter Kitanidis (Civil and Environmental Engineering), Tze Leung Lai (Statistics), Sanjiva Lele (Mechanical Engineering, Aeronautics and Astronautics), Parviz Moin (Mechanical Engineering), Brad Osgood (Electrical Engineering), George Papanicolaou (Mathematics), Peter Pinsky (Mechanical Engineering), Leonid Ryzhik (Mathematics), Eric Shaqfeh (Chemical Engineering, Mechanical Engineering), Andras Vasy (Mathematics), Lawrence Wein (Graduate School of Business), Wing Wong (Statistics), Yinyu Ye (Management Science and Engineering)
Associate Professors: Juan Alonso (Aeronautics and Astronautics), Ronald Fedkiw (Computer Science), Margot Gerritsen (Energy Resources Engineering), Ashish Goel (Management Science and Engineering), Heinz Pitsch (Mechanical Engineering), Charles Taylor (Bioengineering, Surgery), Benjamin Van Roy (Management Science and Engineering, Electrical Engineering)
Assistant Professors: Eric Darve (Mechanical Engineering), Oliver Fringer (Civil and Environmental Engineering), Gianluca Iaccarino (Mechanical Engineering), Ramesh Johari (Management Science and Engineering), Adrian Lew (Mechanical Engineering), Amin Saberi (Management Science and Engineering), Andrew Spakowitz (Chemical Engineering)
Professors (Research): Antony Jameson (Aeronautics and Astronautics), Walter Murray (Management Science and Engineering), Arogyaswami Paulraj (Electrical Engineering), Michael A. Saunders (Management Science and Engineering)
Senior Lecturer: Vadim Khayms
Consulting Assistant Professor: Sepandar Kamvar
Web Site: http://icme.stanford.edu
Mail Code: 94305-4042
Phone: (650) 736-9038

Courses offered by the Institute for Computational and Mathematical Engineering are listed under the subject code CME on the *Stanford Bulletin's* ExploreCourses web site.

The central research mission of the Institute for Computational and Mathematical Engineering (iCME) is to develop sophisticated algorithmic and mathematical tools that impact many applied disciplines. iCME leverages Stanford's strengths in engineering applications and the physical, biological, and information sciences to guide the development of modern methods for research and education in computational mathematics.

iCME's teaching mission is to provide courses for graduate students and undergraduates from all departments in the mathematical sciences focusing on theoretical work and its role in the solution of real problems, integrating numerical computation to facilitate application of mathematical techniques and theories. The institute identifies research areas that benefit from a multidisciplinary approach in which computational mathematics plays a key role such as discrete mathematics, including computational probability and combinatorial optimization, optimization, stochastics, and numerical solution of partial differential equations. Research applications include the physical sciences, business, medicine, and information science.

A strength of iCME is its multidisciplinary intellectual environment, with interaction among students and faculty with diverse backgrounds and expertise. iCME offers service courses for undergraduates and graduate students to fulfill departmental requirements, core courses for M.S. and Ph.D. students in Scientific Computing and Computational Mathematics, and specialized electives in various application areas.

GRADUATE PROGRAMS IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

University regulations governing the M.S. and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

The M.S. degree in Computational and Mathematical Engineering is intended as a terminal professional degree and does not lead

to the Ph.D. program. Students interested in the doctoral program should apply directly to the Ph.D. program. Master's students who have maintained a minimum grade point average (GPA) of 3.5 are eligible to take the Ph.D. qualifying exam; those who pass this examination and secure a research adviser may continue into the Ph.D. program upon acceptance by the institute.

The master's program consists of 45 units of course work taken at Stanford. No thesis is required; however, students may become involved in research projects during the master's program, particularly to explore an interest in continuing to the doctoral program. Although there is no specific background requirement, significant exposure to mathematics and engineering course work is necessary for successful completion of the program.

Applications to the M.S. program and all required supporting documents must be received by January 11, 2011. See http://icme.stanford.edu/admissions for up-to-date information including departmental deadlines. See http://gradadmissions.stanford.edu for information and application materials.

The University requirements for the coterminal M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

REQUIREMENTS

A candidate is required to complete a program of 45 units of courses numbered 200 or above. Courses below 200 level will require special approval from the program office. At least 36 of these must be graded units, passed with a grade point average (GPA) of 3.0 (B) or better. Master's students interested in continuing to the doctoral program must maintain a 3.5 or better grade point average in the program.

Requirement 1—The following courses may be needed as prerequisites for other courses in the program: MATH 41, 42, 51, 52, 53, 103, 113; CME 100, 102, 104, 108, 200, 204, 302; CS 106A, 106X, 108, 205, 229; ENGR 62; STATS 116 or 202.

Requirement 2—Students must demonstrate foundational knowledge in the field by completing the following core courses:

- CME 302. Numerical Linear Algebra
- CME 303. Partial Differential Equations of Applied Mathematics
- CME 304. Numerical Optimization
- CME 305. Discrete Mathematics and Algorithms
- CME 306. Numerical Solution of Partial Differential Equations
- CME 308. Stochastic Methods in Engineering

Courses in this area must be taken for letter grades. Deviations from the core curriculum must be justified in writing and approved by the student's iCME adviser and the chair of the iCME curriculum committee. Courses that are waived may not be counted towards the master's degree.

Requirement 3—12 units of general electives to demonstrate breadth of knowledge in technical area. The elective course list represents automatically accepted electives within the program. However, electives are not limited to the list below, and the list is expanded on a continuing basis. The elective part of the iCME program is meant to be broad and inclusive of relevant courses of comparable rigor to iCME courses. Courses outside this list can be accepted as electives subject to approval by the student's iCME adviser.

1. *Aeronautics and Astronautics:*
   - AA 214B. Numerical Computation of Compressible Flow
   - AA 214C. Numerical Computation of Viscous Flow
   - AA 218. Introduction to Symmetry Analysis
2. *Computational and Mathematical Engineering:*
   - CME 208. Mathematical Programming and Combinatorial Optimization
   - CME 212. Introduction to Large Scale Computing in Engineering
   - CME 215 A,B. Advanced Computational Fluid Dynamics
   - CME263. Introduction to Linear Dynamical Systems
   - CME 324. Advanced Methods in Matrix Computation
   - CME 340. Large-Scale Data Mining
   - CME 342. Parallel Methods in Numerical Analysis
   - CME 364A. Convex Optimization 1
3. *Computer Science:*
   - CS 164. Computing with Physical Objects: Algorithms for Shape and Motion
   - CS 205. Mathematical Methods for Robotics, Vision, and Graphics
   - CS 221. Artificial Intelligence: Principles and Techniques
   - CS 228. Probabilistic Models in Artificial Intelligence
   - CS 229. Machine Learning
   - CS 255. Introduction to Cryptography
   - CS 261. Optimization and Algorithmic Paradigms
   - CS 268. Geometric Algorithms
   - CS 315A. Parallel Computer Architecture and Programming
   - CS 340. Level Set Methods
   - CS 348A. Computer Graphics: Geometric Modeling
   - CS 364A. Algorithmic Game Theory
4. *Electrical Engineering:*
   - EE 222. Applied Quantum Mechanics I
   - EE 223. Applied Quantum Mechanics II
   - EE 256. Numerical Electromagnetics
   - EE 262. Two-Dimensional Imaging
   - EE 278. Introduction to Statistical Signal Processing
   - EE 292E. Analysis and Control of Markov Chains
   - EE 363. Linear Dynamic Systems
   - EE 376A. Information Theory
5. *Management Science and Engineering:*
   - MS&E 220. Probabilistic Analysis
   - MS&E 221. Stochastic Modeling
   - MS&E 223. Simulation
   - MS&E 238. Network Structures and Analysis
   - MS&E 251. Stochastic Decision Models
   - MS&E 310. Linear Programming
   - MS&E 313. Vector Space Optimization
   - MS&E 316. Pricing Algorithms and the Internet
   - MS&E 321. Stochastic Systems
   - MS&E 322. Stochastic Calculus and Control
   - MS&E 323. Stochastic Simulation
6. *Mathematics:*
   - MATH 136. Stochastic Processes
   - MATH 171. Fundamental Concepts of Real Analysis
   - MATH 221. Mathematical Methods of Imaging
   - MATH 227. Partial Differential Equations and Diffusion Processes
   - MATH 236. Introduction to Stochastic Differential Equations
   - MATH 237. Stochastic Equations and Random Media
   - MATH 238. Mathematical Finance
7. *Mechanical Engineering:*
   - ME 335A,B,C. Finite Element Analysis
   - ME 346B. Introduction to Molecular Simulations
   - ME 408. Spectral Methods in Computational Physics
   - ME 412. Engineering Functional Analysis and Finite Elements
   - ME 469A,B. Computational Methods in Fluid Mechanics
   - ME 484. Computational Methods in Cardiovascular Bioengineering
8. *Statistics:*
   - STATS 208. Introduction to the Bootstrap
   - STATS 217. Introduction to Stochastic Processes
   - STATS 219. Stochastic Processes
   - STATS 227. Statistical Computing
   - STATS 237. Time Series Modeling and Forecasting
   - STATS 250. Mathematical Finance

- STATS 305. Introduction to Statistical Modeling
- STATS 310A,B,C. Theory of Probability
- STATS 324. Classical Multivariate and Random Matrix Theory
- STATS 345. Computational Molecular Biology
- STATS 362. Monte Carlo Sampling
- STATS 366. Computational Biology

9. *Other:*
   - CEE 281. Finite Element Structural Analysis
   - CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods
   - ENGR 209A. Analysis and Control of Nonlinear Systems

Requirement 4—9 units of focused graduate application electives, approved by the iCME graduate adviser, in the areas of engineering, mathematics, physical, biological, information, and other quantitative sciences. These courses should be foundational depth courses relevant to the student's professional development and research interests.

Requirement 5—3 units of an iCME graduate seminar or other approved seminar. Additional seminar units may not be counted towards the 45-unit requirement.

DOCTOR OF PHILOSOPHY IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

The deadline for applications to the Ph.D. program is December 7, 2010; all required supporting documents must be received by January 4, 2011. See http://icme.stanford.edu /admissions for full information. Prospective graduate students should see http://gradadmissions.stanford.edu for information and application materials. Applicants should take the Graduate Record Examination by October of the academic year in which the application is submitted.

Admission to the Ph.D. program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement and passing the qualifying examination.

Requirements—

1. Complete a minimum of 135 units of residency at Stanford, including:
   a. 45 units from the master's program
   b. 27 units of focused electives in an area planned with the student's Ph.D. adviser; 12 of these units should come from iCME specialized electives with significant computational content such as the CME 320-380 series. The focused and specialized elective component of the iCME program is meant to be broad and inclusive of relevant courses of comparable rigor to iCME courses. The elective course list following represents automatically accepted electives within the program. However, electives are not limited to the list below, and the list is expanded on a continuing basis; courses outside the list can be accepted as electives subject to approval by the student's iCME adviser.
   c. 60 units of thesis research
   d. 3 units of free electives
2. Maintain a grade point average (GPA) of 3.5.
3. Pass the qualifying examination administered by iCME.
4. Complete an approved program of original research.
5. Complete a written dissertation based on research.
6. Pass the oral examination that is a defense of the dissertation research.

Specialized Elective List—See requirement 1b above.

CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods
CME 364A,B. Convex Optimization I,II
CS 348A. Computer Graphics: Geometric Modeling
EE 363. Linear Dynamical Systems
EE 368. Digital Image Processing
MATH 205A. Real Analysis
MATH 215A. Complex Analysis, Geometry and Topology
MATH 217A. Differential Geometry
MATH 221. Mathematical Methods of Imaging
MATH 227. Partial Differential Equations and Diffusion Processes
MATH 236. Introduction to Stochastic Differential Equations
MATH 237. Stochastic Equations and Random Media
MATH 238. Mathematical Finance
ME 335A,B,C. Finite Element Analysis
ME 346B. Introduction to Molecular Simulations
ME 351A,B. Fluid Mechanics
ME 361. Turbulence
ME 408. Spectral Methods in Computational Physics
ME 412. Engineering Functional Analysis and Finite Elements
ME 469A,B. Computational Methods in Fluid Mechanics
MS&E 319. Approximation Algorithms
MS&E 336. Topics in Game Theory with Engineering Applications
STATS 305. Introduction to Statistical Modeling
STATS 306A,B. Methods for Applied Statistics
STATS 318. Modern Markov Chains
STATS 366. Computational Biology

Note: All courses listed under "Requirement 3" under the "Master of Science in Computational and Mathematical Engineering" section can be used for fulfilling the general elective requirement.

FINANCIAL ASSISTANCE

The department awards a limited number of fellowships, course assistantships, and research assistantships to incoming graduate students. Applying for such assistance is part of submitting the application for admission to the program. Students are appointed for half-time assistantships which provide a tuition scholarship at the 8, 9, 10 unit rate during the academic year and a monthly stipend. Half-time appointments generally require 20 hours of work per week. Most course assistantships and research assistantships are awarded to students in the doctoral program in iCME. If the number of Ph.D. students is not sufficient to staff all course and research assistantship positions available, these positions may be open to master's students. However, master's students are not guaranteed financial assistance.

PH.D. MINOR IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

For a minor in Computational and Mathematical Engineering (CME), a doctoral candidate must complete 20 units of approved graduate level courses. These should include three iCME core courses and three iCME graduate electives at the 300 level or above. A maximum of two units can be taken as iCME seminar units. All courses, except the seminar courses, must be taken for a letter grade and passed with a grade of 'B' or better. Minor programs must receive approval from the iCME curriculum chair prior to completing any of the iCME graduate electives. Minor programs should be developed in close discussion between the student and the student's primary Ph.D. adviser. Courses taken in fulfillment of the minor cannot be used for the student's Ph.D. degree.

COMPUTER SCIENCE

Emeriti: (Professors) Tom Binford, Edward Feigenbaum, Richard Fikes, Donald E. Knuth,* John McCarthy, Edward J. McCluskey, Zohar Manna, William F. Miller, Nils J. Nilsson, Vaughan Pratt,* Jeffrey D. Ullman, Gio Wiederhold*

Chair: Jennifer Widom

Associate Chair for Education: Mehran Sahami

Professors: Alex Aiken, Dan Boneh, David Cheriton, William J. Dally, David Dill, Hector Garcia-Molina, Leonidas J. Guibas, Patrick Hanrahan, John Hennessy, Mark A. Horowitz, Oussama Khatib, Daphne Koller, Monica Lam, Jean-Claude Latombe, Marc Levoy, Teresa Meng, Nick McKeown, John Mitchell, Kunle Olukotun, Yoav Shoham, Sebastian Thrun, Luca Trevisan, Jennifer Widom, Terry Winograd

Associate Professors: Serafim Batzoglou, Dawson Engler, Ronald P. Fedkiw, Michael Genesereth, Christoforos Kozyrakis, Christopher Manning, David Mazieres, Nick McKeown, Andrew Ng, Serge A. Plotkin, Balaji Prabhakar, Mendel Rosenblum

Assistant Professors: Gill Bejerano, Jeffrey Heer, Sachin Katti, Scott Klemmer, Vladlen Koltun, Jure Leskovec, Philip Levis, Fei-Fei Li, Subhasish Mitra, Tim Roughgarden

Professors (Research): John Ousterhout, John K. Salisbury

Professor (Teaching): Eric S. Roberts

Associate Professor (Teaching): Stephen Cooper, Mehran Sahami

Courtesy Professors: Russ Altman, Martin Fischer, Bernd Girod, Michael Levitt, Mark Musen, Clifford J. Nass, Roy Pea, Fouad A. Tobagi

Courtesy Associate Professors: Ashish Goel, Dan Jurafsky, Vijay Pande, Benjamin Van Roy

Courtesy Assistant Professors: Paulo Blikstein, Atul Butte, Noah Goodman, Ramesh Johari, Ge Wang

Lecturers: Gerald Cain, Nicholas J. Parlante, Robert Plummer, Patrick Young, Julie Zelenski

Consulting Professors: Gary Bradski, Stuart Card, Tom Dean, Kathleen Fisher, Prabhakar Raghavan

Consulting Associate Professor: Federico Barbagli, Pei Cao

Consulting Assistant Professors: Kurt Akeley, Martin Casado

Visiting Professor: Martin Abadi

* Recalled to active duty.

Mail Code: 94305-9025

Phone: (650) 723-2273

Web Site: http:// www.cs.stanford.edu

Courses offered by the Department of Computer Science are listed under the subject code CS on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Computer Science (CS) operates and supports computing facilities for departmental education, research, and administration needs. All CS students have access to the departmental student machine for general use (mail, news, etc.), as well as computer labs with public workstations located in the Gates Building. In addition, most students have access to systems located in their research areas.

Each research group in Computer Science has systems specific to its research needs. These systems include workstations (PCs, Macs), multi-CPU computer clusters, and local mail and file servers. Servers and workstations running Linux or various versions of Windows are commonplace. Support for course work and instruction is provided on systems available through Information Technology Services (ITS) and the School of Engineering (SoE).

MISSION OF THE UNDERGRADUATE PROGRAM IN COMPUTER SCIENCE

The mission of the undergraduate program in Computer Science is to develop students' breadth of knowledge across the subject areas of computer sciences, including their ability to apply the defining processes of computer science theory, abstraction, design, and implementation to solve problems in the discipline. Students take a set of core courses. After learning the essential programming techniques and the mathematical foundations of computer science, students take courses in areas such as programming techniques, automata and complexity theory, systems programming, computer architecture, analysis of algorithms, artificial intelligence, and applications. The program prepares students for careers in government, law, and the corporate sector, and for graduate study.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able:

1. to apply the knowledge of mathematics, science, and engineering.
2. to design and conduct experiments, as well to analyze and interpret data.
3. to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. to function on multidisciplinary teams.
5. to identify, formulate, and solve engineering problems.
6. to understand professional and ethical responsibility.
7. to communicate effectively.
8. to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. to demonstrate a working knowledge of contemporary issues.
10. to apply the techniques, skills, and modern engineering tools necessary for engineering practice.
11. to transition from engineering concepts and theory to real engineering application.

GRADUATE PROGRAMS IN COMPUTER SCIENCE

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

COMPUTER SCIENCE COURSE CATALOG NUMBERING SYSTEM

The first digit of a CS course number indicates its general level of sophistication:

001-099	Service courses for nontechnical majors
100-199	Other service courses, basic undergraduate
200-299	Advanced undergraduate/beginning graduate
300-399	Advanced graduate
400-499	Experimental
500-599	Graduate seminars

The tens digit indicates the area of Computer Science it addresses:

00-09	Introductory, miscellaneous
10-19	Hardware Systems
20-29	Artificial Intelligence
30-39	Numerical Analysis
40-49	Software Systems
50-59	Mathematical Foundations of Computing
60-69	Analysis of Algorithms
70-79	Computational Biology and Interdisciplinary Topics
90-99	Independent Study and Practicum

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

The department offers both a major in Computer Science and a minor in Computer Science. Further information is available in the *Handbook for Undergraduate Engineering Programs* published by the School of Engineering. The Computer Science major offers a number of tracks (programs of study) from which students can choose, allowing them to focus their program on the areas of most interest. These tracks also reflect the broad diversity of areas in

computing disciplines. The department has an honors program, which is described in the following section.

In addition to Computer Science itself, Stanford offers several interdisciplinary degrees with a substantial computer science component. The Computer Systems Engineering major (which leads to a B.S. in Engineering) allows the study of areas requiring a knowledge of both computer hardware and software, bridging the gap between traditional CS and Electrical Engineering majors. The Symbolic Systems major (in the School of Humanities and Sciences) offers an opportunity to explore computer science and its relation to linguistics, philosophy, and psychology. Finally, the Mathematical and Computational Sciences major (also Humanities and Sciences) allows students to explore computer science along with more mathematics, statistics, and operations research.

HONORS PROGRAM

The Department of Computer Science (CS) and the School of Engineering degree program in Computer Systems Engineering (CSE) offer an honors program for undergraduates whose academic records and personal initiative indicate that they have the necessary skills to undertake high-quality research in computer science. Admission to the program is by application only. To apply for the honors program, students must be majoring in Computer Science or Computer Systems Engineering, have a grade point average (GPA) of at least 3.6 in courses that count toward the major, and achieve senior standing (135 or more units) by the end of the academic year in which they apply. Coterminal master's students are eligible to apply as long as they have not already received their undergraduate degree. Beyond these requirements, students who apply for the honors program must find a Computer Science faculty member who agrees to serve as the thesis adviser for the project. Thesis advisers must be members of Stanford's Academic Council.

Students who meet the eligibility requirements and wish to be considered for the honors program must submit a written application to the CS undergraduate program office by May 1 of the year preceding the honors work. The application must include a letter describing the research project, a letter of endorsement from the faculty sponsor, and a transcript of courses taken at Stanford. Each year, a faculty review committee selects the successful candidates for honors from the pool of qualified applicants.

In order to receive departmental honors, students admitted to the honors program must, in addition to satisfying the standard requirements for the undergraduate degree, do the following:

1. Complete at least 9 units of CS 191 or 191W under the direction of their project sponsor.
2. Attend a weekly honors seminar Winter and Spring quarters.
3. Complete an honors thesis deemed acceptable by the thesis adviser and at least one additional faculty member.
4. Present the thesis at a public colloquium sponsored by the department.
5. Maintain the 3.6 GPA required for admission to the honors program.

GUIDE TO CHOOSING INTRODUCTORY COURSES

Students arriving at Stanford have widely differing backgrounds and goals, but most find that the ability to use computers effectively is beneficial to their education. The department offers many introductory courses to meet the needs of these students.

For students whose principal interest is an exposure to the fundamental ideas behind computer science and programming, CS 105 is the most appropriate course. It is intended for students in nontechnical disciplines who expect to make some use of computers, but who do not expect to go on to more advanced courses. CS 105 meets the General Education Disciplinary Breadth Requirement in Engineering and Applied Sciences and includes an introduction to programming and the use of modern Internet-based technologies. Students interested in learning to use the computer should consider CS 1C, Introduction to Computing at Stanford.

Students who intend to pursue a serious course of study in computer science may enter the program at a variety of levels, depending on their background. Students with little prior experience or those who wish to take more time to study the fundamentals of programming should take CS 106A followed by CS 106B. Students in CS 106A need not have prior programming experience. Students with significant prior exposure to programming or those who want an intensive introduction to the field should take CS 106X or may start directly in CS 106B. CS 106A uses Java as its programming language; CS 106B and X use C++. No prior knowledge of these languages is assumed, and the prior programming experience required for CS 106B or X may be in any language. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

After the introductory sequence, Computer Science majors and those who need a significant background in computer science for related majors in engineering should take CS 103, 107 and 110. CS 103 offers an introduction to the mathematical and theoretical foundations of computer science. CS 107 exposes students to a variety of programming concepts that illustrate critical strategies used in systems development; CS 110 builds on this material, focusing on the development of larger-scale software making use of systems and networking abstractions.

In summary:
For exposure: CS 1C
For nontechnical use: CS 105
For scientific use: CS 106A
For a technical introduction: CS 106A
For significant use: CS 106A,B or 106X, along with 103, 107, and 110

MASTER OF SCIENCE IN COMPUTER SCIENCE

In general, the M.S. degree in Computer Science is intended as a terminal professional degree and does not lead to the Ph.D. degree. Most students planning to obtain the Ph.D. degree should apply directly for admission to the Ph.D. program. Some students, however, may wish to complete the master's program before deciding whether to pursue the Ph.D. To give such students a greater opportunity to become familiar with research, the department has instituted a program leading to a master's degree with distinction in research. This program is described in more detail below.

Admission—Applications for admission to the M.S. program, and all of the required supporting documents, must be received by December 7, 2010. Exceptions are made for applicants who are already students at Stanford and are applying to the coterminal program. Information on these deadlines is available at http://cs.stanford.edu/wiki/admissions/Applying/Deadlines.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

REQUIREMENTS

A candidate is required to complete a program of 45 units. At least 36 of these must be graded units, passed with a grade point average (GPA) of 3.0 (B) or better. The 45 units may include no more than 10 units of courses from those listed below in Requirement 1. Thus, students needing to take more than two of the courses listed in Requirement 1 actually complete more than 45 units of course work in the program. Only well-prepared students may expect to finish the program in one year; most students complete the program in six quarters. Students hoping to complete the program with 45 units should already have a substantial background in computer science, including course work or experience equivalent to all of Requirement 1 and some prior course work related to their specialization area.

Requirement 1: Foundations—

Students must complete the following courses, or waive out of them by providing evidence to their advisers that similar or more advanced courses have been taken, either at Stanford or another institution:

1. Logic, Automata, and Computability: CS 103
2. Probability: CS 109 *or* STATS 116 *or* MS&E 220 *or* CME 106
3. Algorithms: CS 161
4. Computer Organization and Systems: CS 107
5. Principles of Computer Systems: CS 110

Requirement 2: Significant Software Implementation—

Students must complete at least one course designated as having a significant software implementation component. The list of such courses includes: CS 140, 143, 144, 145, 148, 210B, 221, 243, 248, 346.

Requirement 3: Specialization—

Students may choose to satisfy this requirement through one of two options, Single Depth or Dual Depth, outlined following. All courses taken for this requirement must be taken for letter grades.

- *Option 1—Single Depth*
  - A program of 27 units in a single area of specialization must be completed.
  - Additionally, students must complete three breadth courses from the list of approved breadth courses associated with their chosen specialization. Individual specializations explicitly have different breadth requirements; see the individual specialization sheets at http://cs.stanford.edu/degrees/mscs/programsheets for details.
  - Breadth courses may not be waived and must be completed for a letter grade.
- *Option 2—Dual Depth*
  - Students select distinct primary and secondary areas.
  - A program of 21 units in the primary area of specialization must be completed.
  - Students must also complete a program of five courses satisfying the requirements for their secondary area of specialization.
  - Breadth courses are not required.

Specialization Areas—

Nine approved specialization areas which may be used to satisfy Requirement 3 are listed following. Students may propose to the M.S. program committee other coherent programs that meet their goals and satisfy the basic requirements.

Courses marked with an asterisk (*) require consent of the the faculty adviser. Courses marked with a double asterisk (**) may be waived by students with equivalent course work and with the approval of their adviser.

1. *Artificial Intelligence—*
   a. CS 221**
   b. At least four of: CS 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 228, 229
   c. Sufficient depth units from category (b) and the following: CS 124, 205A, 222, 225A, 225B, 227B, 228T, 246, 262, 270, 273A, 274, 275, 276, 277, 278, 279, 294A*, 321, 322, 323, 326A, 327A, 328, 329, 341, 345, 364A, 364B, 374, 377,* 379*; 393*, 395*, 399*; EE 263, 363, 364A, 364B, 376A; ENGR 205, 209A; MS&E 251, 252, 339, 351, 352, 353; PSYCH 202, 205; STATS 202, 315A, 315B
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Artificial Intelligence must take five total courses satisfying the area (a) and (b) requirements above.
      - Those students who have waived out of CS 221 may take an additional course in either area (b) or (c).

   Artificial Intelligence Breadth Courses—CS 140, 143, 144, 145, 147, 148, 149, 154, 155, 157, 164, 240, 240E, 242, 243, 244, 244E, 249A, 255, 258, 259, 261, 268; CME 108, 302; EE 108B, 282, 284
2. *Biocomputation—*
   a. at least four of: CS 262, 270, 272, 273A, 274, 278, 279
   b. Sufficient depth units from category (a) and the following: CS 228, 229, 245, 246, 261, 268, 275, 277, 341, 345, 346, 365, 374, 393**, 395**, 399**; BIOC 218; GENE 203, 211; SBIO 228
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) and (b) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Biocomputation must take five total courses, three courses of which must come from area (a) and the remaining two courses may come from either area (a) or (b).

   Biocomputation Breadth Courses—CS 121 or 221, 124, 140, 143, 144, 145, 147, 148, 149, 154, 155, 157, 164, 205A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 240, 240E, 242, 243, 244, 244E, 249A, 255, 258, 259, 276, 279; CME 108, 302; EE 108B, 282, 284.
3. *Computer and Network Security—*
   a. CS 140**, 144**, 155, 244, 255
   b. At least three of: CS 142, 240, 241, 244B, 244C, 259, 261, 340, 344, 355, 365
   c. Sufficient depth units from category (b) and the following: CS 240E, 244E, 245, 294S*, 295, 341, 344B, 345, 347, 361A, 393*, 395*, 399*; EE 384A, 384B, 384C, 384M, 384S, 384X, 384Y
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Computer and Network Security must take five courses; those five courses must satisfy the area (a) requirement and additional courses from area (b) should be taken if any area (a) requirements are waived.

   Computer and Network Security Breadth Courses—CS 121 or 221, 124, 143, 147, 148, 149, 154, 157, 164, 205A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 228, 229, 242, 243, 249A, 258, 262, 268, 270, 273A, 274, 276, 279; CME 108, 302; EE 108B, 282.
4. *Database Systems—*
   a. CS 145**, 245
   b. At least two of: CS 341, 345, 346, 347
   c. Sufficient depth units from category (b) and the following: CS 240, 242, 243, 244, 244B, 244C, 246, 249A, 249B, 255, 262, 270, 271, 272, 275, 276, 315A, 321, 344, 364B, 374, 393*, 395*, 399*
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Database Systems must take five courses satisfying the area (a), (b), and (c) requirements above.

   Database Systems Breadth Courses—S121 or 221, 124, 140, 147, 148, 149, 154, 155, 157, 164, 205A, 222,223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 228, 229, 240E, 244E, 258, 259, 261, 268, 273A, 274, 279; CME 108, 302; EE 108B, 282.
5. *Human-Computer Interaction—*
   a. CS 147**
   b. One of: CS 247, 294H
   c. One of: CS 376, 378, 448B

d. One of: CS 124, 142, 148
e. One of: CS 303; COMM 206, 268; PSYCH 110, 252
f. One of: ARTSTUDI 160; ME 203, 216A, 313, 377
g. One or more courses from areas (b) through (f), or the following: CS140, 210A, 210B, 223A, 223B, 224N, 224S, 224U, 224W, 226, 228, 229, 242, 246, 248, 295, 341, 345, 393*, 395*, 399* or any d.school class listed at http://www.stanford.edu/group/dschool/participate/classes.php or any HCI class listed at http://hci.stanford.edu/courses noted as counting towards the CS M.S. degree. Such courses must be numbered 100 or above and be taken for at least 3 units to count for this requirement.
   - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) through (g) requirements above.
   - Students with a secondary area of specialization (per Option 2 above) in Human-Computer Interaction must take five courses as follows:
     1. one course each from areas (a), (d), (e), and (f)
     2. then one course from either area (b) or (c)
   - Students waiving out of the area (a) requirement should take one additional course from areas (b) through (g).

Human-Computer Interaction Breadth Courses—CS 121 or 221, 143, 144, 145, 149, 154, 155, 157, 164, 205A, 222, 224M, 227, 227B, 240,240E, 243, 244, 244E, 249A, 255, 258, 259, 261, 262, 268, 270, 273A, 274, 276, 279; CME 108, 302; EE 108B, 282, 284.

6. *Real-World Computing—*
   a. At least three of: CS 148, 223A, 223B, 248
   b. At least three of: CS 205A, 205B, 226, 249A, 249B, 262, 268, 277, 348A, 348B, 374; CME 302, 306, 326
   c. Sufficient additional units chosen from the above and from the following: CS 225A, 225B, 228, 229, 247, 270, 271, 272, 273A, 274, 294A*, 323, 327A, 328, 448, 393*, 395*, 399*
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Real-World Computing must take five total courses satisfying area (a) and two of the three courses in the area (b) requirements above (i.e., three courses in area (a) and two courses in area (b).

   Real-World Computing Breadth Courses—CS 121, or 221, 124, 140, 143, 144, 145, 147, 149, 154, 155, 157, 164, 222, 224M, 224N, 224S, 224U, 224W, 227, 227B, 240, 240E, 242, 243, 244, 244E, 246, 255, 258, 259, 261, 276, 279; CME 108, 302; EE 108B, 282, 284.
7. *Software Theory—*
   a. CS 242, 243
   b. At least one of: CS 241, 258, 259
   c. At least one of: CS 244, 245, 295, 341, 343, 345
   d. At least one course from the following: CS 255, 261, 268, 355, 361A, 361B, 365
   e. At least two additional courses chosen from (b), (c), (d), or the following: CS 294S*, 346, 393*, 395*, 399*
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a)-(e) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Software Theory need to take 5 total courses satisfying the area (a) through (d) requirements above:
        1. two courses in area (a)
        2. one course each in areas (b) through (d).

   Software Theory Breadth Courses—CS 121 or 221, 124, 140, 147, 148, 149, 154, 155, 157, 164, 205A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 228, 229, 240, 240E, 244E, 249A, 262, 270, 273A, 274, 276, 279; CME 108, 302; EE 108B, 282.
8. *Systems—*
   a. CS 140**, 144**, 240, 242
   b. At least three of: CS 243, 244, 245, 248, 348B; EE 271, 282
   c. At least two additional courses chosen from category (b) and the following: CS 240E, 244B, 244C, 244E, 246, 249A, 249B, 255, 259, 262, 270, 271, 272, 276, 294S*, 295, 315A, 315B, 340, 341, 343, 344, 344B, 345, 346, 347, 348A, 349, 374, 448, 393*, 395*, 399*; EE 273, 382A, 382C, 384A, 384B, 384C, 384M, 384S, 384X, 384Y
      - Students with a 27-unit depth option (Option 1 above) must take 27 units subject to satisfying the area (a), (b), and (c) requirements above.
      - Students with a 21-unit depth option (Option 2 above) must take that many units subject to satisfying the area (a) and (b) requirements above, and additional courses may be taken from area (c) if any courses in the area (a) requirement are waived.
      - Students with a secondary area of specialization (per Option 2 above) in Systems need to take five courses; those courses must satisfy the area (a) requirement and additional courses may be taken from area (b).

   *Systems Breadth Courses—C*S 121 or 221, 124, 147, 154, 155, 157, 164, 205A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 228, 229, 255, 258, 261, 268, 273A, 274, 279; CME 108, 302
9. *Theoretical Computer Science—*
   a. CS 241 or 258 or 259, 261 (361A or 361B may be used as substitutes for 261)
   b. Sufficient additional units chosen from: CS 228, 241, 246, 254, 255, 258, 259, 262, 268, 341, 345, 355, 356, 357, 358, 359,* 361A, 361B, 364A, 364B, 365, 369,* 374, 393*, 395*, 399*, 468*; MS&E 310
      - Multiple CS 359, CS 369, and/or CS 468 courses may be taken as long as they are each on different topics, denoted by different letter suffixes for the courses.
      - Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) and (b) requirements above.
      - Students with a secondary area of specialization (per Option 2 above) in Theoretical Computer Science need to take 5 total courses satisfying the area (a) and (b) requirements above:
        1. two courses in area (a)
        2. three courses in area (b).

   Theoretical Computer Science Breadth Courses—CS 121 or 221, 124, 140, 143, 144, 145, 147, 148, 149, 154, 155, 157, 164, 205A, 222, 223A, 223B, 224M, 224N, 224S, 224U, 224W, 226, 227, 227B, 229, 240,240E, 242, 243, 244, 244E, 249A, 270, 273A, 274, 276, 279; CME 108, 302; EE 108B, 282, 284.

* With consent of faculty adviser.

** Students with equivalent course work may waive with the approval of their adviser.

Requirement 4—

Additional elective units must be technical courses (numbered 100 or above) related to the degree program and approved by the adviser. All CS courses numbered above 110 (with the exception of CS 196 and 198) taken for 3 or more units are pre-approved as elective courses. Additionally, up to a maximum of 3 units of 500-level CS seminars, CS 300, EE 380, EE 385A, or other 1-2 unit seminars offered in the School of Engineering may be counted as electives. Elective courses may be taken on a satisfactory/no credit

basis provided that a minimum of 36 graded units is presented within the 45-unit program.

MASTER OF SCIENCE WITH DISTINCTION IN RESEARCH

A student who wishes to pursue the M.S. in CS with distinction in research must first identify a faculty adviser who agrees to supervise and support the research work. The research adviser must be a member of the Academic Council and must hold an appointment in Computer Science. The student and principal adviser must also identify another faculty member, who need not be in the Department of Computer Science, to serve as a secondary adviser and reader for the research report. In addition, the student must complete the following requirements beyond those for the regular M.S. in CS degree:

1. *Research Experience*—The program must include significant research experience at the level of a half-time commitment over the course of three academic quarters. In any given quarter, the half-time research commitment may be satisfied by a 50 percent appointment to a departmentally supported research assistantship, 6 units of independent study (CS 393, 395, or 399), or a prorated combination of the two (such as a 25 percent research assistantship supplemented by 3 units of independent study). This research must be carried out under the direction of the primary or secondary adviser.
2. *Supervised Writing and Research*—In addition to the research experience outlined in the previous requirement, students must enroll in at least 3 units of independent research (CS 393, 395, or 399) under the direction of their primary or secondary adviser. These units should be closely related to the research described in the first requirement, but focused more directly on the preparation of the research report described in the next section. The writing and research units described in parts (1) and (2) may be counted toward the 45 units required for the degree.
3. All independent study units (CS 393, 395, 399) must be taken for letter grades and a GPA of 3.0 (B) or better must be maintained.
4. *Research Report*—Students must complete a significant report describing their research and its conclusions. The research report represents work that is publishable in a journal or at a high-quality conference, although it is presumably longer and more expansive in scope than a typical conference paper. A copy of the research report must be submitted to the student services office in the department three weeks before the beginning of the examination period in the student's final quarter. Both the primary and secondary adviser must approve the research report before the distinction-in-research designation can be conferred.

JOINT M.S. AND LAW DEGREE

Law students interested in pursuing an M.S. in Computer Science must apply for admission to the Computer Science Department either (i) concurrently with applying to the Law School; or (ii) after being admitted to the Law School, but no later than the earlier of: (a) the end of the second year of law school; or (b) the Computer Science Department's admission deadline for the year following that second year of law school.

In addition to being admitted separately to the Law School and the Computer Science Department, students must secure permission from both academic units to pursue degrees in those units as part of a joint degree program.

J.D./M.S. students may elect to begin their course of study in either the Law School or the Computer Science Department. Faculty advisers from each academic unit participate in the planning and supervising of the student's joint program. Students must be enrolled full-time in the Law School for the first year of law studies. Otherwise, enrollment may be in the graduate school or the Law School and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. degree as specified by the Law School and the M.S. degree as specified in this Bulletin.

The Law School approves courses from the Department of Computer Science that may count toward the J.D. degree, and the Computer Science Department approves courses from the Law School that may count toward the M.S. degree in Computer Science. In either case, approval may consist of a list applicable to all join degree students or may be tailored to each individual student program. No more than 45 units of approved courses may be counted toward both degrees. No more than 36 units of courses that originate outside the Law School may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the Law School but count toward the Law degree, the Law School credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of Law School credits that may be counted toward the M.S. in Computer Science is the greater of: (i) 12 units; or (ii) the maximum number of units from courses outside of the department that M.S. candidates in Computer Science are permitted to count toward the M.S. in the case of a particular student's individual program. Tuition and financial aid arrangements are normally through the school in which the student is then enrolled.

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

Applications to the Ph.D. program and all supporting documents must be submitted and received online by December 7, 2010. See http://cs.stanford.edu/wiki/admissions for complete information. Changes or updates to the admission process are posted in September.

The following are general department requirements. Contact the Computer Science Ph.D. administrator for details.

1. A student should plan and complete a coherent program of study covering the basic areas of computer science and related disciplines. The student's adviser has primary responsibility for the adequacy of the program, which is subject to review by the Ph.D. program committee.
2. The first year of the Ph.D. program is spent working with 1-3 different professors on a rotating basis. The intent is to allow the first-year Ph.D. student to work with a variety of professors before aligning with a permanent program adviser. Students who don't need the full year to find a professor to align with have the option of aligning within the first or second quarter.
3. Each student, to remain in the Ph.D. program, must satisfy the breadth requirement covering introductory-level graduate material in major areas of computer science. A student must fulfill two breadth area requirements in each of three general areas by the end of the second year in the program. Fulfillment of the six breadth-area requirements means eligibility to apply for candidacy prior to the second year in the program. An up-to-date list of courses that satisfy the breadth requirements can be found at the http://cs.stanford.edu/degrees/phd/Main/. The student must completely satisfy the breadth requirement by the end of the second year in the program and must pass a qualifying exam in the general area of the expected dissertation by the end of the third year in the program.
4. As part of the training for the Ph.D., the student is also required to complete at least 4 units (a unit is 10 hours per week for one quarter) as a course assistant or instructor for courses in Computer Science numbered 100 or above.
5. The Reading Committee form and Oral Thesis Proposal must be submitted within one year of passing the qualifying exam.
6. The most important requirement is the dissertation. After passing the required qualifying examination, each student must secure the agreement of a member of the department faculty to act as the dissertation adviser. The dissertation adviser is often the student's program adviser.
7. The student must pass a University oral examination in the form of a defense of the dissertation. This is typically held af-

ter all or a substantial portion of the dissertation research has been completed.
8. The student is expected to demonstrate the ability to present scholarly material orally in the dissertation defense.
9. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member from within the department, and a third member chosen from within or outside of the University. The principal adviser and at least one of the other committee members must be Academic Council members.

PH.D. MINOR IN COMPUTER SCIENCE

For a minor in Computer Science, a candidate must complete 20 unduplicated units of Computer Science course work numbered 200 or above. At least three of the courses must be master's core courses to provide breadth and one course numbered 300 or above to provide depth. One of the courses taken must include a significant programming project to demonstrate programming efficiency. Courses must be taken for a letter grade and passed with a grade of 'B' or better. Applications for a minor in Computer Science are submitted at the same time as admission to candidacy.

TEACHING AND RESEARCH ASSISTANTSHIPS IN COMPUTER SCIENCE

Graduate student assistantships are available. Half-time assistants receive a tuition scholarship for 8, 9, or 10 units per quarter during the academic year, and in addition receive a monthly stipend.

Duties for half-time assistants during the academic year involve approximately 20 hours of work per week. Course assistants (CAs) help an instructor teach a course by conducting discussion sections, consulting with students, and grading examinations. Research assistants (RAs) help faculty and senior staff members with research in computer science. Most course and research assistantships are held by Ph.D. students. If there is an insufficient number of Ph.D. students to staff teaching and research assistantships, then these positions are open to master's students. However, master's students should not plan on being appointed to an assistantship.

Students with fellowships may have the opportunity to supplement their stipends by serving as graduate student assistants.

OVERSEAS STUDIES COURSES IN COMPUTER SCIENCE

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

ELECTRICAL ENGINEERING

Emeriti: (Professors) Clayton W. Bates, Richard Bube, John Cioffi *, Von R. Eshleman, Michael J. Flynn *, Gene F. Franklin *, Joseph W. Goodman, Stephen E. Harris *, Martin E. Hellman, Thomas Kailath *, Gordon S. Kino *, John G. Linvill, Albert Macovski *, Laurence A. Manning, Edward J. McCluskey *, Malcolm M. McWhorter, James D. Meindl, Richard H. Pantell *, R. Fabian W. Pease *, Anthony E. Siegman, Leonard Tyler *, Robert L. White, Bernard Widrow *; (*Associate Professor*) Bruce B. Lusignan; *(Professors, Research)* Donald L. Carpenter *, Aldo da Rosa *, Antony Fraser-Smith *, C. Robert Helms, Ingolf Lindau *, David Luckham, Arogyaswami J. Paulraj *, Calvin F. Quate

Chair: Mark Horowitz

Vice Chairs: Robert W. Dutton, Dwight G. Nishimura

Associate Chair (Admissions): Howard Zebker

Chair (Academic Affairs Committee): Dwight G. Nishimura

Professors: Nicholas Bambos, Stephen P. Boyd, Thomas M. Cover, Donald C. Cox, William J. Dally, Robert W. Dutton, Abbas El Gamal, Hector Garcia-Molina, Bernd Girod, Andrea G. Goldsmith, Robert M. Gray, Patrick Hanrahan, James S. Harris, John L. Hennessy, Lambertus Hesselink, Mark A. Horowitz, Roger T. Howe, Umran S. Inan, Joseph M. Kahn, Gregory T. A. Kovacs, Thomas H. Lee, Marc Levoy, Nick McKeown, Teresa H. Y. Meng, David A. B. Miller, Dwight G. Nishimura, Oyekunle Olukotun, Brad G. Osgood, John Pauly, James D. Plummer, Krishna Saraswat, Fouad A. Tobagi, Shan X. Wang, Jennifer Widom, H. S. Philip Wong, S. Simon Wong, Bruce A. Wooley, Yoshihisa Yamamoto, Howard Zebker

Associate Professors: Dan Boneh, Dawson Engler, Shanhui Fan, John T. Gill III, Christoforos E. Kozyrakis, Sanjay Lall, Andrea Montanari, Boris Murmann, Balaji Prabhakar, Mendel Rosenblum, Krishna V. Shenoy, Olav Solgaard, Sebastian Thrun, Benjamin Van Roy, Jelena Vuckovic, Tsacy Weissman

Assistant Professors: Audrey Ellerbee, Sachin Katti, Philip Levis, Subhasish Mitra, Ada Poon, Peter Peumans

Professors (Research): James F. Gibbons, Leonid Kazovsky, Butrus Khuri-Yakub, Yoshio Nishi, Piero Pianetta

Acting Assistant Professor: Laurent Giovangrandi

Courtesy Professors: Stacey Bent, John Bravman, Emmanuel Candes, David Cheriton, Amir Dembo, David L. Dill, Per Enge, Gary Glover, Peter Glynn, Leonidas Guibas, Monica S. Lam, David G. Luenberger, John C. Mitchell, Sandy Napel, Richard Olshen, Norbert Pelc, Zhi-Xun Shen, Julius Smith, Claire Tomlin, Brian Wandell, Yinyu Ye, Shoucheng Zhang

Courtesy Associate Professors: Kwabena Boahen, Hari Manoharan, David Mazieres, Michael McConnell, Andrew Ng, Daniel Spielman, Barbara van Schewick

Courtesy Assistant Professors: Sigrid Close, Kerwyn C. Huang, Ramesh Johari, Gunter Niemeyer, Amin Saberi

Lecturers: Dennis Allison, Michel Digonnet, Andrew Freeman, Maria del Mar Hershenson, Brooks Leman, Roger Melen, Dieter Scherer, Jason Stinson, Howard Swain, James Weaver

Consulting Professors: Hamid Aghajan, Ahmad Bahai, Richard Dasher, John Doolittle, Leslie Field, Fred M. Gibbons, Dimitry Gorinevsky, Bertrand Hochwald, Bob S. Hu, Theodore Kamins, David Leeson, Madihally Narasimha, Gurudatta Parulkar, Ronald Schafer, David Su, Simon Sze, Martin Walt, John Wenstrand

Consulting Associate Professors: Edward Chan, Micah Siegel, Katelin Vleugels, Jun Ye

Consulting Assistant Professors: Kamesh Medapalli, Daniel O'Neill, Juan Santos, Jatinder Singh

Visiting Professors: Shigeru Nishiyama, Xiaofeng Tao, Zhiping Yu

Visiting Associate Professors: Kyesan Lee, Hyukjun Oh

Visiting Assistant Professors: Seung Hoon Hwang, Ofer Levi

* recalled to active duty

Mail Code: 94305-9505

Phone: (650) 723-3931; Fax: (650) 723-1882

Web Site: http://ee.stanford.edu

Courses offered by the Department of Electrical Engineering are listed under the subject code EE on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN ELECTRICAL ENGINEERING

The mission of the undergraduate program of the Department of Electrical Engineering is to augment the liberal education expected of all Stanford undergraduates, to impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology, and to provide majors in the department with knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals. The program develops students' skills in performing and designing

experimental projects and communicating their findings to the scientific community effectively. Students in the major are required to select one sub-discipline for specialization. Choices include hardware, computer software, controls, electronics, fields and waves, or communication and signal processing. The program prepares students for careers in government agencies, the corporate sector, or for future study in graduate or professional schools.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. The educational objectives of the program are:

1. *Technical knowledge*—provide a knowledge of electrical engineering principles along with the required supporting knowledge of computing, engineering fundamentals, mathematics, and science. The program must include depth in at least one specialty area, currently including computer hardware, computer software, controls, circuits, fields and waves, communication and signal processing, and semiconductor and photonic devices.
2. *Laboratory and design skills*—develop the basic skills needed to perform and design experimental projects. Develop the ability to formulate problems and projects and to plan a process for solution, taking advantage of diverse technical knowledge and skills.
3. *Communications skills*—develop the ability to organize and present information and to write and speak effective English.
4. *Preparation for further study*—provide sufficient breadth and depth for successful subsequent graduate study, postgraduate study, or lifelong learning programs.
5. *Preparation for the profession*—provide an appreciation for the broad spectrum of issues arising in professional practice, including economics, ethics, leadership, professional organizations, safety, service, and teamwork.

UNDERGRADUATE PROGRAMS IN ELECTRICAL ENGINEERING

To major in Electrical Engineering (EE), undergraduates should follow the depth sequence in the "Undergraduate Degree in Electrical Engineering" section of this bulletin. Students are required to have a program planning sheet approved by their adviser and the department prior to the end of the quarter following the quarter in which they declare their major and at least one year prior to graduation. Program sheets for the general EE requirements and for each of the EE specialty sequences may be found at http://ughb.stanford.edu. Majors must receive at least a 2.0 grade point average (GPA) in courses taken for the EE depth requirement; all classes must be taken for a letter grade.

Students interested in a minor should consult the "Minor in Electrical Engineering" section of this bulletin.

A Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

HONORS PROGRAM

The Department of Electrical Engineering offers a program leading to a Bachelor of Science in Electrical Engineering with honors. This program offers a unique opportunity for qualified undergraduate majors to conduct independent study and research at an advanced level with a faculty mentor, graduate students, and fellow undergraduates.

Admission to the honors program is by application. Declared EE majors with a grade point average (GPA) of at least 3.5 in Electrical Engineering are eligible to submit an application. Applications must be submitted by Autumn quarter of the senior year, be signed by the thesis adviser and second reader (one must be a member of the EE Faculty), and include an honors proposal. Students need to declare honors on Axess.

In order to receive departmental honors, students admitted to the honors program must:

1. maintain a grade point average (GPA) of at least 3.5 in EE courses.
2. complete at least 10 units of EE 191 for a letter grade with their project adviser.
3. submit two final copies of the honors thesis approved by the adviser and second reader.
4. attend poster and oral presentation in the Electrical Engineering Honors Symposium held at the end of Spring Quarter or present in another suitable forum approved by the faculty adviser.

GRADUATE PROGRAMS IN ELECTRICAL ENGINEERING

University regulations governing the M.S., Engineer, and Ph.D. degrees are described in the “Graduate Degrees” section of this bulletin.

The profession of electrical engineering demands a strong foundation in physical science and mathematics, a broad knowledge of engineering techniques, and an understanding of the relationship between technology and man. Curricula at Stanford are planned to offer the breadth of education and depth of training necessary for leadership in the profession. To engage in this profession with competence, four years of undergraduate study and at least one year of postgraduate study are recommended. For those who plan to work in highly technical development or fundamental research, additional graduate study is desirable.

A one- to two-year program of graduate study in Electrical Engineering may lead to the degree of Master of Science. The program is typically completed in five academic quarters. A two- to three-year program, offering a wider selection of engineering course work, more opportunity for study in the related fields of engineering, mathematics, and physics, and in particular, more independent work and individual guidance, may lead to the degree of Engineer.

The degree of Doctor of Philosophy is offered under the general regulations of the University. The doctoral program, requiring a minimum of 135 units of graduate study, should be considered by those with the ability and desire to make a life work of research or teaching.

Application for Admission—Applications for admission graduate in Electrical Engineering (EE) should be completed electronically at http://gradadmissions.stanford.edu. For information concerning Electrical Engineering graduate admissions, see http://ee-admissions.stanford.edu. The application deadline for admission for Autumn Quarter 2011-12 is December 14, 2010.

ELECTRICAL ENGINEERING COURSE CATALOG NUMBERING SYSTEM

Electrical Engineering courses are typically numbered according to the year in which the courses are normally taken.

010-099	first or second year
100-199	second through fourth year
200-299	mezzanine courses for advanced undergraduates or graduate students
300-399	first graduate year
400-499	second or third graduate year
600-799	special summer courses

The Department of Electrical Engineering (EE) offers courses in the following areas:

- Communication Systems
- Computer Hardware
- Computer Software Systems
- Control and System Engineering
- Dynamic Systems and Optimization
- Electronic Circuits

- Electronic Devices, Sensors, and Technology
- Fields, Waves, and Radioscience
- Image Systems
- Lasers, Optoelectronics, and Quantum Electronics
- Network Systems
- Signal Processing
- Solid State Materials and Devices

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

Students with undergraduate degrees in physics, mathematics, or related sciences, as well as in various branches of engineering, are invited to apply for admission. They should typically be able to complete the master's degree in five academic quarters; note that many courses are not taught during the summer. Students with undergraduate degrees in other fields may also be admitted for graduate study; see below.

The master's degree program may provide advanced preparation for professional practice or for teaching at the junior college level, or it may serve as the first step in graduate work leading to the degree of Engineer or Ph.D. The faculty does not prescribe specific courses to be taken. Each student, with the help of a program adviser, prepares an individual program and submits it to the faculty for approval. The master's program proposal must be submitted to the department office during the first quarter of graduate study; modifications may be made until one quarter prior to degree conferral. Detailed requirements and instructions are in the *Handbook for Graduate Students in Electrical Engineering at Stanford University* (http://ee.stanford.edu/gradhandbook). Programs of at least 45 units that meet the following guidelines are normally approved. Cognate (extradepartmental) courses of the appropriate level are considered as Electrical Engineering courses.

1. A sequence of three or more letter-graded electrical engineering courses numbered above 200, to provide depth in one area. The student must maintain an average 3.0 grade point average (GPA) or better in both the depth area and overall courses taken.
2. At least one letter-graded EE course numbered above 200 in each of three distinct course areas outside of the area selected under item 1 to provide breadth. Two courses are not considered to be in distinct areas if they can be found under a common depth area.
3. Enough additional units of EE courses so that items 1 through 3 total at least 21 units of letter-graded EE courses numbered above 200, including at least 9 units of such courses numbered in the 300s or 400s. Some 600- or 700-level summer courses may also be considered for inclusion in the M.S. program. Special studies units may not be used.
4. Additional course work to bring the total to 45 or more quarter units
   a. of which at least 36 must be letter-graded units
   b. of which 36 units must be at or above the 100 level
   c. of which 30 units must be in technical areas such as engineering, mathematics, and science
   d. thesis and special studies units cannot be included.
5. Either (a) one formal EE seminar course for credit, or (b) attend a minimum of eight informal or formal EE research seminars, and submit with the final M.S. program a list of the seminars with a paragraph describing the content and the signature of the M.S. adviser. This requirement is to ensure that students sample the many available research seminars.

Capable students without formal undergraduate preparation in electrical engineering may also be admitted for graduate study. Such students may have graduated in any field and may hold either the B.S. or B.A. degree. Each student, with the help of an adviser, prepares a program of study to meet particular needs and submits it to the faculty for approval. A student with adequate preparation in mathematics through calculus and college physics including electricity can usually complete the M.S. degree requirements within two academic years. A student with some additional preparation in electrical engineering may be able to complete the M.S. requirements in only one academic year.

Graduate study in EE demands that students be adequately prepared in circuits, digital systems, fields, lab work, mathematics, and physics. Skill in using modern computing facilities is essential for electrical engineers, and an increasing number of courses routinely require it. This skill should be acquired early in the program, either by taking one of the regular computer science courses or one of the special short courses given by the Computation Center, or by self-study.

It is the student's responsibility, in consultation with an adviser, to determine whether the prerequisites for advanced courses have been met. Prerequisite courses ordinarily taken by undergraduates may be included as part of the graduate program of study. However, if the number of these is large, the proposed program may contain more than the typical 45 units, and the time required to meet the degree requirements may be increased.

Students working toward the Master of Science degree in Electrical Engineering who are considering a Ph.D. or Engineer degree program in Electrical Engineering at Stanford must request the addition of a new degree program by submitting a Graduate Program Authorization Petition for approval by the department. The petition must be submitted and approved at least one quarter prior to M.S. degree completion. Once the M.S. degree in EE has been conferred, a student may not register for additional course work without this approval. Permission to study beyond the M.S. degree is normally granted to students who were originally admitted to the Ph.D. program if the student:

1. has passed the Ph.D. qualifying examination within the past year, or
2. has a written commitment from a regular member of the EE faculty to serve as an Engineer or Ph.D. dissertation adviser, and has a satisfactory academic record to date.

Students originally admitted only for the M.S. degree and not to the Ph.D. program may petition the EE graduate admissions committee during Autumn Quarter of their second year at Stanford for a change of status to the Ph.D. program with permission to take the Ph.D. qualifying exam in January. Requirements for the petition include a grade point average of 3.5 on Stanford courses and a written statement of support from an EE faculty member with whom the student has conducted preliminary research through directed reading (EE 390 or 391) or as part of a 300-level project course. Decisions are based on performance and the strength of the support letter. If admitted to the Ph.D. program, permission to study beyond the M.S. degree is normally granted under the same conditions as those described above for students originally admitted to the Ph.D. program. Students not admitted to the Ph.D. program are normally granted permission to continue past the M.S. degree only if there is a written commitment from a regular member of the EE faculty to serve as an Engineer dissertation supervisor. The student should file for candidacy for the Engineer degree within one quarter of receiving the M.S.

JOINT ELECTRICAL ENGINEERING AND LAW DEGREE (J.D./M.S.)

The Department of Electrical Engineering and the School of Law offer a joint degree program leading to an M.S. degree in EE combined with a J.D. degree. The J.D./M.S. program is designed for students who wish to prepare themselves for careers that involve both Law and Electrical Engineering.

Students interested in this joint degree program must apply to and gain admission separately from the Department of Electrical Engineering and the School of Law, and as an additional step, secure consent from both academic units to pursue both degrees simultaneously. Interest in the program should be noted on a student's application to each academic unit. A student currently enrolled in either the Department of Electrical Engineering or the School of Law may apply for admission to the other academic unit and for joint degree status after commencing study in that unit.

Joint degree students may elect to begin their study in either the Department of Electrical Engineering or the School of Law. Fac-

ulty advisers from each academic unit participate in the planning and supervising of the student's joint program. In the first year of the joint degree program, students must be enrolled full-time in the School of Law. Students must satisfy the requirements for both the J.D. and the M.S. degrees as specified in the *Stanford Bulletin*.

The Electrical Engineering Department approves courses from the Law School that may count toward the M.S. degree in Electrical Engineering, and the Law School approves courses from the Department of Electrical Engineering that may count toward the J.D. degree. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program.

No more than 45 quarter hours of approved courses may be counted toward both degrees. No more than 36 quarter hours of courses that originate outside the School of Law may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the School of Law but count toward the Law degree, the School of Law credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis but not below zero.

The maximum number of School of Law units that may be counted toward the M.S. degree in Electrical Engineering is the greater of:

1. 12 quarter (8 semester) units
   or
2. the maximum number of units from courses outside of the department that M.S. candidates in Electrical Engineering are permitted to count toward the M.S. degree under general departmental guidelines, or as set forth in the case of a particular student's individual program.

Tuition and financial aid arrangements are typically administered through the school in which the student is enrolled.

THE HONORS COOPERATIVE PROGRAM

Many of the department's graduate students are supported by the Honors Cooperative Program (HCP), which makes it possible for academically qualified engineers and scientists in nearby companies to be part-time graduate students in Electrical Engineering while continuing nearly full-time professional employment. Prospective HCP students follow the same admission process and must meet the same admission requirements as full-time graduate students. For more information regarding the Honors Cooperative Program, see the "School of Engineering" section of this bulletin.

ENGINEER DEGREE IN ELECTRICAL ENGINEERING

The degree of Engineer requires a minimum of 90 units of residency. Units completed at Stanford towards a master's degree in an Engineering discipline may be used towards the 90-unit residency requirement for the Engineer degree. A student who received an M.S. degree elsewhere can transfer in 45 units towards the 90-unit requirement for an Engineer's degree. This requires the student to fill out the Application for Graduate Residency Credit form to be filed with the Degree Progress Office in the Registrar's Office.

Work toward the degree of Engineer in Electrical Engineering normally includes the requirements for work toward the master's degree in Electrical Engineering, including qualifications for admission.

An additional year allows time for a broader program, or a more concentrated program, or whatever arrangement may seem suitable to the candidate, the adviser, and the department. Advanced study at other universities, or in other departments at Stanford, may be allowed within the foregoing consideration. The equivalent of approximately one quarter is devoted to independent study and thesis work with faculty guidance. The thesis is often of the nature of a professional report on the solution of a design problem. The degree of Engineer differs from the Ph.D. in that it prepares for professional engineering work rather than theoretical research. The candidate may select courses that are suitable for either the degree of Engineer or the Ph.D. degree and decide later which program to pursue.

Applicants currently working toward the Stanford M.S. degree in Electrical Engineering should request permission to continue graduate studies beyond the master's degree, using the Graduate Program Authorization Petition form obtained from the Department of Electrical Engineering office. Applicants not planning to receive the Stanford M.S. degree in Electrical Engineering should apply for admission to the Department of Electrical Engineering as a candidate for the degree of Engineer.

During the first quarter of work beyond the M.S. degree, formal application for admission to candidacy for the degree of Engineer is made on a form that can be obtained from the department office. The student prepares his or her academic study plan with the help of the thesis adviser and submits it to the academic associate for approval. The form should contain a list of all graduate courses completed at Stanford and elsewhere and all courses yet to be completed. For the most recent information, see http://ee.stanford.edu/gradhandbook.

DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING

The University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

Admission to a graduate program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement, satisfactory performance on a qualifying examination, and sponsorship by two faculty members. Enrollment in EE 391, Special Studies, is recommended as a means for getting acquainted with a faculty member who might be willing to serve as a supervisor.

Students admitted to the Ph.D. program should submit an application to take the department qualifying examination (given each Winter Quarter). Upon completion of the qualifying examination and after securing agreement by two faculty members to serve as dissertation advisers, the student should file an Application for Doctoral Candidacy. Students are expected to apply for candidacy prior to the end of their second year in the graduate program. The Ph.D. in Electrical Engineering is a specialized degree, and is built on a broad base of physics, mathematics, and engineering skills. The course program is expected to reflect competency in Electrical Engineering and specialized study in other areas relevant to the student's research focus. Normally the majority of units are drawn from EE department or cognate courses, with typically 9 units from related advanced physics, mathematics, engineering, or computer science courses, depending on the area of research. Only after receiving department approval of the Application for Candidacy, does the student become a candidate for the Ph.D. degree.

Requirements may be summarized as follows. The student must complete:

1. a minimum of 135 units of residence with graduate standing at Stanford
2. one or more qualifying examinations given by the faculty of the Department of Electrical Engineering
3. an approved course of study in Electrical Engineering
4. an approved program of research and a written dissertation, based on research, which must be a contribution to knowledge
5. an oral examination that is a defense of dissertation research and is taken near the completion of the doctoral program.

For the most recent information, see http://ee.stanford.edu/gradhandbook.

FINANCIAL ASSISTANCE

The department awards a limited number of fellowships, teaching and course assistantships, and research assistantships to incoming graduate students. Applying for financial assistance is part of the admission application.

PH.D. MINOR IN ELECTRICAL ENGINEERING

For a minor in Electrical Engineering (EE), the student must fulfill the M.S. depth requirement, complete a total of at least 20 units of course work at the 200-plus level in Electrical Engineering (of which 15 units must be letter-graded), and be approved by the department's Ph.D. Degree Committee. A grade point average (GPA) of at least 3.35 on these courses is required.

AREAS OF RESEARCH IN ELECTRICAL ENGINEERING

Candidates for advanced degrees participate in the research activities of the department as paid research assistants or as students of individual faculty members. At any one time, certain areas of research have more openings than others. A new applicant should express a second choice of research interest in the event that there are no vacancies in the primary area of interest. At present, faculty members and students are actively engaged in research in the following areas:

- Biomedical Devices and Bioimaging
- Energy: solar cells, smart grid, load control
- Environmental and Remote Sensing: sensor nets, radar systems, space
- Graphics, HCI, Computer Vision, Photography
- Web Applications, Data Management, Security/Privacy
- Systems Software: OS, compilers, languages
- Systems Hardware: architecture, VLSI, embedded systems
- Network Systems and Science: next generation Internet, wireless networks
- Communication Systems: wireless, optical, wireline
- Information Theory and Coding: image and data compression, denoising
- Control, Learning, and Optimization
- Integrated Circuit Design: MEMs, sensors, analog, RF
- Nano, Quantum Science, and Engineering
- Electronic, Photonic, and Magnetic Devices
- Nanofabrication Science and Technology
- Fields and Waves

For additional information, see the Department of Electrical Engineering's Research page at http://ee.stanford.edu/research.php.

OVERSEAS STUDIES COURSES IN ELECTRICAL ENGINEERING

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

SPRING QUARTER

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OSPKYOTO 33. Digital Systems II. 4 units, Kozyrakis, GER:DB:EngrAppSci

MANAGEMENT SCIENCE AND ENGINEERING

Emeriti: (Professors) James L. Adams, Kenneth J. Arrow, Richard W. Cottle, Donald A. Dunn, B. Curtis Eaves, Frederick S. Hillier, Donald L. Iglehart, James V. Jucker, Michael M. May, William J. Perry, Henry E. Riggs, David A. Thompson, Arthur F. Veinott, Jr.

Chair: M. Elisabeth Paté-Cornell

Professors: Nicholas Bambos, Stephen R. Barley, Margaret L. Brandeau, Robert C. Carlson, Kathleen M. Eisenhardt, Peter W. Glynn, Warren H. Hausman, Ronald A. Howard, David G. Luenberger, M. Elisabeth Paté-Cornell, Robert I. Sutton, James L. Sweeney, Yinyu Ye

Associate Professors: Samuel S. Chiu, Ashish Goel, Pamela J. Hinds, Riitta Katila, Ross D. Shachter, Edison T. S. Tse, Benjamin Van Roy

Assistant Professors: Charles E. Eesley, Feryal Erhun, Kay Giesecke, Ramesh Johari, James A. Primbs, Amin Saberi, Thomas A. Weber

Professors (Research): Siegfried S. Hecker, Walter Murray, Michael A. Saunders, John P. Weyant

Professors (Teaching): Thomas H. Byers, Robert E. McGinn

Courtesy Professors: Anat Admati, Stephen P. Boyd, Walter Powell, Tim Roughgarden

Affiliated Faculty: Seenu Srinivasan

Lecturers: Steve Blank, Andrei Z. Broder, Gregory Hamm, Hill Huntington, Vanja Josifovski, Phil Lin, Ann Miura-Ko, Mary Morrison, Donna Novitsky, Lena Ramfelt, Tina Seelig, Rosanne Siino, Lynda Kate Smith, Andreas Weigend

Consulting Professors: Gerd Infanger, Thomas Kosnik, James E. Matheson, D. Warner North, Burke Robinson, Sam L. Savage, Behnam Tabrizi

Consulting Associate Professors: Adam B. Borison, Peter Haas, Gregory L. Hamm, Samuel Holtzman, Hervé Kieffel, Michael Lyons, Audrey MacLean, Dariush Rafinejad, Adam Seiver, F. Victor Stanton

Consulting Assistant Professors: Blake E. Johnson, Jan Pietzsch

Visiting Professor: Olivier de La Grandville

Visiting Associate Professors: Charles Feinstein, Yee-Tien Fu

Visiting Assistant Professors: Arik Lifschitz, Peter Woehrmann

Director of the Industrial Affiliates Program: Yinyu Ye

Department Offices: Huang Engineering Center, 475 Via Ortega, 94305-4121

Mail Code: 4026

Web Site: http://stanford.edu/dept/MSandE

Courses offered by the Department of Management Science and Engineering are listed under the subject code MS&E on the *Stanford Bulletin's* ExploreCourses web site.

In December 1999, the Board of Trustees authorized the creation of the Department of Management Science and Engineering from the Department of Industrial Engineering and Engineering Management and the Department of Engineering-Economic Systems and Operations Research. Its main objective is to be the leader at the interface of engineering, business, and public policy. The department's mission is, through education and research, to advance the design, management, operation, and interaction of technological, economic, and social systems. The department's engineering research strength is integrated with its educational program at the undergraduate, master's, and doctoral levels: graduates of the program are trained as engineers and future leaders in technology, policy, and industry. Research and teaching activities are complemented by an outreach program that encourages the transfer of ideas to the environment of Silicon Valley and beyond.

Management Science and Engineering (MS&E) provides programs of education and research by integrating three basic strengths:

1. depth in conceptual and analytical foundations
2. comprehensive coverage of functional areas of application
3. interaction with other Stanford departments, Silicon Valley industry, and organizations throughout the world.

The analytical and conceptual foundations include decision and risk analysis, dynamic systems, economics, optimization, organizational science, and stochastic systems. The functional areas of application include entrepreneurship, finance, information, marketing, organizational behavior, policy, production, and strategy. Close associations with other engineering departments and with industry enrich the programs by providing opportunities to apply

MS&E methods to important problems and by motivating new theoretical developments from practical experience. MS&E's programs also provide a basis for contributing to other areas such as biotechnology, defense policy, environmental policy, information systems, and telecommunications.

MISSION OF THE UNDERGRADUATE PROGRAM IN MANAGEMENT SCIENCE AND ENGINEERING

The mission of the undergraduate program in Management Science and Engineering is to provide students with the fundamentals of engineering systems analysis so that they are able to plan, design, and implement complex economic and technical management systems. The program builds on the foundational courses for engineering including calculus, engineering fundamentals, and physics or chemistry as well as management science. Students may select courses in computer science, information, organizational theory, mathematical modeling, optimization, probability, statistics and finance or production. To allow for greater in-depth exploration in a particular area, students then choose a concentration area. The major prepares students for a variety of career paths, including facilities and process management, investment banking, management consulting or for graduate school in industrial engineering, operations research, economics, public policy, medicine, law, or business.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able:

1. to apply the knowledge of mathematics, science, and engineering;
2. to design and conduct experiments;
3. to design a system or components to meet desired needs;
4. to identify, formulate, and solve engineering problems;
5. to use techniques, skills, and modern engineering tools necessary for engineering practice;
6. to function on multidisciplinary teams;
7. to communicate effectively;
8. to recognize the need for and demonstrate an ability to engage in life-long learning;
9. to obtain the background necessary for admission to top professional graduate engineering or business programs;
10. to understand professional and ethical responsibility;
11. to obtain the broad education necessary to understand the impact of engineering solutions in a global and societal context; and
12. to obtain a knowledge of contemporary issues pertinent to the field of management science and engineering.

GRADUATE PROGRAMS IN MANAGEMENT SCIENCE AND ENGINEERING

MS&E, in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science and Doctor of Philosophy. The department also offers a coterminal B.S./M.S. degree, and a dual master's degree in cooperation with each of the other departments in the School of Engineering.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

Applicants for admission as graduate students in MS&E must submit the results of the verbal, quantitative, and analytical parts of the Graduate Record Examination. The deadline for application to the doctoral program is December 7, 2010, and the deadline for application to the master's program is January 11, 2011.

Except in unusual circumstances, admission is limited to the Autumn Quarter because courses are arranged sequentially with basic courses and prerequisites offered early in the academic year.

Assistantships and Fellowships—A limited number of fellowships and assistantships are awarded each year. Applicants admitted to the doctoral program, who have indicated on their application that they would like to be considered for financial aid, are automatically considered for these assistantships and fellowships.

Information about loan programs and need-based aid for U.S. citizens and permanent residents can be obtained from the Financial Aid Office.

CAREERS IN MS&E

MS&E helps students prepare for professional careers in business, government, industry, non-profit institutions, and universities. Graduates have pursued careers in consulting, enterprise management, financial analysis, government policy analysis, industrial research, line management, product development, project management, strategic planning, and university teaching and research. Some have founded companies specializing in financial services, high technology products, management and systems consulting, or software. Other graduates have helped establish new analytical capabilities in existing firms or government agencies.

Many graduates have become leaders in technology-based businesses, which have an increasing need for well-educated, analytically oriented people who understand both business and technology. The Department of MS&E is attractive to people with engineering, mathematical science, and physical science backgrounds as it complements their technical abilities with the conceptual frameworks needed to analyze problems of investment, management, marketing, operations, production, and strategic planning in a technical environment.

PROFESSIONAL EDUCATION

The Stanford Center for Professional Development (SCPD) provides opportunities for employees of some local and remote companies to take courses at Stanford.

The Honors Cooperative Program (HCP) provides opportunities for employees of SCPD Member companies to earn an M.S. degree, over a longer period, by taking one or two courses per academic quarter. Some courses are only offered on campus; HCP students may attend those courses at Stanford to meet the degree requirements. It is possible to complete this program as a remote HCP student although the remote offerings are limited. Students must apply for a degree program through the standard application process, and must meet the standard application deadlines.

The non-degree option (NDO) allows employees of some local companies to take courses for credit from their company sites before being admitted to a degree program. Students apply to take NDO courses each quarter through the Stanford Center for Professional Development. Up to 18 units taken as an NDO student may be applied toward a degree program. For additional information about the NDO application process and deadlines, see http://scpd.stanford.edu, or contact SCPD at (650) 725-3000.

The department offers a certificate program within the framework of the NDO program. A certificate can be obtained by completing three MS&E core courses, plus one MS&E elective course for a total of four courses. For further information, see http://scpd.stanford.edu/scpd/programs/certs/managementSci.htm.

BACHELOR OF SCIENCE IN MANAGEMENT SCIENCE AND ENGINEERING

The program leading to the B.S. degree in Management Science and Engineering (MS&E) is outlined in the School of Engineering section of this bulletin; more information is contained in the School of Engineering's *Handbook for Undergraduate Engineering Programs*. Students are encouraged to plan their academic programs as early as possible, ideally in the freshman or sopho-

more year. Students should not wait until they are declaring a major to consult with the department's student services staff. This is particularly important for students who would like to study overseas or pursue another major or minor.

The undergraduate curriculum in Management Science and Engineering provides students training in the fundamentals of engineering systems analysis to prepare them to plan, design, and implement complex economic and technological management systems where a scientific or engineering background is necessary or desirable. Graduates are prepared for work in a variety of career paths, including facilities and process management, investment banking, management consulting, or graduate study in industrial engineering, operations research, economics, public policy, medicine, law, or business.

The educational objectives of the undergraduate degree program are:

- *Principles and Skills*—provide students with a basic understanding of management science and engineering principles, including analytical problem solving and communications skills.
- *Preparation for Practice*—prepare students for practice in a field that sees rapid changes in tools, problems, and opportunities.
- *Preparation for Continued Growth*—prepare students for graduate study and self development over an entire career.
- *Preparation for Service*—develop in students the awareness, background, and skills necessary to become responsible citizens, employees, and leaders.

In particular, the department wants to help students develop:

- an ability to apply knowledge of math, science, and engineering
- an ability to design and conduct experiments
- an ability to design a system or components to meet desired needs
- an ability to identify, formulate, and solve engineering problems
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- an ability to function on multidisciplinary teams
- an ability to communicate effectively
- a recognition of the need for and an ability to engage in lifelong learning
- background necessary for admission to top professional graduate engineering or business programs
- an understanding of professional and ethical responsibility
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a knowledge of contemporary issues pertinent to the field of management science and engineering.

The program builds on the foundational courses for engineering, including calculus, engineering fundamentals, and physics or chemistry.

The department core, taken for all concentrations, includes courses in computer science, deterministic optimization, information, organization theory, a senior project, and finance or production. Through the core, students in the program are exposed to the breadth of faculty interests, and are in a good position to choose a concentration during the junior year.

The five concentrations are designed to allow a student to explore one area of the department in greater depth.

1. *Financial and Decision Engineering:* focuses on the design and analysis of financial and strategic plans. It features accounting, decision analysis, economics, finance, investment science, and stochastic models.
2. *Operations Research:* provides a more mathematical program, based on algorithms, theory, and applications in economics and operations.
3. *Organization, Technology, and Entrepreneurship:* focuses on understanding and design of organizations, particularly technology-based issues. It features courses on innovation, product development, entrepreneurship, work and manufacturing systems, information systems, and human-computer interaction.
4. *Production and Operations Management:* focuses on the design and analysis of manufacturing, production, and service systems.
5. *Policy and Strategy*: focuses on the design and analysis of public policies and corporate strategies, especially those with technology-based issues. It features a core in microeconomics and modeling approaches, and policy-focused courses in topics such as national security, energy and environment, and health care, and strategy-focused courses in topics such as entrepreneurship, innovation, and product development.

Students interested in a minor should see the "Minor in MS&E" section of this bulletin.

MS&E also participates with the departments of Computer Science, Mathematics, and Statistics in a program leading to a B.S. in Mathematical and Computational Science. See the "Mathematical and Computational Science" section of this bulletin.

MASTER OF SCIENCE IN MANAGEMENT SCIENCE AND ENGINEERING

The M.S. degree programs require a minimum of 45 units beyond the equivalent of a B.S. degree at Stanford. All programs represent substantial progress in the major field beyond the bachelor's degree.

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

The M.S. program in Management Science and Engineering (MS&E) prepares individuals for a lifelong career addressing critical technical and managerial needs in private and public decision making. Department requirements for the M.S. degree provide breadth across some of the areas of the department, and flexibility for meeting individual objectives of depth in a particular area of concentration. The master's degree may be a terminal degree program with a professional focus, or a preparation for a more advanced graduate program. The M.S. degree can normally be earned in one academic year (three academic quarters) of full-time work, although students may choose to continue their education by taking additional MS&E courses beyond that year. Background requirements, taken in addition to degree requirements, must be met by students who have had insufficient course work in mathematical sciences, computer science, engineering and/or natural sciences.

Students must take a minimum of 45 course units as follows:

1. At least five core courses
2. At least three other courses in an area of concentration of their choice
3. A course in probability, unless a college-level course in probability has already been passed
4. A project course requirement
5. The remaining units in elective courses.

Background Requirements—Students must have had or must take the following (or equivalent) courses before the M.S. degree is conferred: MATH 41, 42, 51, Calculus, 15 units; CS 106A, Programming Methodology, 5 units, and an additional 15 units of engineering, mathematical sciences, or natural sciences. These courses do not count toward the 45 units of the M.S. degree. Courses taken to meet MS&E background requirements may be at either the undergraduate or graduate level, and may be taken as credit/no credit. These additional background requirements would typically be met by students who have a bachelor's degree in engineering, or mathematical or natural sciences.

Core (Depth) Courses—M.S. students must take at least five courses out of the following eleven options:

- MS&E 201. Dynamic Systems *or* MS&E 251. Stochastic Decision Models
- MS&E 211. Linear and Nonlinear Optimization

- MS&E 220. Probabilistic Analysis
- MS&E 221. Stochastic Modeling *or* MS&E 223. Simulation
- MS&E 240. Accounting *or* MS&E 242. Investment Science
- MS&E 241. Economic Analysis
- MS&E 252. Decision Analysis *or* MS&E 250A. Risk Analysis
- MS&E 261. Production Systems
- MS&E 270. Strategy in Technology-Based Companies
- MS&E 271. Global Entrepreneurial Marketing
- MS&E 280. Organizational Behavior

Students may not waive core courses. They may, however, petition to substitute an approved, more advanced MS&E course in the same area. Courses used to satisfy the core requirement must be taken for a letter grade, must be taken for a minimum of three units each, and may not also be used to satisfy the concentration requirement.

Courses in an Area of Concentration (Breadth)—Students must complete a departmentally approved set of three or more letter-graded courses taken for a minimum of three units each, in an area of concentration of one of the following types:

1. An area of concentration in the MS&E department
2. An area of concentration in one of the seven other departments of the School of Engineering
3. In exceptional cases, a coherent area of concentration designed by the student. Petitions for student-designed concentrations must list the three proposed courses (taken for three units or more and at the 200-level or above) and include a brief justification. The petition must be submitted to student services no later than the fifth week of the quarter prior to graduation.

Project Course Requirement—Students must take either a designated project course or two designated integrated project courses. The project course(s) must be taken for a letter grade, must be taken for a minimum of three units, and may also be used to satisfy the core or concentration requirement.

Additional requirements are:

1. At least 45 units must be in courses numbered 100 and above.
2. At least 27 units must be in courses numbered 200 and above in MS&E, taken for a letter grade and a minimum of two units each, and at least 36 letter-graded units must be in MS&E or closely related fields. Closely related fields include any department in the School of Engineering, mathematics, statistics, economics, sociology, psychology, or business.
3. The degree program must be completed with a grade point average (GPA) of 3.0 or higher.
4. A maximum of three units of language courses (numbered 100 and above).
5. A maximum of three units of 1-unit courses such as seminars, colloquia, workshops, in any department, and a maximum of one unit of MS&E 208A, B, or C, Curricular Practical Training.
6. A maximum of 18 non-degree option (NDO) units through the Stanford Center for Professional Development (SCPD).
7. Courses in athletics may not be applied toward the degree.

See the student services office or department web site for complete listing of project, integrated project, and approved concentrations.

ENERGY AND ENVIRONMENT TRACK

The Energy and Environment M.S. track is designed for students interested in energy and environmental issues from the perspectives of public policy, nongovernmental organizations, or corporations. This track includes: core courses that provide the conceptual background in economics, decisions, strategy, investment, and organizational behavior; courses in energy resources, natural resource economics, and energy/environmental policy analysis; and an individually designed concentration emphasizing policy, strategy, and/or technology. Seminars provide insights into current corporate strategy, public policy, and research community developments. Energy/environmental project courses give practice in applying methodologies and concepts. Students can complete the program in one year or may extend the program up to two years, taking additional courses for greater depth and breadth. For additional information, see http://www.stanford.edu/dept/MSandE/academics/energyenvironment.html.

DUAL MASTER'S DEGREE PROGRAM

The dual degree program enables a small group of graduate students to obtain two master's degrees simultaneously. Students complete the course requirements for each department. A total of 90 units is required to complete the dual master's degree.

Admission—For the dual degree, admission to two departments is required, but is coordinated by designated members of both admissions committees who make recommendations to the committees of their respective departments. Students may apply to only one department initially. After the first quarter at Stanford, students may apply to be admitted to the second department.

Advising—Every student in the dual degree program has one adviser in each department.

JOINT MS&E AND LAW DEGREES

The School of Law and the Department of Management Science and Engineering offer joint degree programs leading to a J.D. degree and an M.S. degree in MS&E, or to a J.D. and Ph.D. in MS&E. These programs are designed for students who wish to prepare themselves for careers in areas relating to both law and to the decision making, policy making, and problem solving knowledge and skills developed in the MS&E program. Students interested in either joint degree program must apply and gain admission separately to the School of Law and the Department of Management Science and Engineering and, as an additional step, must secure consent from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or MS&E may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or MS&E. Students are assigned to a joint program committee composed of at least one faculty member from Law and one from MS&E. This committee plans the student's program jointly with the student. Students must be enrolled full time in the Law School for the first year of law studies, and it is recommended that students devote exclusively one Autumn Quarter to the MS&E M.S. program to initiate their MS&E work. After that time, enrollment may be in MS&E or Law, and students may choose courses from either program regardless of where enrolled. A candidate in the joint J.D./Ph.D. program should spend a substantial amount of full time residency in MS&E. Students must satisfy the requirements for both the J.D. and the M.S. or Ph.D. degrees as specified in this bulletin or by the School of Law. The Law School may approve courses from MS&E or courses in the student's MS&E program from outside of the Department of Management Science and Engineering that may count toward the J.D. degree, and MS&E may approve courses from the Law School that may count toward the M.S. or Ph.D. degree in MS&E. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The lists may differ depending on whether the student is pursuing an M.S. or a Ph.D. in MS&E.

In the case of a J.D./M.S. program, no more than 45 units of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 units of approved courses may be counted toward both degrees. In either case, no more than 36 units of courses that originate outside the Law School may count toward the law degree. To the extent that courses under this joint degree program originate outside the Law School but count toward the law degree, the law credits permitted under Section 17(1) of the Law School Regulations are reduced on

a unit-per-unit basis, but not below zero. The maximum number of law school credits that may be counted toward the M.S. in MS&E is the greater of: (a) 18 units in the case of the M.S., or (b) the maximum number of hours from courses outside the department that an M.S. candidate in MS&E is permitted to count toward the applicable degree under general departmental guidelines or under departmental rules that apply in the case of a particular student.

Tuition and financial aid arrangements are normally through the school in which the student is then enrolled.

DOCTOR OF PHILOSOPHY IN MANAGEMENT SCIENCE AND ENGINEERING

University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

The Ph.D. degree in MS&E is intended for students primarily interested in a career of research and teaching, or high-level technical work in universities, industry, or government. The program requires three years of full-time graduate study, at least two years of which must be at Stanford. Typically, however, students take about four to five years after entering the program to complete all Ph.D. requirements. The Ph.D. is generally organized around the requirement that the students acquire a breadth across some of the eight areas of the department, and depth in one of them. These fields of study are:

- Decision analysis and risk analysis
- Economics and finance
- Information science and technology
- Organization, technology, and entrepreneurship
- Policy and strategy
- Probability and stochastic systems
- Production and operations management
- Systems modeling and optimization

Each student admitted to the Ph.D. program must satisfy a breadth requirement and pass a qualification procedure. The purpose of the qualification procedure is to assess the student's command of the field and to evaluate his or her potential to complete a high-quality dissertation in a timely manner. The student must complete specified course work in one of the eight areas of the department, or the Systems Program which is a combination of several areas. The qualification decision is based on the student's grade point average (GPA), on the one or two preliminary papers prepared by the student, and on the student's performance in an area examination. Considering this evidence, the department faculty votes on advancing the student to candidacy in the department at large. The Ph.D. requires a minimum of 135 units, at least 54 of which must be in courses of 3 units or more. At least 48 course units in courses of 3 units or more must be taken for a letter grade. Finally, the student must pass a University oral examination and complete a Ph.D. dissertation. During the course of the Ph.D. program, students who do not have a master's degree are strongly encouraged to complete one, either in MS&E or in another Stanford department.

Breadth Requirement—

1. The breadth requirement is to be satisfied by a choice of four courses spanning four out of the above mentioned eight areas of the department. The list of courses satisfying the breadth requirement is available from the MS&E student services office.
2. The Ph.D. candidacy form must contain four courses that satisfy the breadth requirement.
3. Courses chosen to satisfy the breadth requirement must be taken for letter grades.
4. At least one of the four courses chosen to satisfy the breadth requirement must be at the 300 level.

Qualification Procedure Requirements—The qualification procedure is based both on breadth across the department's disciplines and depth in an area of the student's choice. The qualification process must be completed by the end of the month of May of the student's second year of graduate study in the department. The performance of all doctoral students is reviewed every year at a department faculty meeting at the end of May or beginning of June. Ph.D. qualification decisions are made at that time and individual feedback is provided.

The Ph.D. qualification requirements comprise these elements:

1. *Grade Point Average:* A student must maintain a GPA of at least 3.4 in the four courses chosen to satisfy the breadth requirements, and a GPA of at least 3.4 in the set of all courses taken by the student within the department. In both cases, the GPA is computed on the basis of the nominal number of units for which each course is offered.
2. *Paper(s):* A student may choose between two options, either of which is to be completed before the Spring Quarter of the student's second year. The first option involves one paper supervised by a primary faculty adviser and a faculty consultant. This paper should be written in two quarters.
   The second option involves two shorter sequential tutorials, with two different faculty advisers. Each tutorial should be completed in one quarter. In both options, the student chooses the faculty adviser(s)/consultant with the faculty members' consent.
   A student may register for up to 3 units per tutorial and up to 6 units for a paper. These paper or tutorial units do not count towards the 54 course units required for the Ph.D., and letter grades are not given.
3. *Area Qualification:* In addition, during the second year, a student must pass an examination in one of the eight areas of the MS&E department or the Systems Program, a combination of several areas, which is of the student's choice. This area examination is written, oral, or both, at the discretion of the area faculty administering the exam.
4. *Area Course Requirement:* Students must complete the depth requirements of one of the eight fields of study of the MS&E department or the Systems Program which is a combination of several areas. Courses used to satisfy depth requirements must be taken for a letter grade. The Ph.D. requirements for the eight areas of the MS&E department are available from the MS&E student services office.

PH.D. MINOR IN MANAGEMENT SCIENCE AND ENGINEERING

Students pursuing a Ph.D. in another department who wish to receive a Ph.D. minor in Management Science and Engineering should consult the MS&E student services office. A minor in MS&E may be obtained by completing 20 units of approved graduate-level MS&E courses, of which at least 6 units must be at the 300-level. Courses approved for the minor must form a coherent program, and must include one course from at least three of the eleven MS&E Master of Science core options. The program must include a minimum of 16 letter-graded units, and a minimum grade point average of 3.3 must be achieved in these courses.

MATERIALS SCIENCE AND ENGINEERING

Emeriti: (Professors) Clayton W. Bates, John C. Bravman, Richard H. Bube, Theodore H. Geballe,* Stig B. Hagstrom,* Robert A. Huggins,* William D. Nix,* Oleg D. Sherby, John C. Shyne, William A. Tiller, Robert L. White*; *(Professor, Research)* Robert S. Feigelson*

Chair: Robert Sinclair

Associate Chair: Reinhold H. Dauskardt

Professors: David M. Barnett, Arthur I. Bienenstock, Bruce M. Clemens, Reinhold H. Dauskardt, Friedrich B. Prinz, Robert Sinclair, Shan X. Wang

Associate Professors: Mark L. Brongersma, Yi Cui, Michael D. McGehee, Paul C. McIntyre

Assistant Professors: Jennifer A. Dionne, Sarah C. Heilshorn, Aaron M. Lindenberg, Nicholas A. Melosh, Evan J. Reed, Alberto Salleo

Courtesy Professors: Stacey F. Bent, Curtis W. Frank, Sanjiv Gambhir, Geoffrey C. Gurtner, James S. Harris, Michael T. Longaker, Yoshio Nishi, James D. Plummer, Krishna Saraswat, Jonathan F. Stebbins, Joachim Stohr

Courtesy Associate Professor: Ian R. Fisher

Courtesy Assistant Professor: Wei Cai

Lecturers: Eric Guyer, Brad James, Ann Marshall, Arturas Vailionis

Acting Assistant Professor: Christopher M. Earhart

Consulting Professors: Charles A. Evans, Robert Fontana, Turgut Gur, Michael A. Kelly, Rommel Noufi, Baylor Triplett, Robert M. White

Consulting Associate Professors: Geraud Dubois, Alan Sellinger

Consulting Assistant Professors: Rene Meyer, Wendelin Wright

* Recalled to active duty.

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Web Site: http://mse.stanford.edu

Courses offered by the Department of Materials Science and Engineering are listed under the subject code MATSCI on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Materials Science and Engineering is concerned with the relation between the structure and properties of materials, factors that control the internal structure of solids, and processes for altering their structure and properties, particularly at the nanoscale.

MISSION OF THE UNDERGRADUATE PROGRAM IN MATERIALS SCIENCE AND ENGINEERING

The mission of the undergraduate program in Materials Science and Engineering is to provide students with a strong foundation in materials science and engineering with emphasis on the fundamental scientific and engineering principles which underlie the knowledge and implementation of material structure, processing, properties, and performance of all classes of materials used in engineering systems. Courses in the program develop students' knowledge of modern materials science and engineering, teach them to apply this knowledge analytically to create effective and novel solutions to practical problems, and develop their communication skills and ability to work collaboratively. The program prepares students for careers in industry and for further study in graduate school.

The B.S. in Materials Science and Engineering provides training for the materials engineer and also preparatory training for graduate work in materials science. Capable undergraduates are encouraged to take at least one year of graduate study to extend their course work through the coterminal degree program which leads to an M.S. in Materials Science and Engineering. Coterminal degree programs are encouraged both for undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines.

The department also hosts the School of Engineering undergraduate major in Engineering Physics leading to a B.S. in Engineering.

GRADUATE PROGRAMS IN MATERIALS SCIENCE ENGINEERING

Graduate programs lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Graduate students can specialize in any of the areas of materials science and engineering.

FACILITIES

The department is based in the William F. Durand Building, with extensive facilities in the Jack A. McCullough building and the Gordon and Betty Moore Materials Research Building. These buildings house offices for the chair and most of the faculty, for the administrative and technical staff, and for most graduate students, along with lecture and seminar rooms. Facilities for teaching and research are also available, including equipment for electrical measurements; mechanical testing of bulk and thin film materials; fracture and fatigue of advanced materials; metallography; optical, scanning, transmission electron microscopy, and atomic force microscopy; UHV sputter deposition; vacuum annealing treatments; wet chemistry; and x-ray diffraction. The McCullough/Moore Complex is also the home for the Center for Magnetic Nanotechnology, with corresponding facilities for magnetic measurements, and to the Stanford Nanocharacterization Laboratory (SNL). The Rapid Prototyping Laboratory (RPL), housing material deposition and removal stations, is a joint facility with Mechanical Engineering, and is housed in Building 530. The department maintains a microcomputer cluster for its students, which is linked to the internet.

Depending on the needs of their programs, students and faculty also conduct research in a number of other departments and independent laboratories. Chief among these are the Stanford Nanofabrication Facility (SNF), the Geballe Laboratory for Advanced Materials (GLAM) (http://stanford.edu/group/glam), and the Stanford Synchrotron Radiation Laboratory.

The Stanford Nanofabrication Facility (SNF) is a laboratory joining government and industrially funded research on microelectronic materials, devices, and systems. It houses a 10,000 square foot, class 100 clean room for Si and GaAs integrated circuit fabrication; a large number of electronic test, materials analysis, and computer facilities; and office space for faculty, staff, and students. In addition, the Center for Integrated Systems (CIS) provides startup research funds and maintains a fellow-mentor program with industry.

BACHELOR OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING

MISSION STATEMENT

The mission of the Materials Science and Engineering Program is to provide students with a strong foundation in materials science and engineering. The program's curriculum places special emphasis on the fundamental scientific and engineering principles which underlie the knowledge and implementation of materials structure, processing, properties, and performance of all classes of materials used in engineering systems. Courses in the program develop students' knowledge of modern materials science and engineering and teach them to apply this knowledge analytically to create effective and novel solutions to practical problems. The program prepares students for careers in industry or for further study in graduate school.

The undergraduate program provides training in solid state fundamentals and materials engineering. Students desiring to specialize in this field during their undergraduate period may do so by following the curriculum outlined in the "Undergraduate Degree in Materials Science and Engineering" section of this bulletin as well as the *School of Engineering Undergraduate Handbook*. The University's basic requirements for the bachelor's degree are discussed in the "Undergraduate Degrees and Programs""section of this bulletin. Electives are available so that students with broad interests can combine materials science and engineering with work in another science or engineering department.

Students interested in the minor should see the "Minor in Materials Science and Engineering" section of this bulletin.

COTERMINAL B.S./M.S. PROGRAM IN MATERIALS SCIENCE AND ENGINEERING

Stanford undergraduates who wish to continue their studies for the Master of Science degree in Materials Science and Engineering through the coterminal program may apply for admission after they have earned 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. Applicants must submit their application no later than eight weeks before the start of the proposed admit quarter. The application must give evidence that the student possesses the potential for strong academic performance at the graduate level. Scores from the Graduate Record Exam (GRE) General Test must be reported before action can be taken on an application.

Materials science is a highly integrated and interdisciplinary subject, and so applications from students of any engineering or science undergraduate major are encouraged.

Information and other requirements pertaining to the coterminal program may be obtained from the department's student services office in Durand 115.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF SCIENCE IN MATERIALS SCIENCE ENGINEERING

The University's basic requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering requires a minimum of 45 units for a master's degree to be taken in residence at Stanford. Master's Program Proposal forms should be filled out, signed by the student's academic adviser, and submitted to the department's student services manager by the end of the student's first quarter of study. Final changes to the master's program must be submitted no later than one academic quarter prior to the quarter of expected degree conferral. Stanford Materials Science undergraduates who are pursuing or who plan to pursue a coterminal M.S. degree may have more flexibility in their programs and should consult with their academic advisers regarding appropriate core course and elective choices.

Degree requirements are as follows:

1. A minimum of 30 units of Materials Science and Engineering (MATSCI) course work, including core and lab courses specified below, taken for a letter grade. Research units, one-unit seminars, and courses in other departments (i.e., where students cannot enroll in a class with a MATSCI subject code) cannot be counted for this requirement.
2. Of these 30 units Materials Science requirements, students must include a or b.
   a. three classes from MATSCI 201-210 core courses and any three MATSCI laboratory courses.
   b. four classes from MATSCI 201-210 core courses and any two MATSCI laboratory courses.
3. 15 units of approved course electives that result in a technically coherent program. Of the 15 units of elective courses:
   a. 12 of the 15 units must be taken for a letter grade (except for those submitting an M.S. report).
   b. a maximum of three units may be seminars.
   c. if writing a master's research report, a minimum of 6 and a maximum of 15 units of Materials Science research units (MATSCI 200) may be counted. M.S. research units may only be counted if writing an M.S. research report. See student services manager for approval.
   d. a maximum of three units may be undergraduate units, but not courses below the 100 level (offered at Stanford University).
   e. a maximum of five units may be used for a foreign language course (not including any remedial English courses or courses in the student's native language if other than English).
   f. the combination of seminar, undergraduate, and language units may not exceed six units total.
   g. the combination of research, seminar, undergraduate, and language units may not exceed 15 units total.
   h. activity units may not be counted toward a graduate degree.
4. A minimum grade point average (GPA) of 2.75 for degree course work taken at Stanford.

All proposed degree programs are subject to approval by the department's student services manager and the Academic Degree Committee, which has responsibility for assuring that each proposal is a technically coherent program.

MASTER'S RESEARCH REPORT

Students wishing to take this option must include 6-15 Materials Science research units on their program proposal and the name of the faculty member supervising the research. Students using 15 units of research toward the degree must participate in a more complex and demanding research project than those using fewer units.

The report must be approved by two faculty members of which one must be a faculty member from the department. One faculty member is the student's research adviser. The other faculty member must be approved by the department's student services manager. Three copies of the report (one copy for each approving faculty member and one for the department file), in final form and signed by the two faculty members must be submitted. The report is not an official University thesis but is intended to demonstrate to department faculty an ability to conduct and report directed research. Refer to the *Materials Science and Engineering Student Handbook* for further clarification concerning this report.

As a general guide line, a 6-9 units of master's research is a normal load for most students. The report should reflect the number of units taken. For instance, 3-4 laboratory reports are required for a 3-unit laboratory course. Accordingly, the level expected for 9 units of research would be at least equivalent to three such courses.

Students are advised to submit their thesis draft to the readers by the end of fifth week of the quarter in which the units are to be assigned to allow time form comments and revisions. A copy of final draft should be submitted to faculty and student services manager by last day of classes. The appropriate grade for satisfactory progress in the research project prior to submission of the report is 'N' (continuing); the 'S' grade is given only when the report is fully approved by both faculty members.

In cases where students decide to pursue research after the initial program submission deadline, they should submit a revised M.S. Program Proposal at least two quarters before the degree is granted. The total combined units of Materials Science research units, seminars, language courses, and undergraduate courses cannot exceed 15. If a master's research report is not to be submitted, units of MATSCI 200 cannot be applied to the department's requirement of 45 units for the master's degree.

HONORS COOPERATIVE PROGRAM

Some of the department's graduate students participate in the Honors Cooperative Program (HCP), which makes it possible for academically qualified engineers and scientists in industry to be part-time graduate students in Materials Science while continuing professional employment. Prospective HCP students follow the same admissions process and must meet the same admissions requirements as full-time graduate students. For information regarding the Honors Cooperative Program, see Graduate Programs in the "School of Engineering" section of this bulletin.

PETITION PROCESS FOR TRANSFER FROM M.S. TO PH.D. DEGREE PROGRAM

Students admitted to the graduate program are admitted specifically into either the M.S. or the Ph.D. program. A student admitted to the M.S. program should not assume admission to the Ph.D. program. Admission to the Ph.D. program is required for the student to be eligible to work towards the Ph.D. degree.

A student in the M.S. program may petition to be admitted to the Ph.D. program by filing an M.S. to Ph.D. Transfer Petition. This petition must be accompanied by a one-page statement of purpose stating the reasons why the student wishes to transfer to the Ph.D. program, an updated transcript, and two letters of recommendation from members of the Stanford faculty, including one from the student's prospective adviser and at least one from a Materials Science faculty member belonging to the Academic Council. The M.S. to Ph.D. Transfer Petition is due to the student services manager by the end of the second week of Spring Quarter during the student's first year in the M.S. program. Only students enrolled in the 200 series core course sequence are eligible to petition, and a grade point average (GPA) of 3.5 or better in the core courses is required.

Transferring to the Ph.D. program is a competitive process and only highly qualified M.S. students may be admitted. Faculty consider the student's original application to the graduate program as well as the material provided with the transfer petition.

ENGINEER IN MATERIALS SCIENCE ENGINEERING

The University's basic requirements for the degree of Engineer are outlined in the "Graduate Degrees" section of this bulletin.

A student wishing to enter the Engineer program must have completed the requirements of the M.S. in Materials Science and Engineering, and must file a petition requesting admission to the program, stating the type of research to be done and the proposed supervising professor. Once approved, the Application for Candidacy must be submitted to the department's student services manager by the end of the second quarter in the Engineer program. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.

The 90-unit program must include 9 units of graduate courses in Materials Science with a MATSCI subject code (exclusive of research units, seminars, colloquia, and MATSCI 400, Participation in Teaching) beyond the requirements for the M.S. degree, and additional research or other units to meet the 90-unit University minimum requirement. A grade point average (GPA) of 3.0 must be maintained for all degree course work taken at Stanford.

Completion of an acceptable thesis is required. The Engineer thesis must be approved by two Academic Council faculty members, one of whom must be a member of the department, and submitted in triplicate.

DOCTOR OF PHILOSOPHY IN MATERIALS SCIENCE ENGINEERING

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees"section of this bulletin.

Degree requirements for the department are as follows:

1. Students must submit a Ph.D. program plan consisting of at least 135 units,* which contains a minimum of 48 core, approved technical and seminar units.† For these 48 units:
   a. 30 units Materials Science and Engineering required core courses (MATSCI 201**, 202, 203, 204, 205, 206, 207, 208, 209, 210) must be taken, with at least six core courses (including MATSCI 203, 204, 207) during the first year
   b. 15 elective graduate technical units directly relevant to Materials Science and Engineering must be taken (units not to include MATSCI 300, Ph.D Research, MATSCI 400, Participation in Materials Science Teaching, or MATSCI 299, Practical Training)
   c. all core and technical classes must be for a letter grade
   d. first-year Ph.D. students are required to take the Materials Science Colloquium, MATSCI 230 (1 unit), each quarter of their first year (not counted as technical course units). Please note that attendance is required, roll is taken, and that more than two absences results in an automatic 'NP' grade.
2. The remaining 87 units are to be at least 75 units of MATSCI 300, Ph.D. research, and up to 12 units of other courses (may include MATSCI 400, Participation in Materials Science Teaching, and a maximum 3 units of MATSCI 299, Practical Training).
3. Students must consult with their Academic Adviser on program planning. The program planning sheet must be submitted with the approval of the student's Dissertation Adviser on joining that research group, and no later than the end of spring quarter of the the first year. For students with a non-MATSCI Dissertation Adviser, the MATSCI Academic Adviser must also approve the list of proposed courses. Any proposed deviations from the requirements can only be considered by petition.
4. Ph.D. students are required to obtain an M.S. degree in Materials Science normally by the end of their third year. A Graduate Program Authorization Petition and a M.S. Program Proposal must be submitted prior to taking the qualifying examination. Courses taken for the 48 core and technical units of Ph.D. work may count towards the M.S. degree requirements.
5. A departmental oral qualifying examination must be passed by the end of January of the second year. A grade point average (GPA) of 3.5 from the six core classes taken is required for admission to the Ph.D. qualifying exam. Students who have passed the Ph.D. Qualifying exam are required to complete the Application for Candidacy for the Ph.D. degree by the end of the quarter in which they pass the exam. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.
6. Maintain a GPA of 3.0 in all degree courses taken at Stanford.
7. Students must present the results of the dissertation at the University Ph.D. oral examination.
8. Current students subject to either this set of requirements or a prior set must obtain the approval of their adviser before filing a revised program sheet, and should as far as possible adhere to the intent of the new requirements.
9. Students may reference the list of Advanced Speciality Courses and Cognate Courses provided below as guidance for their selection of technical units. As noted above, Academic Adviser approval is required.

* At least 90 units must be taken in residence at Stanford. Students entering with an M.S. degree in Materials Science from another university may request to transfer up to 45 units of equivalent work toward the total of 135 required units.

† Students may, if they have sufficient background, petition out of some of the required core courses. To petition, students must have prior consent from their academic adviser, and consent from the instructor of the core course. That instructor provides an oral or written examination that the petitioning student must pass.

** EE 222/223 is accepted in place of this requirement.

ADVANCED SPECIALTY COURSES

Biomaterials—APPPHYS 292; BIOPHYS 228; CHEMENG 260, 310, 355; ME 284A,B, 381, 385, 457; MATSCI 380, 381, 382

Electronic Materials Processing—EE 212, 216, 311, 316, 410; MATSCI 312

Materials Characterization—APPPHYS 216, CHEMENG 345; EE 329; MATSCI 320, 321, 322, 323, 325, 326

Mechanical Behavior of Solids—AA 252, 256; MATSCI 251, 353, 358; ME 335A,B,C, 340, 340A,B, 345

Physics of Solids and Computation—APPPHYS 272, 273; EE 222, 223, 228, 327, 328, 329, 335; MATSCI 331,343, 347; ME 344A,B

Soft Materials—CHEMENG 260, 310, 460; MATSCI 343; ME 455

COGNATE COURSES

- AA 252. Techniques of Failure Analysis

- AA 256. Mechanics of Composites
- APPPHYS 216. X-Ray and VUV Physics
- APPPHYS 270. Magnetism and Long Range Order in Solids
- APPPHYS 272,273. Solid State Physics I,II
- APPPHYS 292. Introductory Biophysics
- BIOPHYS 228. Computational Structural Biology
- CHEMENG 260. Polymer Science and Engineering
- CHEMENG 310. Microhydrodynamics
- CHEMENG 345. Fundamentals and Applications of Spectroscopy
- CHEMENG 355. Advanced Biochemical Engineering
- CHEMENG 460. Polymer Surfaces and Interfaces
- EE 212. Integrated Circuit Fabrication Processes
- EE 216. Principles and Models of Semiconductor Devices
- EE 222,223. Applied Quantum Mechanics I,II
- EE 228. Basic Physics for Solid State Electronics
- EE 311. Advanced Integrated Circuit Fabrication Processes
- EE 312. Micromachined Sensors and Actuators
- EE 316. Advanced VLSI Devices
- EE 327. Properties of Semiconductor Materials
- EE 328. Physics of Advanced Semiconductor Devices
- EE 329. The Electronic Structure of Surfaces and Interfaces
- EE 335. Introduction to Information Storage Systems
- EE 410. Integrated Circuit Fabrication Laboratory
- ENGR 31. Chemical Principles with Application to Nanoscale Science and Technology
- ENGR 50. Introduction to Materials Science, Nanotechnology Emphasis
- ENGR 50E. Introduction to Materials Science, Energy Emphasis
- ENGR 50M. Introduction to Materials Science, Biomaterials Emphasis
- ME 284A,B. Cardiovascular Bioengineering
- ME 329. Physical Solid Mechanics
- ME 335A,B,C. Finite Element Analysis
- ME 340A. Theory and Applications of Elasticity
- ME 340B. Elasticity in Microscopic Structures
- ME 344A. Computational Nanotechnology
- ME 344B. Nanomaterials Modeling
- ME 345. Fatigue Design and Analysis
- ME 381. Orthopaedic Bioengineering
- ME 385. Tissue Engineering Lab
- ME 455. Complex Fluids and Non-Newtonian Flows
- ME 457. Fluid Flow in Microdevices
- PHYSICS 230,231. Quantum Mechanics

PH.D. MINOR IN MATERIALS SCIENCE AND ENGINEERING

The University's basic requirements for the Ph.D. minor are outlined in the "Graduate Degrees" section of this bulletin. A minor requires 20 units of graduate work of quality and depth to be approved by the advanced degree committee of the department. Individual programs must be submitted to the student services manager at least one quarter prior to degree conferral and approved as are other academic plans.

MECHANICAL ENGINEERING

Emeriti: (Professors) James L. Adams, Peter Bradshaw*, Daniel B. DeBra, Robert H. Eustis, Thomas J. R. Hughes, James P. Johnston, Thomas R. Kane, William M. Kays, Joseph B. Keller, Charles H. Kruger, Robert H. McKim, Robert J. Moffat,* M. Godfrey Mungal*, J. David Powell, Rudolph Sher, Charles R. Steele,* Douglass J. Wilde;* *(Professors, Research)* Richard M. Christensen, Elliot Levinthal, Sidney A. Self, Felix E. Zajac

Chair: Friedrich B. Prinz

Vice Chair: Kenneth E. Goodson

Group Chairs: Mark R. Cutkosky (Design), Scott L. Delp (Biomechanical Engineering), Parviz Moin (Flow Physics and Computational Engineering), Peter M. Pinsky (Mechanics and Computation), Juan G. Santiago (Thermosciences)

Professors: Thomas P. Andriacchi, David M. Barnett, Craig T. Bowman, Brian J. Cantwell, Mark A. Cappelli, Dennis R. Carter, Mark R. Cutkosky, Scott L. Delp, John K. Eaton, Charbel Farhat, Kenneth E. Goodson, Ronald K. Hanson, David M. Kelley, Thomas W. Kenny, Larry J. Leifer, Sanjiva K. Lele, Reginald E. Mitchell, Parviz Moin, Drew V. Nelson, Peter M. Pinsky, Friedrich B. Prinz, Bernard Roth, Juan G. Santiago, Eric S. G. Shaqfeh, Sheri D. Sheppard

Associate Professors: Eric F. Darve, Christopher F. Edwards, J. Christian Gerdes, Ellen Kuhl, Marc E. Levenston, Beth L. Pruitt

Assistant Professors: Wei Cai, Gianluca Iaccarino, Adrian J. Lew, Xiaolin Zheng

Professor (Research): Kenneth J. Waldron

Professor (Teaching): David W. Beach

Associate Professor (Research): Heinz G. Pitsch

Associate Professor (Teaching): Shilajeet S. Banerjee

Courtesy Professors: Fu-Kuo Chang, Reinhold Dauskardt, Ralph S. Greco, Oussama Khatib, Paul Yock

Courtesy Associate Professor: Margot G. Gerritsen, Nicholas Giori, Charles A. Taylor

Courtesy Professors (Research): J. Kenneth Salisbury, R. Lane Smith

Courtesy Professor (Teaching): Shelley V. Goldman

Senior Lecturers: Vadim Khayms, J. Craig Milroy

Acting Associate Professor: Kurt A. Beiter

Consulting Professors: Gary S. Beaupre, J. Edward Carryer, Shuichi Fukuda, David M. Golden, Barry M. Katz, Paul Mitiguy, Johannes Schoonman, George Toye, Stephen P. Walch, Edith Wilson, Albert Yu

Consulting Associate Professors: Mehdi Asheghi, Gary D. Lichtenstein, William Moggridge, R. Matthew Ohline, Sunil Puria, Paul Saffo, Marc F. Theeuwes

Consulting Assistant Professors: Michael Barry, Brendan J. Boyle, William R. Burnett, Dev Patnaik

* Recalled to active duty.

Student Services: Building 530, Room 125

Mail Code: 94305-3030

Student Services Phone: (650) 725-7695

Web Site: http://me.stanford.edu

Courses offered by the Department of Mechanical Engineering are listed under the subject code ME on the *Stanford Bulletin's* ExploreCourses web site.

The programs in the Department of Mechanical Engineering (ME) emphasize a mix of applied mechanics, biomechanical engineering, computer simulations, design, and energy science and technology. Since mechanical engineering is a broad discipline, the undergraduate program can be a springboard for graduate study in business, law, medicine, political science, and other professions where understanding technology is important. Both undergraduate and graduate programs provide technical background for work in biomechanical engineering, environmental pollution control, ocean engineering, transportation, and other multidisciplinary problems that concern society. In all programs, emphasis is placed on developing systematic procedures for analysis, communication of work and ideas, practical and aesthetic aspects in design, and responsible use of technology.

MISSION OF THE UNDERGRADUATE PROGRAM IN MECHANICAL ENGINEERING

The mission of the undergraduate program in Mechanical Engineering is to provide students with a balance of intellectual and practical experiences that enable them to address a variety of societal needs. The curriculum encompasses elements from a wide array of disciplines built around the themes of biomedicine, com-

putational engineering, design, energy, and multiscale engineering. Course work may include mechatronics, computational simulation, solid and fluid dynamics, microelectromechanical systems, biomechanical engineering, energy science and technology, propulsion, sensing and control, nano- and micro-mechanics, and design. The program prepares students for entry-level work as mechanical engineers and for graduate studies in either an engineering discipline or another field where a broad engineering background is useful.

GRADUATE PROGRAMS IN MECHANICAL ENGINEERING

ADMISSION AND FINANCIAL ASSISTANCE

To be eligible for admission to the department, a student must have a B.S. degree in engineering, physics, or a comparable science program. To apply for the Ph.D. degree, applicants must have already completed an M.S. degree. Applications for Ph.D. and HCP (Honors Co-op) programs are accepted throughout the year. M.S. applications for fellowship aid must be received by the first Tuesday in December. The department annually awards, on a competitive basis, a limited number of fellowships, teaching assistantships, and research assistantships to incoming graduate students. Research assistantships are used primarily for post-master's degree students and are awarded by individual faculty research supervisors, not by the department.

Mechanical engineering is a varied profession, ranging from primarily aesthetic aspects of design to highly technical scientific research. Disciplinary areas of interest to mechanical engineers include biomechanics, energy conversion, fluid mechanics, materials, nuclear reactor engineering, propulsion, rigid and elastic body mechanics, systems engineering, scientific computing, and thermodynamics, to name a few. No mechanical engineer is expected to have a mastery of the entire spectrum.

A master's degree program leading to the M.S. is offered in Mechanical Engineering, and a master's degree program leading to the M.S. is offered in Engineering with a choice of the following fields of study: Biomechanical Engineering, Product Design, and an individually designed major. Fields of study are declared on Axess.

POST-MASTER'S DEGREE PROGRAMS

The department offers two post-master's degrees: Engineer and Doctor of Philosophy. Post-master's research generally requires some evidence that a student has research potential before a faculty member agrees to supervision and a research assistantship appointment. It is most efficient to carry out preliminary research during the M.S. degree program, if interested in a post-master's degree.

DEPARTMENTAL GROUPS

The department has five groups: Biomechanical Engineering; Design; Flow Physics and Computation; Mechanics and Computation; and Thermosciences. Each maintains its own labs, shops, and offices.

The Biomechanical Engineering (BME) Group has teaching and research activities which focus primarily on musculoskeletal biomechanics, neuromuscular biomechanics, cardiovascular biomechanics, and rehabilitation engineering. Research in other areas including hearing, ocean, plant, and vision biomechanics exists in collaboration with associated faculty in biology, engineering, and medicine. The group has strong research interactions with the Mechanics and Computation and the Design groups, and the departments of Neurology, Radiology, and Surgery in the School of Medicine.

The Design Group emphasizes cognitive skill development for creative design. It is concerned with automatic control, computer-aided design, creativity, design aesthetics, design for manufacturability, design research, experimental stress analysis, fatigue and fracture mechanics, finite element analysis, human factors, kinematics, manufacturing systems, microcomputers in design, microelectromechanics systems (MEMS), robotics, and vehicle dynamics. The group offers undergraduate and graduate programs in Product Design (jointly with the Department of Art and Art History) and is centrally involved in the Institute of Design; for further information, see http://dschool.stanford.edu.

The Flow Physics and Computation Group (FPC) is developing new theories, models, and computational tools for accurate engineering design analysis and control of complex flows (including acoustics, chemical reactions, interactions with electromagnetic waves, plasmas, and other phenomena) of interest in aerodynamics, electronics cooling, environmental engineering, materials processing, planetary entry, propulsion and power systems, and other areas. FPC research emphasizes modeling and analysis of physical phenomena in engineering systems. Students and research staff are developing new methods and tools for generation, access, display, interpretation and post-processing of large databases resulting from numerical simulations of physical systems. Research in FPC ranges from advanced simulation of complex turbulent flows to active flow control. Faculty teach graduate and undergraduate courses in acoustics, aerodynamics, computational fluid mechanics, computational mathematics, fluid mechanics, combustion, and thermodynamics and propulsion.

The Mechanics and Computational Group covers biomechanics, continuum mechanics, dynamics, experimental and computational mechanics, finite element analysis, fluid dynamics, fracture mechanics, micromechanics, nanotechnology, and simulation based design. Qualified students can work as research project assistants, engaging in thesis research in association with the faculty director and fellow students. Projects include analysis, synthesis, and control of systems; biomechanics; flow dynamics of liquids and gases; fracture and micro-mechanics, vibrations, and nonlinear dynamics; and original theoretical, computational, and experimental investigations in the strength and deformability of elastic and inelastic elements of machines and structures.

The Thermosciences Group conducts experimental and analytical research on both fundamental and applied topics in the general area of thermal and fluid systems. Research strengths include high Reynolds number flows, microfluidics, combustion and reacting flows, multiphase flow and combustion, plasma sciences, gas physics and chemistry, laser diagnostics, microscale heat transfer, convective heat transfer, and energy systems. Research motivation comes from applications including air-breathing and space propulsion, bioanalytical systems, pollution control, electronics fabrication and cooling, stationary and mobile energy systems, biomedical systems, and materials processing. Emphasis is on fundamental experiments leading towards advances in modeling, optimization, and control of complex systems.

FACILITIES

The department groups maintain modern laboratories that support undergraduate and graduate instruction and graduate research work.

The Structures and Composites Laboratory, a joint activity with the Department of Aeronautics and Astronautics, studies structures made of fiber-reinforced composite materials. Equipment for fabricating structural elements includes autoclave, filament winder, and presses. X-ray, ultrasound, and an electron microscope are available for nondestructive testing. The lab also has environmental chambers, a high speed impactor, and mechanical testers. Lab projects include designing composite structures, developing novel manufacturing processes, and evaluating environmental effects on composites.

Experimental facilities are available through the interdepartmental Structures and Solid Mechanics Research Laboratory, which includes an electrohydraulic materials testing system, a vehicle crash simulator, and a shake table for earthquake engineering and related studies, together with highly sophisticated auxiliary instrumentation. Facilities to study the micromechanics of fracture areas are available in the Micromechanics/Fracture Laboratory, and include a computer-controlled materials testing system, a long

distance microscope, an atomic force microscope, and other instrumentation. Additional facilities for evaluation of materials are available through the Center for Materials Research, Center for Integrated Circuits, and the Ginzton Laboratory. Laboratories for biological experimentation are accessible through the School of Medicine. Individual accommodation is available for the work of each research student.

Major experimental and computational laboratories engaged in bioengineering work are located in the Biomechanical Engineering Group. Other Biomechanical Engineering Group activities and resources are associated with the Rehabilitation Research and Development Center of the Veterans Administration Palo Alto Health Care System. This major national research center has computational and prototyping facilities. In addition, the Rehabilitation Research and Development Center houses the Electrophysiology Laboratory, Experimental Mechanics Laboratory, Human Motor Control Laboratory, Rehabilitation Device Design Laboratory, and Skeletal Biomechanics Laboratory. These facilities support graduate course work as well as Ph.D. student research activities.

Computational and experimental work is also conducted in various facilities throughout the School of Engineering and the School of Medicine, particularly the Advanced Biomaterials Testing Laboratory of the Department of Materials Science and Engineering, the Orthopaedic Research Laboratory in the Department of Functional Restoration, and the Vascular Research Laboratory in the Department of Surgery. In collaboration with the School of Medicine, facilities throughout the Stanford Medical Center and the Veterans Administration Palo Alto Health Care System conduct biological and clinical work.

The Design Group has facilities for lab work in experimental mechanics and experimental stress analysis. Additional facilities, including MTS electrohydraulic materials test systems, are available in the Solid Mechanics Research Laboratory. Design Group students also have access to Center for Integrated Systems (CIS) and Ginzton Lab microfabrication facilities.

The group also maintains the Product Realization Laboratory (PRL), a teaching facility offering students integrated experiences in market definition, product design, and prototype manufacturing. The PRL provides coaching, design manufacturing tools, and networking opportunities to students interested in product development. The ME 310 Design Project Laboratory has facilities for CAD, assembly, and testing of original designs by master's students in the engineering design program. A Smart Product Design Laboratory supports microprocessor application projects. The Center for Design Research (CDR) has an excellent facility for concurrent engineering research, development, and engineering curriculum creation and assessment. Resources include a network of high-performance workstations. For worldwide web mediated concurrent engineering by virtual, non-collocated, design development teams, see the CDR web site at http://cdr.stanford.edu. In addition, CDR has several industrial robots for student projects and research. These and several NC machines are part of the CDR Manufacturing Sciences Lab. The Manufacturing Modeling Laboratory (MML) addresses various models and methods that lead to competitive manufacturing. MML links design for manufacturing (dfM) research at the Department of Mechanical Engineering with supply chain management activities at the Department of Management Science and Engineering. The Rapid Prototyping Laboratory consists of seven processing stations including cleaning, CNC milling, grit blasting, laser deposition, low temperature deposition, plasma deposition, and shot peening. Students gain experience by using ACIS and Pro Engineer on Hewlett Packard workstations for process software development. The Design Group also has a Product Design Loft in which students in the Joint Program in Design develop graduate thesis projects.

The Flow Physics and Computation Group has a 32 processor Origin 2000, 48-node and 85-node Linux cluster with high performance interconnection and an array of powerful workstations for graphics and data analysis. Several software packages are available, including all the major commercial CFD codes. FPC is strongly allied with the Center for Turbulence Research (CTR), a research consortium between Stanford and NASA, and the Center for Integrated Turbulence Simulations (CITS), which is supported by the Department of Energy (DOE) under its Accelerated Strategic Computing Initiative (ASCI). The Center for Turbulence Research has direct access to major national computing facilities located at the nearby NASA-Ames Research Center, including massively parallel super computers. The Center for Integrated Turbulence Simulations has access to DOE's vast supercomputer resources. The intellectual atmosphere of the Flow Physics and Computation Group is greatly enhanced by the interactions among CTR's and CITS's postdoctoral researchers and distinguished visiting scientists.

The Mechanics and Computation Group has a Computational Mechanics Laboratory that provides an integrated computational environment for research and research-related education in computational mechanics and scientific computing. The laboratory houses Silicon Graphics, Sun, and HP workstations and servers, including an 8-processor SGI Origin2000 and a 16-processor networked cluster of Intel-architecture workstations for parallel and distributed computing solutions of computationally intensive problems. Software is available on the laboratory machines, including commercial packages for engineering analysis, parametric geometry and meshing, and computational mathematics. The laboratory supports basic research in computational mechanics as well as the development of related applications such as simulation-based design technology.

The Thermosciences Group has four major laboratory facilities. The Heat Transfer and Turbulence Mechanics Laboratory concentrates on fundamental research aimed at understanding and improved prediction of turbulent flows and high performance energy conversion systems. The laboratory includes two general-purpose wind tunnels, a pressurized high Reynolds number tunnel, two supersonic cascade flow facilities, three specialized boundary layer wind tunnels, and several other flow facilities. Extensive diagnostic equipment is available, including multiple particle-image velocimetry and laser-Doppler anemometry systems.

The High Temperature Gas Dynamics Laboratory includes research on sensors, plasma sciences, cool and biomass combustion and gas pollutant formation, and reactive and non-reactive gas dynamics. Research facilities include diagnostic devices for combustion gases, a spray combustion facility, laboratory combustors including a coal combustion facility and supersonic combustion facilities, several advanced laser systems, a variety of plasma facilities, a pulsed detonation facility, and four shock tubes and tunnels. The Thermosciences Group and the Design Group share the Microscale Thermal and Mechanical Characterization laboratory (MTMC). MTMC is dedicated to the measurement of thermal and mechanical properties in thin-film systems, including microfabricated sensors and actuators and integrated circuits, and features a nanosecond scanning laser thermometry facility, a laser interferometer, a near-field optical microscope, and an atomic force microscope. The activities at MTMC are closely linked to those at the Heat Transfer Teaching Laboratory (HTTL), where undergraduate and master's students use high-resolution probe stations to study thermal phenomena in integrated circuits and thermally-actuated microvalves. HTTL also provides macroscopic experiments in convection and radiative exchange.

The Energy Systems Laboratory is a teaching and research facility dedicated to the study of energy conversion systems. The lab includes three dynamometers for engine testing, a computer-controlled variable engine valve controller, a fuel-cell experimental station, a small rocket testing facility, and a small jet engine thrust stand.

The Guidance and Control Laboratory, a joint activity of the Department of Aeronautics and Astronautics and the Department of Mechanical Engineering, specializes in construction of electromechanical systems and instrumentation, particularly where high precision is a factor. Work ranges from robotics for manufacturing to feedback control of fuel injection systems for automotive emission control. The faculty and staff work in close cooperation with

both the Design and Thermosciences Groups on device development projects of mutual interest.

Many computation facilities are available to department students. Three of the department's labs are equipped with superminicomputers. Numerous smaller minicomputers and microcomputers are used in the research and teaching laboratories.

Library facilities at Stanford beyond the general library include Engineering, Mathematics, and Physics department libraries.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Undergraduates seeking to major in Mechanical Engineering should see the curriculum outlined in the "Undergraduate Degree in Mechanical Engineering" section of this bulletin. The University's basic requirements for the bachelor's degree are discussed in the "Undergraduate Degrees" section of this bulletin. Courses taken for the departmental major (mathematics; science; science, technology, and society; engineering fundamentals; and engineering depth) must be taken for a letter grade if the instructor offers the option.

A Product Design program offered by the Design Group leads to the B.S. in Engineering (Product Design). A major in Biomechanical Engineering offered by the Biomechanical Engineering Group leads to the B.S. in Engineering (Biomechanical Engineering); this may be appropriate for students preparing for medical school or graduate bioengineering studies.

Grade Requirements—To be recommended by the department for a B.S. in Mechanical Engineering, a student must achieve the minimum grade point average (GPA) set by the School of Engineering (2.0 in engineering fundamentals and mechanical engineering depth).

Students interested in the minor should see the "Minor in Mechanical Engineering" section of this bulletin.

HONORS PROGRAM

The Department of Mechanical Engineering offers a program leading to a B.S. in Mechanical Engineering with honors. This program offers a unique opportunity for qualified undergraduate engineering majors to conduct independent study and research at an advanced level with a faculty mentor.

Mechanical Engineering majors who have a grade point average (GPA) of 3.5 or higher in the major may apply for the honors program. Students who meet the eligibility requirement and wish to be considered for the honors program must submit a written application to the Mechanical Engineering student services office no later than the second week of Autumn Quarter in the senior year. The application to enter the program can be obtained from the ME student services office, and must contain a one-page statement describing the research topic and include an unofficial Stanford transcript. In addition, the application must be approved by a Mechanical Engineering faculty member who agrees to serve as the thesis adviser for the project. Thesis advisers must be members of Stanford's Academic Council.

In order to receive departmental honors, students admitted to the program must:

1. maintain the 3.5 GPA required for admission to the honors program.
2. submit a completed thesis draft to the adviser by April 25. Further revisions and final endorsement by the adviser are to be finished by May 15, when two bound copies are to be submitted to the Mechanical Engineering student services office.
3. present the thesis at the Mechanical Engineering Poster Session held in mid-April.

COGNATE COURSES

- ARTSTUDI 60. Design I: Fundamental Visual Language
- ARTSTUDI 160. Design II: The Bridge
- CHEMENG 25. Biotechnology
- CS 106A. Programming Methodology
- ENGR 14. Applied Mechanics: Statics
- ENGR 15. Dynamics
- ENGR 25. Biotechnology
- ENGR 30. Engineering Thermodynamics
- ENGR 31. Chemical Principles with Application to Nanoscale Science and Technology
- ENGR 40. Introductory Electronics
- ENGR 70A. Programming Methodology
- ENGR 102M. Technical/Professional Writing for Mechanical Engineers
- ENGR 105. Feedback Control Design
- ENGR 205. Introduction to Control Design Techniques

COTERMINAL B.S./M.S. PROGRAM IN MECHANICAL ENGINEERING

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program must have earned a minimum of 120 units towards graduation. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree. This is normally Winter Quarter (the deadline is January 25th) prior to Spring Quarter graduation. The application must provide evidence of potential for strong academic performance as a graduate student. The Mechanical Engineering department graduate admissions committee makes decisions on each application. Typically, a GPA of at least 3.5 in engineering, science, and math is expected. Applicants must have completed two of ME 80, 112, 131A, and 131B, and must take the Graduate Record Examination (GRE) before action is taken on the application. Coterminal information, applications deadlines, and forms can be obtained from the ME Student Services Office.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

MASTER OF SCIENCE IN MECHANICAL ENGINEERING

The basic University requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin.

The master's program consists of 45 units of course work taken at Stanford. No thesis is required, although many students become involved in research projects during the master's program, particularly to explore their interests in working towards a Ph.D. degree. Students whose undergraduate backgrounds are entirely devoid of some of the major subject disciplines of engineering (for example, applied mechanics, applied thermodynamics, fluid mechanics, ordinary differential equations) may need to take some undergraduate courses to fill obvious gaps and prepare themselves to take graduate courses in these areas. Such students may require more than three quarters to fulfill the master's degree requirements, as the makeup courses may only be used as unrestricted electives (see item 4 below) in the M.S. degree program. However, it is not the policy to require fulfillment of mechanical engineering B.S. degree requirements to obtain an M.S. degree.

MECHANICAL ENGINEERING

The master's degree program requires 45 units of course work taken as a graduate student at Stanford. No thesis is required. However, students who want some research experience during the master's program may participate in research through ME 391 and 392.

Students are encouraged to refer to the most recent *Mechanical Engineering Graduate Student Handbook* provided by the student services office. The department's requirements for the M.S. in Mechanical Engineering are as follows:

1. *Mathematical Fundamentals:* two mathematics courses for a total of at least 6 units from the following list are required: ME 300A, 300B, 300C; CME 302; MATH 106, 109; CS 205A or B; EE 261, 263; STATS 110, 141; ENGR 155C. Other MATH

and CME courses with catalog numbers of 200 and above also fulfill the mathematics requirement. Mathematics courses must be taken for a letter grade.

2. *Depth in Mechanical Engineering:* a set of graduate-level courses in Mechanical Engineering to provide depth in one area. The faculty have approved these sets as providing depth in specific areas as well as a significant component of applications of the material in the context of engineering synthesis. These sets are outlined in the *Mechanical Engineering Graduate Student Handbook*. Depth courses must be taken for a letter grade.
3. *Breadth in Mechanical Engineering:* two additional graduate level courses (outside the depth) from the depth/breadth charts listed in the *Mechanical Engineering Graduate Handbook.* Breadth courses must be taken for a letter grade.
4. *Sufficient Mechanical Engineering Course Work:* students must take a minimum of 24 units of course work in mechanical engineering topics. For the purposes of determining mechanical engineering topics, any course on approved lists for the mathematics, depth, and breadth requirements counts towards these units. In addition, any graduate-level course with an ME course number is considered a mechanical engineering topic.
5. *Approved Electives* (to bring the total number of units to at least 39): electives must be approved by an adviser. Graduate engineering, mathematics, and science courses are normally approved. Approved electives must be taken for a letter grade. No more than 6 of the 39 units may come from ME 391/392 (or other independent study/research courses), and no more than 3 may come from seminars. Students planning a Ph.D. should discuss with their advisers the option of taking 391 or 392 during the master's program. ME 391/392 (and other independent study courses) may only be taken on a credit/no credit basis.
6. *Unrestricted electives* (to bring the total number of units submitted for the M.S. degree to 45): students are encouraged to take these units outside engineering, mathematics, or the sciences. Students should consult their advisers on course loads and on ways to use the unrestricted electives to make a manageable program. Unrestricted electives may be taken CR/NC.
7. Within the courses satisfying the requirements above, there must be at least one graduate-level course with a laboratory component. Courses which satisfy this requirement are: ENGR 206, 341; ME203, 210, 220, 218A,B,C,D, 310A,B,C, 317A,B, 318, 323, 324, 348, 354, 367, 382A,B, 385. ME 391/392 (or other independent study courses) may satisfy this requirement if 3 units are taken for work involving laboratory experiments.

Candidates for the M.S. in Mechanical Engineering are expected to have the approval of the faculty; they must maintain a minimum grade point average (GPA) of 2.75 in the 45 units presented for fulfillment of degree requirements (exclusive of independent study courses). All courses used to fulfill mathematics, depth, breadth, approved electives, and lab studies must be taken for a letter grade (excluding seminars, independent study, and courses for which a letter grade is not an option for any student).

Students falling below a GPA of 2.5 at the end of 20 units may be disqualified from further registration. Students failing to meet the complete degree requirements at the end of 60 units of graduate registration are disqualified from further registration. Courses used to fulfill deficiencies arising from inadequate undergraduate preparation for mechanical engineering graduate work may not be applied to the 45 units required for completion of the MS degree.

ENGINEERING

As described in the "School of Engineering" section of this bulletin, each department in the school may sponsor students in a more general degree, the M.S. in Engineering. Sponsorship by the Department of Mechanical Engineering (ME) requires (1) filing a petition for admission to the program by no later than the day before instruction begins, and (2) that the center of gravity of the proposed program lies in ME. No more than 18 units used for the proposed program may have been previously completed. The program must include at least 9 units of graduate-level work in the department other than ME 300A,B,C, seminars, and independent study. The petition must be accompanied by a statement explaining the program objectives and how it is coherent, contains depth, and fulfills a well-defined career objective. The grade requirements are the same as for the M.S. in Mechanical Engineering.

COGNATE COURSES

ANTHRO 332. Transformative Design
CS 223A. Introduction to Robotics
CS 327A. Advanced Robotics
ENGR 207B. Linear Control Systems II
ENGR 209A. Analysis and Control of Nonlinear Systems
ENGR 231. Transformative Design
ENGR 240. Introduction to Micro and Nano Electromechanical Systems (M/NEMS)
ENGR 341. Micro/Nano Systems Design and Fabrication Laboratory
MS&E 250A. Engineering Risk Analysis
MS&E 264. Sustainable Product Development and Manufacturing
MS&E 289. Clicks and Bricks: Creating Customer Experiences

MASTER OF SCIENCE IN ENGINEERING, BIOMECHANICAL ENGINEERING

The Master of Science in Engineering: Biomechanical Engineering (MSE:BME) promotes the integration of engineering mechanics and design with the life sciences. Applicants are expected to have an additional exposure to biology and/or bioengineering in their undergraduate studies. Students planning for subsequent medical school studies are advised to contact Stanford's Premedical Advising Office in Sweet Hall.

Students wishing to pursue this program must complete the Graduate Program Authorization form and get approval from the Student Services Office. This form serves to officially add the field to the student's record. This form must be filled out electronically on Axess.

Degree Requirements—

1. Mathematical competence (minimum 6 units) in two of the following areas: partial differential equations, linear algebra, complex variables, or numerical analysis, as demonstrated by completion of two appropriate courses from the following list: ME300A,B,C; MATH106, 109, 113, 131M/P, 132; STATS110, or ENGR155C; CME108, 302. Students who have completed comparable graduate-level courses as an undergraduate, and who can demonstrate their competence to the satisfaction of the instructors of the Stanford courses, may be waived via petition from this requirement by their adviser and the Student Services Office. The approved equivalent courses should be placed in the approved electives category of the program proposal.
2. Graduate Level Engineering Courses (minimum 21 units), consisting of:
   a. Biomechanical engineering restricted electives (9 units) to be chosen from: ME 280, 281, 284A, 337, 339, 381, 382A,B, 385, or 387.
   b. Specialty in engineering (9-12 units): A set of three or four graduate level courses in engineering mechanics, materials, controls, or design (excluding bioengineering courses) selected to provide depth in one area. Such sets are approved by the Mechanical Engineering Faculty. Comparable specialty sets composed of graduate engineering courses outside the Mechanical Engineering Department can be used with the approval of the student's adviser. Examples can be obtained from the Biomechanical Engineering Group Office (Durand 223).
   c. Graduate engineering electives (to bring the total number of graduate level engineering units to at least 21). These electives must contribute to a cohesive degree program, and be approved by the student's adviser. No units may

come from bioengineering courses, mathematics courses, or seminars.

3. Life science approved electives (minimum 6 units): Undergraduate or graduate biological/medical science/chemistry courses which contribute to a cohesive program.
4. Biomechanical engineering seminar ME 389.
5. General approved electives (to bring the total number of units to 39): These courses must be approved by the student's adviser. Graduate level engineering, math, and physical science courses and upper division undergraduate or graduate life science courses are normally approved.
6. Unrestricted electives (to bring the total number of units to 45): Students without undergraduate biology are encouraged to use some of these unrestricted units to strengthen their biology background. Students should consult their adviser for recommendations on course loads and on ways to use the unrestricted electives to create a manageable program.

All courses except unrestricted electives must be taken for a letter grade unless letter grades are not an option.

MASTER OF SCIENCE IN ENGINEERING, PRODUCT DESIGN

The Joint Program in Design focuses on the synthesis of technology with human needs and values to create innovative products, services, and experience designs. This program is offered jointly by the departments of Mechanical Engineering and Art and Art History. It provides a design education that integrates technical, human, aesthetic, and business concerns. Students entering the program from the engineering side earn a Master of Science in Engineering degree with a concentration in Product Design, and those from the art side a Master of Fine Arts. Students complete the core product design courses in their first year of graduate study at Stanford before undertaking the master's project in their second year.

DEGREE REQUIREMENTS

Students must complete the following courses. Students making unsatisfactory degree progress by the end of the first year may not advance to the thesis year per the faculty's discretion. A minimum cumulative GPA of 2.75 is required for degree conferral.

Subject and Catalog Number	*Units*
ME 203. Manufacturing and Design	4
ME 216A. Advanced Product Design: Needfinding	4
ME 311. Design Strategy and Leadership	3
ME 312. Advanced Product Design: Formgiving	3
ME 313. Human Value and Innovation in Design	3
ME 316A,B,C. Product Design Master's Project*	9
ME 365. Structure of Design Research	1-3
ARTSTUDI 60. Design I: Fundamental Visual Language	3
ARTSTUDI 160. Design II: The Bridge	3
ARTSTUDI 360A,B,C. Master's Project*	9
Approved Electives**	18
Total Units	60-62

Note: All required and approved electives must be taken for a letter grade unless prior approval is granted to take a class CR/NC.

* ME 316A,B,C and ARTSTUDI 360A,B,C are taken concurrently for three quarters during the second year.

** Students may choose classes (at the 200 level or higher) from any of the schools at the University to fulfill their elective requirement. However, electives that are not already pre-approved must be approved by the student's adviser via petition prior to enrollment. Electives should be chosen to fulfill career objectives; students may focus their energy in engineering, entrepreneurship and business, psychology, or other areas relevant to design. Taking a coherent sequence of electives focused on a subject area is recommended. For example, the patent, negotiation, and licensing classes (ME 207, 208, 265) constitute a sequence most relevant to potential inventors. The classes in the Graduate School of Business (STRAMGT S353, 356/366) and MS&E 273 constitute a coherent sequence in entrepreneurship and new venture formation. Students interested in social entrepreneurship should apply to the d.school course ME 206A,B, Extreme Affordability.

Pre-approved electives list: The following courses are pre-approved for fulfilling the 18-unit elective requirement for the master's degree in Engineering/Product Design. Electives taken that are not on this list must be approved via petition prior to enrollment. These must be taken for a letter grade unless prior approval is obtained.

ME 204.	The Designer's Voice
ME 207.	Negotiation
ME 208.	Patent Law and Strategy for Innovators and Entrepreneurs
ME 212.	Calibrating the Instrument
ME 222.	Design for Sustainability
ME 265.	Technology Licensing and Commercialization
ME 297.	Forecasting the Future of Engineering
ME 315.	The Designer in Society
MS&E 273.	Technology Venture Formation
STRAMGT 353.	Entrepreneurship: Formation of New Ventures
STRAMGT 356/366.	Evaluating Entrepreneurial Opportunities

Additional requirements: As part of their master's degree program, students are required to take at least one course offered by the Hasso Plattner Institute of Design (the d.School). All d.School courses require applications submitted the quarter prior to the start of class. These classes are considered pre-approved electives that fulfill part of the 18 units elective requirement.

ME206 A/B.	Entrepreneurial Design for Extreme Affordability
ME 228.	Creating Infectious Action
ME 325.	Software Design Experience
MS&E 287.	Prototyping Organizational Change
MS&E 485.	Crosscultural Design
ENGR 231.	Transformative Design
ENGR 280.	From Play to Innovation
ENGR 281.	Design and Media

ENGINEER IN MECHANICAL ENGINEERING

The basic University requirements for the degree of Engineer are discussed in the "Graduate Degrees" section of this bulletin.

This degree requires an additional year of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master's degree alone.

Admission standards are substantially the same as indicated under the master's degree. However, since thesis supervision is required and the availability of thesis supervisors is limited, admission is not granted until the student has personally engaged a faculty member to supervise a research project. This most often involves a paid research assistantship awarded by individual faculty members (usually from the funds of sponsored research projects under their direction). Thus, individual arrangement between student and faculty is necessary. Students studying for the M.S. degree at Stanford who wish to continue to the Engineer degree ordinarily make such arrangements during the M.S. degree program. Students holding master's degrees from other universities are invited to apply and may be admitted providing they are sufficiently well qualified and have made thesis supervision and financial aid arrangements.

Department requirements for the degree include a thesis; up to 18 units of credit are allowed for thesis work (ME 400). In addition to the thesis, 27 units of approved advanced course work in mathematics, science, and engineering are expected beyond the requirements for the M.S. degree; the choice of courses is subject to approval of the adviser. Students who have not fulfilled the Stanford M.S. degree requirements are required to do so, with allowance for approximate equivalence of courses taken elsewhere; up to 45 units may be transferable. A total of 90 units is required for degree conferral.

Candidates for the degree must have faculty approval and have a minimum grade point average (GPA) of 3.0 for all courses (exclusive of thesis credit and other independent study courses) taken beyond those required for the master's degree.

DOCTOR OF PHILOSOPHY IN MECHANICAL ENGINEERING

The basic University requirements for the Ph.D. degree are discussed in the "Graduate Degree" section of this bulletin. The Ph.D. degree is intended primarily for students who desire a career in research, advanced development, or teaching; for this type of work, a broad background in mathematics and the engineering sciences, together with intensive study and research experience in a specialized area, are the necessary requisites.

Ph.D. students must have a master's degree from another institution, or must fulfill the requirements for the Stanford M.S. degree in Mechanical Engineering or another discipline.

In special situations dictated by compelling academic reasons, Academic Council members who are not members of the department's faculty may serve as the principal dissertation adviser when approved by the department. In such cases, a member of the department faculty must serve as program adviser and as a member of the reading committee, and agree to accept responsibility that department procedures are followed and standards maintained.

Admission involves much the same consideration described under the Engineer degree. Since thesis supervision is required, admission is not granted until the student has personally engaged a member of the faculty to supervise a research project. Once a student has obtained a research supervisor, this supervisor becomes thereafter the student's academic adviser. Research supervisors may require that the student pass the departmental qualifying examination before starting research and before receiving a paid research assistantship. Note that research assistantships are awarded by faculty research supervisors and not by the department.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of engineering fundamentals by passing a qualifying examination. The academic level and subject matter of the examination correspond approximately to the M.S. program described above. Typically, the exam is taken shortly after the student completes the M.S. degree requirements. The student is required to have a minimum graduate Stanford GPA of 3.5 to be eligible for the exam (grades from independent study courses are not included in the GPA calculation). Once the student's faculty sponsor has agreed that the exam should be scheduled, the student must submit an application folder containing several items including a curriculum vitae, research project abstract, and preliminary dissertation proposal. Information, examination dates, and deadlines may be obtained from the department's student services office.

Ph.D. candidates must complete a minimum of 27 units (taken for a letter grade) of approved formal course work (excluding research, directed study, and seminars) in advanced study beyond the M.S. degree. The courses should consist primarily of graduate courses in engineering and sciences, although the candidate's adviser may approve a limited number of upper-level undergraduate courses and courses outside of engineering and sciences, as long as such courses contribute to a strong and coherent program. In addition to this 27-unit requirement, all Ph.D. candidates must participate each quarter in one of the following (or equivalent) seminars: ME 389, 390, 393, 394, 395, 396 397; AA 297; ENGR 298, 311A/B. The department has a breadth requirement for the Ph.D. degree. This may be satisfied either by a formal minor in another department (generally 20 units) or by at least 9 units of course work (outside of the primary research topic) which are approved by the principal dissertation adviser. If a minor is taken, 9 units from the minor requirements can be counted towards the depth requirement.

The Ph.D. thesis normally represents at least one full year of research work and must be a substantial contribution to the field. Students may register for course credit for thesis work (ME 500) to help fulfill University academic unit requirements, but there is no minimum limit on registered dissertation units, as long as students are registered in at least 8 units per quarter prior to TGR. Candidates should note that only completed course units are counted toward the requirement, so ungraded courses or courses with an "N" grade must be cleared before going TGR. Questions should be directed to the department student services office.

The final University oral examination (dissertation defense) is conducted by a committee consisting of a chair from another department and four faculty members of the department or departments with related interests. Usually, the committee includes the candidate's adviser, reading committee members, plus two more faculty. The examination consists of two parts. The first is open to the public and is scheduled as a seminar talk, usually for one of the regular meetings of a seminar series. The second is conducted in private and covers subjects closely related to the dissertation topic.

PH.D. MINOR IN MECHANICAL ENGINEERING

Students who wish a Ph.D. minor in ME should consult with the ME student services office. A minor in ME may be obtained by completing 20 units of approved graduate-level ME courses. Courses approved for the minor must form a coherent program and must be chosen from those satisfying requirement 2 for the M.S. in Mechanical Engineering.

See the *Mechanical Engineering Graduate Student Handbook* produced by the Mechanical Engineering student services office for more information.

MECHANICAL ENGINEERING COURSE CATALOG NUMBERING SYSTEM

The department uses the following course numbering system:

010-099	Freshman and Sophomore
100-199	Junior and Senior
200-299	Advanced Undergraduate and Beginning Graduate
300-399	Graduate
400-499	Advanced Graduate
500	Ph.D. Thesis

SCHOOL OF HUMANITIES AND SCIENCES

Dean: Richard P. Saller
Senior Associate Deans: Ralph L. Cohen, Stephen D. Krasner, Debra M. Satz
Senior Associate Dean for Finance and Administration: Adam R. Daniel
Associate Dean for Faculty Affairs: Tina Kass
Associate Dean for Graduate and Undergraduate Studies: Susan J. Weersing
Assistant Dean and Data and Technology Manager for Graduate and Undergraduate Studies and Diversity Programs: Ayodele Thomas
Graduate Diversity Recruitment Specialist: Joseph L. Brown
Department Chairs: Paula Findlen (History), James Fishkin (Communication), Hester Gelber (Religious Studies), Lawrence Goulder (Economics), Steven Kahn (Physics), Steven Kerckhoff (Mathematics), Beth Levin (Linguistics), Helen Longino (Philosophy), Hideo Mabuchi (Applied Physics), Richard Martin (Classics), James McClelland (Psychology), Josiah Ober (Political Science), Stephen Palumbi (Hopkins Marine Station), Peggy Phelan (Drama), Gabriella Safran (Division of Literature, Cultures, and Languages), Stephen Sano (Music), Robert Simoni (Biology), Jennifer Summit (English), Chaofen Sun (East Asian Languages and Cultures), Nancy Troy (Art and Art History), Andrew Walder (Sociology), Wing Wong (Statistics), Sylvia Yanagisako (Anthropology), Richard Zare (Chemistry)
Lecturer: Ayodele Thomas

The School of Humanities and Sciences, with over 40 departments and interdepartmental degree programs, is the primary locus for the liberal arts education offered by Stanford University. Through exposure to the humanities and arts, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and are thereby prepared to make thoughtful and imaginative contributions to the culture of the future. Through the study of social, political, and economic events, they acquire theories and techniques for the analysis of specific societal issues, as well as general cross-cultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they become well-informed participants and leaders in today's increasingly technological societies.

The research environment within the school offers both undergraduate and graduate students the intellectual adventure of working on their own research projects side by side with the school's distinguished faculty. While a few of the school's graduate programs offer professional degrees such as the Master of Fine Arts, most are academic and research programs leading to the Ph.D. Doctoral programs emphasize original scholarly work by the graduate students, often at the frontiers of knowledge, and normally require the students to participate in the supervised teaching of undergraduates. Indeed, in the school, as in the University more broadly, graduate students are of central importance in developing a community of scholars.

The fact that so many different disciplines lie within the same organization is one reason why the school has had great success in promoting interdisciplinary teaching and research programs. Whether engaged in studies as wide ranging as ethics, policy, and technological issues, or by applying contemporary social and philosophical theories to classical literature, the school's undergraduates, graduate students, and faculty are challenging the barriers among scholarly disciplines. The school continues to strive for a balance between teaching and research, the academy and society.

ORGANIZATION

The School of Humanities and Sciences includes the departments of Anthropology, Applied Physics, Art and Art History, Biology (and the Hopkins Marine Station), Chemistry, Classics, Communication, Division of Literatures, Cultures, and Languages, Drama, East Asian Languages and Cultures, Economics, English, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Religious Studies, Sociology, and Statistics.

The school also includes 21 interdepartmental degree programs: African and African American Studies; African Studies; American Studies; Archaeology; Biophysics; Comparative Studies in Race and Ethnicity; East Asian Studies; Feminist Studies; Financial Mathematics; Human Biology; Interdisciplinary Studies in Humanities; International Policy Studies; International Relations; Latin American Studies; Mathematical and Computational Science; Modern Thought and Literature; Public Policy; Russian, East European and Eurasian Studies; Science, Technology, and Society; Symbolic Systems; and Urban Studies.

In addition, the school sponsors programs that do not currently grant degrees: Astronomy; Black Performing Arts; Buddhist Studies; Creative Writing; Ethics in Society; History and Philosophy of Science; the Institute for Gender Research; the Institute for Social Science Research; Islamic Studies; Jewish Studies; Medieval Studies; and the Social Science History Institute.

Faculty and academic staff of the School of Humanities are listed under their respective departments or programs.

DEGREES OFFERED

Candidates for the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Arts and Sciences, Master of Arts, Master of Fine Arts, Master of Science, Doctor of Musical Arts, or Doctor of Philosophy should consult the department or program in which they intend to specialize.

AFRICAN AND AFRICAN AMERICAN STUDIES

Acting Director: Arnetha Ball
Associate Director: Cheryl Brown
Advisory Committee: James Campbell (History), Clayborne Carson (History), Linda Darling-Hammond (Education), Harry Elam (Drama), Michele Elam (English), Shelley Fisher Fishkin (English), Allyson Hobbs (History), Morris Graves (Associate Dean of Students), Arnold Rampersad (English), Elaine C. Ray (Director, Stanford University News Service), John R. Rickford (Linguistics), Joel Samoff (African Studies)
Affiliated Faculty: David Abernethy (Political Science, emeritus), Samy Alim (Education), R. Lanier Anderson (Philosophy), Anthony Antonio (Education), Richard Banks (Law), Lucius Barker (Political Science, emeritus), Don Barr (Sociology), Shasad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), Rashida Braggs (IHUM), Bryan Brown (Education), Albert Camarillo (History), James Campbell (History), Clayborne Carson (History), Prudence Carter (Education), Wanda Corn (Art and Art History, emerita), Linda Darling-Hammond (Education), David Degusta (Anthropology), Sally Dickson (Law), Sandra Drake (English, emerita), Jennifer Eberhardt (Psychology), Paulla Ebron (Anthropology), Harry Elam (Drama), Michele Elam (English), James Ferguson (Anthropology), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), George Fredrickson (History, emeritus), James Gibbs Jr. (Political Science, emeritus), William B. Gould (Law, emeritus), Sean Hanretta (History), Aleta Hayes (Drama), Allyson Hobbs (History), Terry Karl (Political Science), Anthony Kramer (Drama), Teresa LaFromboise (Education), Brian Lowery (Graduate School of Business), Lisa Malkki (Anthropology), Hazel Markus (Psychology), Barbaro Martinez-Ruiz (Art and Art History), Monica McDermott (Sociology), Robert Moses (Drama), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Comparative Literature), Susan Olzak (Sociology), David Palumbo-Liu (Comparative Literature), Patricia Powell (African and African American Studies), Jack Rakove (History), Arnold Rampersad (English), Vaughn Rasberry (English), John R. Rickford (Linguistics), Richard Roberts (History), Sonia Rocha (Sociology), Michael Rosenfeld (Sociology), Ramón Saldívar (English), Joel Samoff (African Studies), Paul Sniderman (Political Science), Ewart Thomas (Psychology), Jeremy Weinstein (Political Science)
Program Offices: 450 Serra Mall, Building 360, Suite 362
Mail Code: 94305-2084
Phone: (650) 723-3782
Email: aaas@stanford.edu
Web Site: http://aaas.stanford.edu

Courses offered by the Program in African and African American Studies are listed under the subject code AFRICAAM on the *Stanford Bulletin's* ExploreCourses web site.

UNDERGRADUATE PROGRAM IN AFRICAN AND AFRICAN AMERICAN STUDIES

The Program in African and African American Studies (AAAS), established in 1968, was the first ethnic studies program developed at Stanford University and the first African and African American Studies program at a private institution in the U.S. The AAAS program provides an interdisciplinary introduction to the study of peoples of African descent as a central component of American culture, offering a course of study that promotes research across disciplinary and departmental boundaries as well as providing research training and community service learning opportunities for undergraduates. It has developed an extensive network of Stanford scholars who work in race studies specific to AAAS and in concert with the Center for Comparative Studies in Race and Ethnicity.

AAAS encourages an interdisciplinary program of study drawn from fields including anthropology, art, art history, economics, languages, linguistics, literature, music, philosophy, political science, psychology, religion, and sociology. The program emphasizes rigorous and creative scholarship and research, and fosters close academic advising with a faculty adviser, the AAAS Associate Director, and the Director.

AAAS is an interdisciplinary program (IDP) affiliated with the Center for Comparative Studies in Race and Ethnicity (CCSRE) and offers a major independent of it. CCSRE offers additional majors in Asian American Studies, Chicana/o Studies, Comparative Studies in Race and Ethnicity, and Native American Studies.

MISSION STATEMENT FOR THE UNDERGRADUATE PROGRAM IN AFRICAN AND AFRICAN AMERICAN STUDIES

The mission of the undergraduate programs in African and African American Studies is to provide students with an interdisciplinary introduction to the study of the peoples of African descent as a central component of American culture. Courses in the major promote research across disciplinary and departmental boundaries as well as provide students with research training and community service learning opportunities. Courses of study are drawn from anthropology, art, art history, economics, languages, linguistics, literature, music, philosophy, political science, psychology, religion, and sociology among others. The program provides an intellectual background for students considering graduate school or professional careers.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. interdisciplinary understanding of scholarship related to the African diaspora and Africa, drawing on interdisciplinary course work and each student's individualized concentration.
2. ability to identify and critically assess different disciplinary, methodological, and interpretive approaches to the study of the African Americans, Africans, and/or people of the African diaspora.
3. understanding of comparative approaches to race
4. skills in disciplinary methods necessary for their study.
5. ability to express their interpretive and analytical arguments in clear, effective prose.

BACHELOR OF ARTS IN AFRICAN AND AFRICAN AMERICAN STUDIES

MAJOR

Majors must complete a total of 60 units, which include the following:

1. 1. AFRICAAM 105. Introduction to African and African American Studies,
   or ENGLISH 143. Introduction to African American Literature
   and
   ENGLISH 152D. W. E. B. Du Bois as Writer and Philosopher
   or ENGLISH 172G. Great Works of the African American Literary Tradition
2. One 5 unit course on Africa, approved by the AAAS Director and Associate Director
3. AFRICAAM 200X. Honors Thesis and Senior Thesis Seminar
4. 40 units from other AAAS core and cognate courses.

At least 10 of these units must be core courses, which are defined as courses that are primarily focused on Africa, African American Studies, the Caribbean, or the African Diaspora.

Students also work closely with a faculty adviser, the AAAS associate director, and the AAAS director in developing a coherent thematic emphasis within their major that reflects their scholarly interests in the field.

THEMATIC EMPHASIS

AAAS majors select a thematic emphasis, devoting at least 25 units in their major program of study towards the emphasis. Selecting an emphasis allows students to customize their curriculum and to synthesize course work taken across various departments and programs into a coherent focus. Emphases offered include:

Africa; African America; Diaspora; Identities, Diversity, and Aesthetics (IDA); Gender; Class; Theory; Historical Period.

All emphases (those listed as well as proposed alternatives) must be approved by the director and a course plan developed and approved by the director, associate director, and faculty adviser within the first year of declaring the major.

HONORS PROGRAM

AAAS offers a special program leading to Honors in African and African American Studies. Students accepted to this program will complete an honors thesis on an approved topic, on which work will normally begin in the junior year and be completed by mid-May of the senior year. The honors thesis is intended to enable students to synthesize skills to produce a document or project demonstrating a measure of competence in their specialty.

The Honors program begins with extensive advising from the faculty adviser and a petition for Honors, approved no later than the Spring Quarter of the junior year. Students must enroll in AFRICAAM 200X, Honors Thesis and Senior Thesis Seminar, during Autumn of the senior year and may take up to an additional 10 units of honors work to be distributed as best fits the student's program. Senior Research units are taken in addition to the required courses for the major. In May of the senior year, Honors students share their research findings in a public presentation to which faculty and students are invited.

Majors who have maintained a grade point average (GPA) of at least 3.5 in the major may apply for the honors program. Forms are available in the AAAS office.

CORE COURSES

Subject and Catalog Number	*Units*
AFRICAAM 101. African and African American Lecture Series	1-3
AFRICAAM 105. Intro to African and African American Studies (required)	5
AFRICAAM 123/ENGLISH 172G. Great Works of the African American Tradition	5
AFRICAAM 200X. Honors Thesis and Senior Thesis Seminar	5
ENGLISH 143. Introduction to African and African American Literature	5
ENGLISH 152D. W. E. B. Du Bois and American Culture (required)	5
or ENGLISH 172G. Great Works of the African American Tradition	5
FRENLIT 133. Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean	4
HISTORY 145B. Africa in the 20th Century	5
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle	4-5
LINGUIST 65. African American Vernacular English	3-5
POLISCI 225R. Black Politics in the Post-Civil Rights Era (not given this year)	5
SOC 144. Race and Crime in America	5

AAAS COURSES

AFRICAAM 12. Presidential Politics: Race, Class, Faith and Gender in the 2008 Election
AFRICAAM 40. The Muse, Musings, and Music
AFRICAAM 54/HISTORY 54N. African American Women's Lives
AFRICAAM 60/RELIGST 60. Nation, Diaspora, and the Gods of African America
AFRICAAM 64/HISTORY 64C/164C. From Freedom to Freedom Now: African American History 1865-1965
AFRICAAM 75. Black Cinema
AFRICAAM 75B. Black Sitcoms
AFRICAAM 101. African and African American Lecture Series: Race and Faith
AFRICAAM 105. Introduction to African and African American Studies
AFRICAAM 105R/RELIGST 105. Race, Faith, and Migration
AFRICAAM 123/ENGLISH 172G. Great Works of the African American Tradition
AFRICAAM 145. Writing Race, Writing Faith: An Exploration of the Poetics and Politics of Spirituality in Black Literature
AFRICAAM 200Y. Thesis Research
AFRICAAM 200Z. Thesis Research
AFRICAAM 255/HISTORY 255D/355D. Racial Identity in the American Imagination

COGNATE COURSES

AFRICAST 111/211. Education for All? The Global and Local in Public Policy Making in Africa
AFRICAST 112/212. Aids, Literacy, and the Land: International Aid and the Problems of Development in Africa
AMELANG 100A,B,C. Beginning Amharic
AMELANG 102A,B,C. Advanced Amharic
AMELANG 106A,B,C. Beginning Swahili
AMELANG 107A,B,C. Intermediate Swahili
AMELANG 108A,B,C. Advanced Swahili
AMELANG 133A,B,C. The African Forum
AMELANG 156A,B,C. Beginning Zulu
AMELANG 157A,B,C. Intermediate Zulu
AMELANG 158A,B,C. Advanced Zulu
AMSTUD 105. From Blues to Rap: Representing Music in African American Literature
ARTHIST 160A/360A. Twentieth-Century African American Art
ARTHIST 192/392. Introduction to African Art
ARTHIST 234A. Harlem Renaissance
ARTHIST 256A. Critical Race Art History
CASA 36. Life on the Streets: Anthropology of United States Urban Life
CASA 72. Dance and Culture in Latin America
CASA 88. Theories of Race and Ethnicity
CASA 119. The State in Africa
CHICANST 180E. Introduction to Chicana/o Life and Culture
COMM 148. Hip-Hop and Don't Stop: Introduction to Modern Speech Communities
COMM 246. Language and Discourse: Race, Class, and Gender
COMPLIT 41Q. Ethnicity and Literature
COMPLIT 147. Comparative Approaches to African American and Asian American Literature
COMPLIT 148. Introduction to Asian American Cultures
COMPLIT 241. Comparative Fictions of Ethnicity
CSRE 198. Internship for Public Service
CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century
DANCE 42. Dances of Latin America
DANCE 43. Afro-Brazilian and Afro-Peruvian Dance
DANCE 44. Jazz Dance I
DANCE 51. Congolese Dance
DANCE 58. Beginning Hip-Hop
DANCE 59. Intermediate-Advanced Hip Hop
DANCE 105. Contemporary Afro Styles and Dance Making: Technique, Rhythm, and Architecture
DANCE 106. Essence of Contemporary Dance Performance: African Styles on Stage
DANCE 144. Jazz Dance II
DANCE 145. Jazz Dance III
DRAMA 17N. Salt of the Earth: The Docudrama in America

DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for the Diversity in the Arts
DRAMA 155D. Performances of Race, Race-ing Performance
DRAMA 163. Performance and America
DRAMA 168. African American Drama: Traditions and Revisions
DRAMA 169. Contemporary Dramatic Voices of Color
DRAMA 177. Playwriting
DRAMA 179F. *Flor y Canto:* Poetry Writing Workshop
DRAMA 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
DRAMA 219. Contemporary African American Drama
ECON 116. American Economic History
ECON 148. Urban Economics
EDUC 103B/337. Race, Ethnicity, and Linguistic Diversity In Classrooms: Sociocultural Theory and Practices
EDUC 156A. Understanding Racial and Ethnic Identity
EDUC 177. Education of Immigrant Students
EDUC 193C. Peer Counseling: The African American Community
EDUC 201A. History of African American Education
EDUC 201B. Education for Liberation
EDUC210. History of Education in the United States
EDUC 245. Understanding Racial and Ethnic Identity Development
EDUC 336X. Language, Identity, and Classroom Learning
ENGLISH 143. Introduction to African American Literature
ENGLISH 45/145. Writings by Women of Color
ENGLISH 55N. American Sports, American Lives
ENGLISH 69Q. Sources of Global Challenges Today, Possibilities for Global Solutions: A Literary Exploration
ENGLISH 146C. Hemingway, Hurston, Faulkner, and Fitzgerald
ENGLISH 172E. The Literature of the Americas
ENGLISH 172G. Great Works of the African American Literary Tradition
ENGLISH 172P. African American Poetry
ENGLISH 374. Writing Race and Nation: Mark Twain and Paul Lawrence Dunbar
FEMSTUD 140 J. Black Feminist Theory
FRENLIT 133. Literature and Society: Introduction to Francophone Literature from Africa and the Caribbean
FRENLIT 248. Literature, History, and Representation
HISTORY 48Q. South Africa: Contested Transitions
HISTORY 52N. The Harlem Renaissance
HISTORY 54N. African American Women's Lives
HISTORY 59. Introduction to Asian American History
HISTORY 61. The Constitution and Race
HISTORY 64. Introduction to Race and Ethnicity in the American Experience
HISTORY 145B. Africa in the 20th Century
HISTORY 147G. African History in Novels and Film
HISTORY 150A. Colonial and Revolutionary America
HISTORY 150B. 19th-Century America
HISTORY 150C. The United States in the Twentieth Century
HISTORY 151. Slavery and Freedom in American History
HISTORY 158. The United States Since 1945
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
HISTORY 243S. Human Origins: History, Evidence, and Controversy
HISTORY 245E. Health and Society in Africa
HISTORY 245G. Law and Colonialism in Africa
HISTORY 246. Successful Futures for Africa: An Inventory of the 1970s-2000s
HISTORY 246S. Popular Culture in Africa
HISTORY 248S. African Societies and Colonial States
HISTORY 255D. Racial Identity in the American Imagination
HISTORY 260. California's Minority-Majority Cities
HISTORY 261. Race, Gender, and Class in Jim Crow America
HISTORY 299M. Martin Luther King, Jr. Research and Education Institute
HUMBIO 122S. Social Class, Race, Ethnicity, Health
HUMBIO 129/INDE 244. Ethnicity and Medicine
IHUM 68A/68B. Performing Religion
LINGUIST 65. African American Vernacular English
LINGUIST 152. Sociolinguistics and Pidgin Creole Studies
MUSIC 18A. Jazz History: Ragtime to Bebop (1900-1940)
MUSIC 18B. Jazz History: Bebop to Present (1940-Present)
MUSIC 20A. Jazz Theory
MUSIC 20B. Advanced Jazz Theory
MUSIC 20C. Jazz Arranging and Composition
MUSIC 153. The Soul Tradition in African American Music
MUSIC 161B. Jazz Orchestra
PHIL 177. Philosophical Issues Concerning Race and Racism
POLISCI 125V. Minority Representation and the Voting Rights Act
POLISCI 136. Philosophical Issues Concerning Race and Racism
POLISCI 141. The Global Politics of Human Rights
POLISCI 221. Tolerance and Democracy
POLISCI 221T. Politics of Race and Ethnicity in the United States
POLISCI 325S. Race and Place in American Politics
POLISCI 327. Minority Behavior and Representation
PSYCH 75. Cultural Psychology
PSYCH 180. Social Psychological Perspectives on Stereotyping and Prejudice
PSYCH 215. Mind, Culture, and Society
SOC 138. American Indians in Comparative Historical Perspective
SOC 139. American Indians in Contemporary Society
SOC 141A. Social Class, Race, Ethnicity, Health
SOC 143. Prejudice, Racism, and Social Change
SOC 144. Race and Crime in America
SOC 145. Race and Ethnic Relations
SOC 147/247. Comparative Ethnic Conflict
SOC 149. The Urban Underclass

MINOR IN AFRICAN AND AFRICAN AMERICAN STUDIES

Students who minor in AAAS complete a minimum of 30 units from the list of AAAS courses. These courses must include:

1. AFRICAAM 105. Introduction to African and African American Studies
2. one course from the social sciences list
3. one course from the humanities list

See the "Bachelor of Arts in African and African American Studies" section of this bulletin to view the humanities and social sciences lists.

Students should seek to develop a coherent theme in their course selections in consultation with the program director or associate director. An appointment should be made to discuss the rationale for the Minor theme preceding submission of the declaration forms.

OVERSEAS STUDIES COURSES IN AFRICAN AND AFRICAN AMERICAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

WINTER QUARTER

CAPETOWN

- OSPCPTWN 18. Xhosa Language and Culture. 2 units, Nolubabalo Tyam
- OSPCPTWN 24A. Targeted Research Project in Community Health and Development. 3 units, Timothy Stanton
- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan

- OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa. 4 units, Chris Saunders
- OSPCPTWN 38. Genocide: The African Experience. 3 units, Mohamed Adhikari, GER:DB:SocSci, EC:GlobalCom
- OSPCPTWN 41. Race and the Division of Labor in South Africa: a Historical Perspective. 4 units, Xolani Ngazimbi

PARIS

- OSPPARIS 186F. Contemporary African Literature in French. 4 units, Françoise Rullier, GER:DB:Hum, EC:GlobalCom

SPRING QUARTER

CAPETOWN

- OSPCPTWN 18. Xhosa Language and Culture. 2 units, Nolubabalo Tyam
- OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development. 3 units, Timothy Stanton
- OSPCPTWN 24B. Targeted Research Project in Community Health and Development. 5 units, Timothy Stanton
- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan
- OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers. 5 units, John Parkington
- OSPCPTWN 40. Education in the Post-Apartheid City. 4 units, Aslam Fataar
- OSPCPTWN 44. Negotiating Home, Citizenship and the South African City. 4 units, Sophie Oldfield, GER:DB:SocSci, EC:GlobalCom
- OSPCPTWN 52. The Ethics of Imperialism. 5 units, James Daughton, GER:DB:Hum
- OSPCPTWN 53. The South African Environment in Historical Context. 5 units, James Daughton

AFRICAN STUDIES

Emeriti: David B. Abernethy, John Baugh, Joan Bresnan, Susan Cashion, Sandra E. Drake, Peter Egbert, James. L. Gibbs, Jr., William B. Gould, Bruce F. Johnston, William R. Leben, Bruce Lusignan, Hans N. Weiler, Sylvia Wynter

Chair: Richard Roberts

Professors: Jean-Marie Apostolidès (French, Drama), Ellen Jo Baron (Pathology), Michele Barry (Medicine), Joel Beinin (History), John Boothroyd (Microbiology and Immunology), Elisabeth Mudimbe-Boyi (French and Italian, Comparative Literature), James T. Campbell (History), Martin Carnoy (Education), Harry Elam (Drama), James Fearon (Political Science), James Ferguson (Anthropology), Terry Lynn Karl (Political Science), Richard Klein (Anthropology), David Laitin (Political Science), Michael McFaul (Political Science), Yvonne Maldonado (Pediatrics, Infectious Diseases), Lynn Meskell (Anthropology), Julie Parsonnet (Infectious Diseases), Mary L. Polan (Obstetrics and Gynecology), John Rickford (Linguistics), Richard Roberts (History)

Associate Professors: Prudence L. Carter (Education), Paulla A. Ebron (Anthropology), Liisa Malkki (Anthropology), Hugh Brent Solvason (Psychiatry and Behavioral Sciences)

Assistant Professors: Jenna Davis (Civil and Environmental Engineering), David DeGusta (Anthropology), Oliver Fringer (Civil and Environmental Engineering), Sean A. Hanretta (History), Barbaro Martinez-Ruiz (Art History), Kathryn Miller (History), Grant Parker (Classics), Jeremy Weinstein (Political Science)

Professor (Research): David Katzenstein (School of Medicine)

Associate Professor (Teaching): Robert Siegel (Microbiology and Immunology)

Assistant Professor (Clinical): Brian Blackburn (Infectious Diseases)

Senior Lecturers: Khalil Barhoum (African and Middle Eastern Languages), Helen Stacy (Law)

Lecturers: Byron Bland (Stanford Center on Conflict and Negotiation), Jonathan Greenberg (Law), Ramzi Salti (African and Middle Eastern Languages), Galen Sibanda (African and Middle Eastern Languages), Timothy Stanton (Bing Overseas Studies)

Consulting Professors: Anne Firth-Murray (Human Biology), Joel Samoff (Center for African Studies)

Curators: Karen Fung (African Collection Curator, Green Library), Thomas Seligman (Director, Cantor Arts Center, and Lecturer, Art and Art History), Barbara Thompson (Phyllis Wattis Curator of the Arts of Africa and the Americas, Cantor Arts Center)

Senior Research Fellows: Coit Blacker (Freeman Spogli Institute), Larry Diamond (Hoover Institution), Stephen Stedman (Freeman Spogli Institute, Center for International Security and Cooperation)

Center Office: Encina Hall West, Room 216
Mail Code: 94305-6045
Phone: (650) 723-0295
Email: africanstudies@stanford.edu
Web Site: http://africanstudies.stanford.edu

Courses offered by the Center for African Studies are listed under the subject code AFRICAST on the *Stanford Bulletin's* ExploreCourses web site.

The Center for African Studies coordinates an interdisciplinary program in African Studies for undergraduates and graduate students. The program seeks to enrich understanding of the interactions among the social, economic, cultural, historical, linguistic, genetic, geopolitical, ecological, and biomedical factors that shape and have shaped African societies. By arrangement with the Stanford/Berkeley Joint Center for African Studies, graduate students may incorporate courses from both institutions into their programs. Contact the center for information regarding courses offered at the University of California, Berkeley.

Courses in African Studies are offered by departments and programs throughout the University. Each year the center sponsors a seminar to demonstrate to advanced undergraduates and graduate students how topics of current interest in African Studies are approached from different disciplinary perspectives.

Course offerings in African languages are also coordinated by the Center for African Studies. Along with regular courses in several levels of Arabic, Swahili, Xhosa, and Zulu, the center arranges with the African and Middle Eastern Languages and Literatures Program in the Stanford Language Center to offer instruction in other African languages; in recent years, it has offered courses in Amharic, Bambara, Chichewa, Ewe, Fulani, Hausa, Igbo, Shona, Twi, Wolof, and Yoruba.

The Center for African Studies offers a master of arts degree for graduate students. Undergraduates and graduate students not pursuing the master's degree can specialize in African Studies under the arrangements listed below.

UNDERGRADUATE PROGRAMS IN AFRICAN STUDIES

Undergraduates may choose an African Studies focus from:

1. A major in a traditionally defined academic department such as Anthropology, History, or Political Science. These departments afford ample opportunity to enroll in courses outside the major, leaving the student free to pursue the interdisciplinary study of Africa.
2. Interdepartmental majors, such as African and African American Studies or International Relations, which offer coordinated and comprehensive interdisciplinary course sequences, permitting a concentration in African Studies.
3. An individually designed major. Under the supervision of a faculty adviser and two other faculty members, the student can

plan a program of study focused on Africa that draws courses from any department or school in the University. If approved by the dean's advisory committee on individually designed majors, the program becomes the curriculum for the B.A. degree.

CERTIFICATE IN AFRICAN STUDIES

Students may apply for a certificate in African Studies. Requirements for the certificate are the same as for the minor; however, students may double-count courses applied toward their major or graduate studies. The principal difference between the minor and the certificate is that the certificate does not appear on the transcript. For more information and an application, contact the center.

GRADUATE STUDY IN AFRICAN STUDIES

For those who wish to specialize in Africa at the graduate level, African Studies can be designated a field of concentration within the master's and doctoral programs of some academic departments. Students in such departments as Anthropology, History, Political Science, and Sociology, and in the School of Education, may declare African Studies as the area of specialization for their master's and Ph.D. thesis work. Some other departments, programs, and institutes such as the International Comparative Education Program also permit students to specialize in African Studies. Stanford graduate students who are U.S. citizens or permanent residents may request an academic year application for a Foreign Language and Area Studies (FLAS) Fellowship. Students need not be enrolled at Stanford to apply for the summer fellowship. The deadline for both is January 8. For more information or an application, contact the Center.

FINANCIAL AID

The Center for African Studies offers a limited number of Foreign Language and Area Studies (FLAS) fellowships to U.S. citizens and permanent residents who undertake full-time study of an African language as part of their graduate training.

MINOR IN AFRICAN STUDIES

The Center for African Studies awards a minor in African Studies. Students majoring in any field qualify for this minor by meeting the following requirements:

1. A minimum of 25 units of Africa-related courses. Students may not double-count courses for completing major and minor requirements.
2. At least one quarter's exposure to a sub-Saharan African language. The Center for African Studies and the Special Languages Program may arrange instruction in any of several languages spoken in West, East, Central, and Southern Africa.
3. One introductory course that deals with more than one region of Africa.
4. A minimum 25-page research paper, with a focus on Africa. This paper may be an extension of a previous paper written for an African Studies course.
5. A designated focus of study, either disciplinary or regional, through a three-course concentration.

Upon completion of requirements, final certification of the minor is made by the Center for African Studies and appears on the student's transcript.

COTERMINAL BACHELOR'S AND MASTER OF ARTS IN AFRICAN STUDIES

The one-year master's program in African Studies is designed for students who have experience working, living, or studying in Africa, and little prior course work on the region.

Undergraduates at Stanford may apply for admission to the coterminal master's program in African Studies. Coterminal degree applications will only be accepted from students in their fourth year, meaning that the program must be completed in the fifth year. An exception can only be made for students who completed an honors thesis in their third year. For University coterminal degree program rules and application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm. Requirements for the master's degree are summarized below.

The annual deadline for all applications, including coterminal and master's, is January 8. All applicants must submit an online application, including a 500-word statement of purpose, resume, 15-20 page double-spaced academic writing sample, three letters of recommendation, official transcripts, and Graduate Record Examination scores. TOEFL scores are required of applicants for whom English is not their first language or who did not attend an undergraduate institution where English is the language of instruction. To apply online and for information on graduate admissions, see http://gradadmissions.stanford.edu.

DEGREE REQUIREMENTS

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin. A description of the M.A. program is also available from the Center or at http://ica.stanford.edu/afr/ma.

The program requires completion of a minimum of 45 graduate units. Upon entering, each student is assigned a faculty adviser who works with the student to develop a customized program of study.

To receive the M.A. degree in African Studies, students must complete:

1. *Core Courses* (15 units): students must complete the core African Studies M.A. course, AFRICAST 301, Dynamics of Change in Africa, in Autumn Quarter. Students elect two additional graduate courses taught by African Studies academic council members and drawn from a list of approved courses. Students must also complete AFRICAST 302, Research Workshop, in Spring Quarter, in which they present and discuss their research and research interests.
2. *Cognate Courses* (10 units): a minimum of 10 units of graduate-level credit in two cognate courses from the following thematic clusters not chosen as the student's concentration field: culture and society; health, well-being, and the environment; and political economy and security.
3. *Concentration Field* (12-15 units): students choose one area of specialization (culture and society; health, well-being, and the environment; or political economy and security), and a group of three related elective courses for graduate credit from the cognate course listings or elsewhere in the Stanford curriculum in consultation with the student's adviser and with the approval of the CAS director. With approval, introductory courses may be substituted in fields such as advanced undergraduate biology for those interested in epidemic diseases or public health. The academic adviser, in agreement with faculty in the chosen field, guarantees that each set of courses forms part of a coherent program.
4. *Language Requirement:* students take one year of training in an African language, usually at least 3 units per quarter, resulting in intermediate-level proficiency as measured by the American Council on the Teaching of Foreign Languages (ACTFL) or comparable language acquisition standards. Students who have advanced proficiency in an African language must fulfill this requirement by taking another European language spoken in Africa, such as French or Portuguese, by taking another African language to the intermediate-level, or by taking a year-long sequence in Arabic. Students with competency in one or more African languages and one or more other languages widely spoken in Africa, may substitute a program of methodological training including, for example, a sequence of courses in statistics or GIS survey techniques.
5. *Seminar Requirement:* students enroll each quarter in AFRICAST 300, Contemporary Issues in African Studies, 1 unit, in which guest scholars present lectures on African themes and topics.
6. *Thesis Option:* students may elect to write a master's thesis; they may register for up to 10 units of thesis research under the

guidance of an Academic Council member. Thesis units may be counted toward the electives within the concentration field unit requirements.

7. *Grade Requirements:* courses to be counted toward the degree, except for AFRICAST 300, must be taken for a letter grade and receive a grade of 'B' or higher.

In addition to AFRICAST courses, the following courses offered in other departments may be used to fulfill optional requirements. To meet requirements for the master's degree, students must take courses at the graduate level which are typically at least at the 200 level.

AFRICAAM 101. African American Lecture Series: Race and Faith
AFRICAAM 105. Introduction to African and African American Studies
AFRICAAM 144. African Women Writers
ANTHRO 139. Ethnography of Africa
ECON 106. World Food Economy
ECON 118. Development Economics
ECON 214. Development Economics I
EDUC 202. Introduction to Comparative and International Education
EDUC 273. Gender and Higher Education: National and International Perspectives
EDUC 306A. Education and Economic Development
ENGLISH 171A. English in the World
FRENLIT 133. Literature and Society in Africa and the Caribbean
FRENLIT 248. Literature, History, and Representation
HISTORY 106A. Global Human Geography: Asia and Africa
HISTORY 145B. Africa in the 20th Century
HISTORY 299X. Design and Methodology for International Field Research
HISTORY 305. Graduate Workshop in Teaching
HISTORY 345B. African Encounters with Colonialism
HISTORY 346. The Dynamics of Change in Africa
HISTORY 448A,B. African Societies and Colonial States
HUMBIO 129. Critical Issues in International Women's Health
HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges
HUMBIO 156. Global HIV/AIDS
INTNLREL 161A. Global Human Geography: Asia and Africa
MED 243. Biomedical and Social Science Responses to the HIV/AIDS Epidemic
POLISCI 136R. Introduction to Global Justice
POLISCI 141. The Global Politics of Human Rights
POLISCI 215. Explaining Ethnic Violence

OVERSEAS STUDIES COURSES IN AFRICAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

WINTER QUARTER

CAPETOWN

- OSPCPTWN 18. Xhosa Language and Culture. 2 units, Nolubabalo Tyam
- OSPCPTWN 24A. Targeted Research Project in Community Health and Development. 3 units, Timothy Stanton
- OSPCPTWN 32. Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 3-5 units. Janice McMillan, GER:DB:SocSci, EC:GlobalCom
- OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa. 4 units, Chris Saunders

SPRING QUARTER

CAPETOWN

- OSPCPTWN 18. Xhosa Language and Culture. 2 units, Nolubabalo Tyam
- OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development. 3 units, Timothy Stanton
- OSPCPTWN 24B. Targeted Research Project in Community Health and Development. 5 units, Timothy Stanton
- OSPCPTWN 32. Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 3-5 units. Janice McMillan, GER:DB:SocSci, EC:GlobalCom
- OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers. 5 units, John Parkington
- OSPCPTWN 40. Education in the Post-Apartheid City. 4 units, Azeem Badroodien, Aslam Fataar
- OSPCPTWN 44. Negotiating Home, Citizenship and the South African City. 4 units, Sophie Oldfield
- OSPCPTWN 52. The Ethics of Imperialism. 5 units, James Daughton, GER:DB:Hum
- OSPCPTWN 53. The South African Environment in Historical Context. 5 units, James Daughton

AMERICAN STUDIES

Director: Shelley Fisher Fishkin
Program Coordinators: Richard Gillam, Judith Richardson
Administrative Committee: Barton J. Bernstein (History), David Brady (Political Science), Scott Bukatman (Art and Art History), James T. Campbell (History) Gordon H. Chang (History), Michele B. Elam (English), Estelle Freedman (History), Leah Gordon (Education), Allyson Hobbs (History), Nicholas Jenkins (English), Gavin Jones (English), Doug McAdam (Sociology), Hilton Obenzinger (English), David Palumbo-Liu (Comparative Literature), Jack Rakove (History), Arnold Rampersad (English), Vaughn Raspberry (English), Judith Richardson (English), Ramón Saldívar (English, Comparative Literature), Stephen Sohn (English), Fred Turner (Communication), Barry Weingast (Political Science), Caroline Winterer (History), Bryan Wolf (Art and Art History), Gavin Wright (Economics)
Program Offices: Building 460
Mail Code: 94305-2022
Phone: (650) 723-3413
Email: monica.moore@stanford.edu
Web Site: http://amstudies.stanford.edu/

Courses offered by American Studies Program are listed under the subject code AMSTUD on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN AMERICAN STUDIES

The mission of the undergraduate program in American Studies is to provide students with a broad understanding of American culture and society. Building on a foundation of courses in history and institutions, literature and the arts, and race and ethnicity, students learn to analyze and interpret America's past and present, forging fresh and creative syntheses along the way. The program is an interdisciplinary major and, beyond the core requirements of the major, students may define and pursue their own interests from fields such as history, literature, art, communication, theatre, African American studies, feminist studies, economics, anthropology, religious studies, Chicana/o studies, law, sociology, education, Native American studies, music, and film. The program is designed to provide students majoring in American Studies with excellent preparation for further study in graduate or professional schools as well as careers in government, business, or other specialized fields.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. higher order, interdisciplinary, historically informed understanding of how to think about American culture and society, drawing on course work in: history and institutions; literature, art, and culture; comparative race and ethnicity; and each student's individualized thematic focus.
2. ability to identify and critically to assess different disciplinary, methodological, and interpretive approaches to the study of Americans and their past.
3. ability to produce their own persuasive, nuanced, fact-based interpretations reflecting a close critical reading and analysis of relevant primary or secondary sources.
4. ability to express their interpretive and analytical arguments in clear, effective prose.
5. ability to listen actively and to contribute to productive intellectual discussion in class.

BACHELOR OF ARTS IN AMERICAN STUDIES

The core requirements illustrate how different disciplines approach the study and interpretation of American life and include three courses in each of two main areas: history and institutions; and literature, culture, and the arts; and one course in comparative race and ethnicity. The required gateway seminar, AMSTUD 160, Perspectives on American Identity, explores the tensions between commonality and difference from a variety of disciplinary perspectives.

Beyond the core requirements of the major, American Studies expects students to define and pursue their own interests in interpreting important dimensions of American life. Accordingly, each student designs a thematic concentration of at least five courses drawn from fields such as history, literature, art, communication, theater, political science, African American studies, feminist studies, economics, anthropology, religious studies, Chicana/o studies, law, sociology, education, Native American studies, music, and film. At least one of the five courses in a student's thematic concentration should be a small group seminar or a colloquium. With program approval, students may conclude the major with a capstone honors research project during their senior year.

Whether defined broadly or narrowly, the thematic focus or concentration should examine its subject from the vantage of multiple disciplines. Examples of concentrations include: race and the law in America; gender in American culture and society; technology in American life and thought; health policy in America; art and culture in 19th-century America; education in America; nature and the environment in American culture; politics and the media; religion in American life; borders and boundaries in American culture; the artist in American society; and civil rights in America.

Completion of the major thus normally requires 13 courses (totaling at least 60 units), all of which must be taken for a letter grade. Not all courses are offered each year; students should consult ExploreCourses for scheduling information for the current academic year.

The course requirements for the American Studies major are:

1. *Gateway Seminar*—American Studies majors are required to take AMSTUD 160, Perspectives on American Identity (5 units), which is the Writing in the Major (WIM) course for American Studies.
2. *History and Institutions*—Majors are required to complete three courses in American History and Institutions. Specific requirements are:
   - AMSTUD 150A. (same as HISTORY 150A) Colonial and Revolutionary America
   - AMSTUD 150B. (same as HISTORY 150B) 19th Century America
   - The third course may be chosen from one of the following
   - AMSTUD 1B. (same as COMM 1B) Media, Culture, and Society
   - AMSTUD 2. (same as POLISCI 2) American National Government and Politics
   - AMSTUD 137. (same as COMM 137) When the People Speak: Deliberative Democracy and Public Consultation
   - AMSTUD 139. (same as SOC 139) American Indians in Contemporary Society
   - AMSTUD 150C. (same as HISTORY 150C) The United States in the 20th Century
   - AMSTUD 156H. Women and Medicine in US History: Women as Patients, Healers and Doctors
   - AMSTUD 161. (same as HISTORY 161) Women in 20th Century America
   - AMSTUD 164C. (same as HISTORY 164C) From Freedom to Freedom Now: African-American History, 1865-1965
   - AMSTUD 165. (same as EDUC 165) History of Higher Education in the U.S.
   - AMSTUD 166. (same as HISTORY 166) Introduction to African-American History
   - AMSTUD 179. (same as POLISCI 122) Introduction to American Law
   - AMSTUD 201. (same as EDUC 201) History of Education in the U.S.
   - AMSTUD 216X. (same as EDUC 216X) Education, Race, and Inequality in African American History, 1880-1990
   - AMSTUD 251. (same as HISTORY 251) Topics in Constitutional History
   - AMSTUD 251C. (same as HISTORY 251C) The American Enlightenment
   - AMSTUD 258. (same as HISTORY 258) Topics in the History of Sexuality: Sexual Violence in America
   - ECON 116. American Economic History (not given 2010-11)
   - HISTORY 154. 19th Century U.S. Cultural and Intellectual History, 1790-1860 (not given 2010-11)
   - SOC 155. The Changing American Family
3. *Literature, Culture, and the Arts*—Majors are required to take three courses in American literature, culture, and the arts. Specific requirements are: at least one course focusing on the period before the Civil War, normally AMSTUD 150, (same as ENGLISH 123) American Literature and Culture to 1855, and two additional courses, including at least one from Art, Film Studies, Music, or Drama. Choices include but are not limited to:
   - AMSTUD 35N. (same as MUSIC 35N) A Union of Diversities: Charles Ives and American Musical Tradition
   - AMSTUD 120. (same as COMM 120) Digital Media in Society
   - AMSTUD 121. (same as ENGLISH 121) Masterpieces of American Literature
   - AMSTUD 121X. (same as EDUC 121X) Hip Hop, Youth Identities, and the Politics of Language
   - AMSTUD 123D. (same as ENGLISH 123D) American Literature, 1855 to WWII
   - AMSTUD 123G. (same as ENGLISH 123G) Mark Twain: A Fresh Look at an Icon and Iconoclast (not given 2010-11)
   - AMSTUD 138C. (same as ENGLISH 138C) *Huckleberry Finn* and American Culture (not given 2010-11)
   - AMSTUD 140. Stand Up Comedy and the "Great American Joke" since 1945
   - AMSTUD 142. (same as COMPLIT 142) Literature of the Americas
   - AMSTUD 143. (same as ENGLISH 143) Introduction to African-American Literature
   - AMSTUD 146. (same as COMPLIT 146) Asian American Culture and Community

- AMSTUD 152A. (same as ENGLISH 152A) American Culture and the Cold War
- AMSTUD 152G. (same as ENGLISH 152G) Global Harlem Renaissance
- AMSTUD 167. (same as FILMST 167) Hollywood Musicals
- AMSTUD 183C. (same as ENGLISH 183C) Feminism and American Literature
- AMSTUD 186. (same as ENGLISH 186) Tales of Three Cities: New York, Chicago, Los Angeles
- AMSTUD 240. (same as ARTHIST 240) Sister Arts: Image and Text in America
- AMSTUD 257. (same as ENGLISH 257) Journalism and Imaginative Writing in America
- AMSTUD 260G. (same as ENGLISH 260G) Century's End: Race, Gender and Ethnicity at the Turn of the Century
- AMSTUD 261A. (same as ENGLISH 261A) Geography, Time, and Trauma in Asian American Literature
- AMSTUD 261F. (same as ENGLISH 261F) Gender and Sexuality in Asian American Literature
- AMSTUD 262C. (same as ENGLISH 262C) African American Literature and the Retreat of Jim Crow
- AMSTUD 262D. (same as ENGLISH 262D) African American Poetics
- ARTHIST 132. American Art and Culture, 1528-1860 (not given 2010-11)
- ARTHIST 176. Feminism and Contemporary Art (not given 2010-11)
- ARTHIST 178. Ethnicity and Dissent in United States Art and Literature (not given 2010-11)
- ARTHIST 259. The Fifties: Abstract Expressionism to Beat Culture (not given 2010-11)
- CSRE 179. Asian American Experiences and Documentary Practice
- DRAMA 163. Performance and America (not given 2010-11)
- DRAMA 165M. Musical Theater (not given 2010-11)
- ENGLISH 152D. Du Bois and American Culture (not given 2010-11)

4. *Comparative Race and Ethnicity*—Majors are required to take one course that focuses on the comparative study of race and ethnicity rather than a single racial or ethnic group, generally from the offerings listed by Comparative Studies in Race and Ethnicity (CSRE). Courses that satisfy this requirement include:
   - AMSTUD 114N. Visions of the 1960s
   - AMSTUD 121X. (same as EDUC 121X) Hip Hop, Youth Identities, and the Politics of Language
   - AMSTUD 161E. (same as ENGLISH 261E) Mixed Race Literature in the U.S. and South Africa
   - AMSTUD 169. (same as DRAMA 169A) Cultural Traffic: Race, Performance and Globalization
   - AMSTUD 183. Border Crossings and American Identities
   - AMSTUD 214. The American 1960s: Thought, Protest and Culture
   - CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity
   - CSRE 199A. Race/Sex/Gender in Cultural Representations
   - CSRE 226. Race and Racism in American Politics
   - SOC 149. The Urban Underclass
5. *Concentration and Capstone Seminar*—Students must design a thematic concentration of at least 5 courses, with the help of faculty advisers. The courses, taken together, must give the student in-depth knowledge and understanding of a coherent topic in American cultures, history, and institutions. Thematic concentrations should be approved by the end of the registration period of the Autumn Quarter of the junior year, if at all possible. Sample thematic concentrations and courses that allow a student to explore them are available in the American Studies Office in Building 460.

At least one of the courses in the concentration must be designated as the capstone seminar and must require a substantial research paper on a topic related to the thematic concentration. This paper must be filed in the program office prior to degree conferral. The program office has a list of courses that satisfy the capstone requirement, but students are encouraged to propose others that may fit better with their concentrations. An honors project, or an independent study course with a faculty member culminating in a research paper, may also fulfill this requirement with the Director's approval.

Students may choose courses for their thematic concentrations from the following list:

- AMSTUD 101. American Fiction into Film: How Hollywood Scripts and Projects Black and White Relations Over the Decades
- COMM 1A. Media Technologies, People, and Society
- COMM 125. Perspectives on American Journalism
- COMM 131. Media Ethics and Responsibility
- COMM 162. Analysis of Presidential Campaigns
- COMPLIT 41Q. Ethnicity and Literature
- COMPLIT 134. The Poetry of History in the Americas
- COMPLIT 149. The Laboring of Diaspora and Border Literary Cultures
- COMPLIT 242. The Global South -- Faulkner, Garcia Marquez, Morrison, and Cisneros
- CSRE 116. Language, Culture, and Education in Native North America
- CSRE 132. Friends, Enemies, and Lovers: Interracial Encounters in American Culture
- CSRE 133. Women and Race in the American West, 1849-1950
- CSRE 161. Asian American Immigration and Health
- CSRE 166. New Citizenship: Grassroots Movements for Social Justice in the U.S.
- CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity
- CSRE 200. Latina/o Literature
- CSRE 201. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era
- CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century
- DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts
- DRAMA 180Q. Noam Chomsky: The Drama of Resistance
- EDUC 112X. Urban Education
- EDUC 177. Education of Immigrant Students: Psychological Perspectives
- EDUC 220B. Introduction to the Politics of Education
- EDUC 220C. Education and Society
- ENGLISH 143A. American Indian Mythology, Legend and Lore
- ENGLISH 187J. Lady Sings the Blues: Blues, Literature, and Black Feminism
- HISTORY 130A. The Rise of Scientific Medicine
- HISTORY 166B. Immigration in 20th-Century America: Ethnicity, Race, Nation
- HISTORY 250A. History of California Indians
- HISTORY 255B. Introduction to African and African American Studies
- HPS 158. The Social History of Mental Illness
- HUMBIO 120. Health Care in America: The Organizations and Institutions that Shape our Health Care System
- HUMBIO 122S. Social Class, Race, Ethnicity, Health
- HUMBIO 170. Justice, Policy and Science
- LINGUIST 65. African American Vernacular English
- LINGUIST 150. Language in Society
- LINGUIST 156. Language and Gender
- MUSIC 8A. Rock, Sex and Rebellion

- MUSIC 18A. Jazz History I: Ragtime to Bebop, 1900-1945
- MUSIC 18B. Jazz History II: Bebop to the Present, 1945-
- MUSIC 146. Music and Urban Film
- MUSIC 147. The Soul Tradition in African American Music
- NATIVEAM 120. Native American Writers, 1880-1920
- NATIVEAM 123. American Indians an the Cinema
- POLISCI 120B. Campaigns, Voting, Media and Elections
- POLISCI 120C. American Political Institutions: Congress, the Executive Branch, and the Courts
- POLISCI 123. Politics and Public Policy
- POLISCI 124R. Judicial Politics and Constitutional Law: The Federal System
- POLISCI 124S. Judicial Politics and Constitutional Law: Civil Liberties
- POLISCI 132S. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
- POLISCI 220R. The Presidency
- POLISCI 221. Democratic Theory and Democratic Citizenship
- POLISCI 222R. Culture and Diversity
- POLISCI 222S. Topics in Constitutional History
- POLISCI 223. Race in American Politics
- POLISCI 224T. Legislature, Court and Public Policy
- POLISCI 225L. Positive Political Theory and the Law
- POLISCI 226T. The Politics of Education
- POLISCI 227R. Polarized Politics and Special Interest Groups
- POLISCI 227P. Analyzing Contemporary Politics
- PUBLPOL 125. Law and Public Policy
- PUBLPOL 135. Regional Politics and Decision Making in Silicon Valley
- PUBLPOL 154. Politics and Policy in California
- PUBLPOL 194. Technology Policy
- SOC 142. Sociology of Gender
- STS 101. Science, Technology, and Contemporary Society
- STS 110. Ethics and Public Policy

HONORS PROGRAM

To graduate with honors, American Studies majors must complete a senior thesis and have an overall grade point average of 3.5 in the major, or demonstrated academic competence. Students must apply to enter the honors program no later than the end of registration period in Autumn Quarter of their senior year, and must enroll in 10-15 units of AMSTUD 250, Senior Research, during the senior year. These units are in addition to the units required for the major. The application to enter the program must contain a one-page statement of the topic of the senior thesis, and must be signed by at least one faculty member who agrees to be the student's honors adviser. (Students may have two honors advisers.) The thesis must be submitted for evaluation and possible revision to the adviser no later than four weeks before graduation.

Students are encouraged to choose an honors topic and adviser during the junior year. To assist students in this task, American Studies offers a pre-honors seminar (AMSTUD 240A) in which students learn research skills, develop honors topics, and complete honors proposals. Students also may enroll in the American Studies Honors College during September before the senior year. American Studies also provides students the opportunity to work as paid research assistants for faculty members during the summer between their junior and senior year, which includes participation in a research seminar. More information about American Studies honors is available from the program office.

MINOR IN AMERICAN STUDIES

To earn a minor in American Studies, students must complete at least 28 units of course work in the program. Because students may not count courses for both a major and a minor, the specific courses that are used for an American Studies minor depend on the courses that are used to satisfy the major requirement.

A student must take the following:

1. The gateway seminar, AMSTUD 160. Perspectives on American Identity
2. at least 2 courses from category 2 (History and Institutions)
3. at least 2 courses from category 3 (Literature, Culture and the Arts)
4. at least 1 course from category 4 (Comparative Race and Ethnicity)

Courses used to satisfy these requirements must be taken for a letter grade.

ANTHROPOLOGY

Emeriti: (Professors) Clifford R. Barnett, Harumi Befu, George A. Collier, Jane F. Collier, Carol Delaney, Charles O. Frake, James L. Gibbs, Jr., Renato I. Rosaldo, George D. Spindler, Robert B. Textor

Chair: Sylvia Yanagisako

Professors: Lisa Curran, William H. Durham, James Ferguson (on leave), Thomas Blom Hansen, Ian Hodder, Richard G. Klein, Tanya Luhrmann, Lynn Meskell, Sylvia J. Yanagisako

Associate Professors: Rebecca Bliege Bird, Paulla Ebron, James A. Fox, Miyako Inoue, Sarah Lochlann Jain, James Holland Jones, Matthew Kohrman, Liisa Malkki, John W. Rick, Barbara Voss

Assistant Professors: Melissa J. Brown, Ian G. Robertson, Michael V. Wilcox

Assistant Professor (Research): Douglas W. Bird

Courtesy Professors: Penelope Eckert, Raymond McDermott

Visiting Associate Professors: Ewa Domanska, Jean-Jacques Hublin, Mark Maguire

Lecturers: Kathleen Coll, Claudia Engel, Karen Holmberg, Patrick Hunt, Matthew Jobin, Alma Kunanbaeva, Sandra Lee, Merritt Ruhlen, Dan Salkeld, James Truncer

Consulting Associate Professor: Dominique Irvine

Affiliated Faculty: Carol Boggs, J. Gordon Brotherston, Susan Cashion, Jean-Pierre Dupuy, Marcus W. Feldman, John A. Gosling, Robert Sapolsky, Jeffrey T. Schnapp, Bernardo Subercaseaux

Post Doctoral Fellows: Ayca Alemdaroglu, Carter Hunt

Teaching Affiliates: Elif Babul, Serena Love, Erin Pettigrew, Angel Roque, Robert Samet, Joshua Samuels, Bryn Williams, Austin Zeiderman

Department Offices: Building 50, Main Quadrangle, 450 Serra Mall

Mail Code: 94305-2034

Phone: (650) 723-3421

Email: anthropology@stanford.edu

Web Site: http://anthropology.stanford.edu

Courses offered by the Department of Anthropology are listed under the subject code ANTHRO on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE DEPARTMENT OF ANTHROPOLOGY

The courses offered by the Department of Anthropology are designed to: provide undergraduates with instruction in anthropology; provide undergraduate majors in Anthropology with a program of work leading to the bachelor's degree; and prepare graduate candidates for advanced degrees in Anthropology. Anthropology is devoted to the study of human beings and human societies as they exist across time and space. It is distinct from other social sciences in that it gives central attention to the full time span of human history, and to the full range of human societies and cultures, including those located in historically marginalized parts of the world. It is therefore especially attuned to questions of social, cultural, and biological diversity, to issues of power, identity, and

inequality, and to understanding the dynamic processes of social, historical, ecological, and biological change over time. Education in Anthropology provides excellent preparation for living in a multicultural and globally-interconnected world, and helps to equip students for careers in fields including law, medicine, business, public service, research, ecological sustainability, and resource management. Students may pursue degrees in Anthropology at the bachelor's, master's, and doctoral levels.

The Department of Anthropology offers a wide range of approaches to the topics and area studies within the field, including archaeology, ecology, environmental anthropology, evolution, linguistics, medical anthropology, political economy, science and technology studies, and sociocultural anthropology. Methodologies for the study of micro- and macro-social processes are taught through the use of qualitative and quantitative approaches. The department provides students with excellent training in theory and methods to enable them to pursue graduate study in any of the above mentioned subfields of Anthropology.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the Anthropology discipline.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the Anthropology discipline.

UNDERGRADUATE PROGRAMS IN ANTHROPOLOGY

In addition to gaining an excellent foundation for graduate research and study, students majoring in Anthropology can pursue careers in government, international business, international development agencies, international education, law, mass media, nonprofit organizations, and public policy.

GRADUATE PROGRAMS IN ANTHROPOLOGY

Graduate training in Anthropology at Stanford is designed for students who seek the Doctoral (Ph.D.) degree, and for students who seek the Masters of Arts (M.A.) degree only. Entering graduate students need not have majored in Anthropology as undergraduates, although most have backgrounds in behavioral, biological, social, or physical sciences.

BACHELOR OF ARTS IN ANTHROPOLOGY

Undergraduate training in the department of Anthropology is designed for students who seek the bachelor of arts (B.A.) degree only. Students may declare a major in Anthropology and earn the B.A. degree by following the requirements below. The department also offers a minor in Anthropology. The B.A. degree program usually requires at least five quarters of enrollment. Students interested in majoring in Anthropology are encouraged to declare by the beginning of their junior year and to work closely with an adviser to develop a coherent program of study. For more complete information about the major see the department web site at http://anthropology.stanford.edu.

To declare a major in Anthropology, contact the department's student peer adviser(s) or the undergraduate student services specialist to prepare the checklist for the major and the major planning form. These forms are available at http://www.stanford.edu/dept/anthropology/cgi-bin/web/?q=node/19. Apply in Axess for the B.A. in Anthropology, submit the required forms to the undergraduate student services specialist requesting a faculty adviser assignment, and meet with the assigned faculty adviser to receive approval of the checklist and major planning form. Students must apply in Axess for the B.A. Major in Anthropology by the time junior status is achieved (85 units).

DEGREE REQUIREMENTS

The B.A. degree in Anthropology may be earned by fulfilling the following requirements:

1. A faculty adviser appointed in the department of Anthropology. Undergraduate Anthropology majors should plan to meet with their faculty adviser at least once each quarter.
2. A program of 65 units, passed with an overall minimum grade of 'C' or higher:
   a. of the 65 units, 15 units may be approved from related areas of study, overseas studies, and/or transfer units.
   b. of the 65 units, at least 15 units must be in courses with the ANTHRO subject code numbered 100 or above.
   c. no more than 10 units of directed reading-style course work may be counted towards the major. These units may only be included among the 15 related units permitted for the major.
   d. no more than 10 units may be taken for a satisfactory/no credit grade: 5 units in ANTHRO courses, and 5 in related or transfer units.
3. A grade of 'B-' or higher in an ANTHRO Writing in the Major (WIM) course. This should be taken within a year of declaring the major or before the end of the junior year.
4. A grade of 'B-' or higher in an ANTHRO theory course. This should be taken within a year of declaring the major or before the end of the junior year.
5. A grade of 'B-' or higher in an ANTHRO methods course. This should be taken within a year of declaring the major or before the end of the junior year.
6. A self-designed course of study, approved by the faculty adviser, chosen from an Anthropology emphasis listed below:
   a. Archaeology and Heritage
   b. Culture and Society
   c. Ecology, Environment, and Evolution
   d. Medical Anthropology
7. A grade of 'C' or higher in a minimum of four ANTHRO essential courses listed at the 100 level or higher and taught by Anthropology faculty. (Courses should be related to the student's self-designed course study and emphasis.)
8. Competence in a foreign language beyond the first-year level. Such competence is usually demonstrated by completing a 5 unit course at the second-year level with a grade of 'B-' or better. The requirement may be met by special examination administered through the Language Center, or demonstration of superior placement scores.
   Note: Students whose programs require non-English language study as part of a geographical or linguistics focus may ask their faculty adviser to approve up to 5 units from language courses toward the degree if such courses are at the second-year level and above, or are in a second non-English language.
9. At least five quarters of enrollment in the major. Each candidate for the B.A. in Anthropology should declare a major by the first quarter of the third year of study.

Advising is an important component of the Anthropology major. Students are encouraged to work closely with their major adviser throughout their pursuit of the degree. Advising milestones for the major include the following:

1. In the quarter in which the major is declared, students meet with their assigned faculty adviser, create a rigorous course of study based on topical breadth, and obtain adviser approval of an Anthropology emphasis as a course of study by obtaining the major adviser's signature on the Major Checklist.

2. Undergraduate Anthropology majors should plan to meet with their major faculty adviser at least once each quarter before the Final Study List deadline. Any revisions to the initial checklist must be approved by the faculty adviser.
3. Undergraduate Anthropology majors must submit an updated major checklist and planning form to the undergraduate student services specialist in the quarter before graduating.

REQUIRED COURSES—

1. *Writing in the Major courses—*
   a. Undergraduate majors can fulfill the Writing in the Major course requirement for the B.A. in Anthropology by taking the ANTHRO Theory course corresponding to their chosen emphasis.
2. *Theory courses—*
   Enroll in one of the following according to the student's chosen emphasis:
   a. Archaeology and Heritage: ANTHRO 90A. History of Archaeological Thought
   b. Culture and Society/Medical Anthropology: ANTHRO 90B. Theory in Cultural and Social Anthropology
   c. Ecology, Environment, and Evolution: ANTHRO 90C. Theory of Ecological and Environmental Anthropology
3. *Methods courses—*
   The following course fulfills the methods course requirement. Students choosing the Archaeology and Heritage emphasis may substitute ANTHRO 91A. Archaeological Methods.
   ANTHRO 91. Evidence and Methods in Anthropology
4. *Essential courses—*
   Choose from the following according to the student's chosen emphasis. These courses may fulfill the essential course requirements for more than one emphasis; see the undergraduate student services specialist for details.
   a. For the Archaeology and Heritage emphasis, most essential courses are numbered ANTHRO 100 through ANTHRO 113.
   b. For the Culture and Society emphasis, most essential courses are numbered ANTHRO 120 through ANTHRO 150.
   c. For the Ecology, Environment, and Evolution emphasis, most essential courses are numbered ANTHRO 160 through ANTHRO 178.
   d. For the Medical Anthropology emphasis, most essential courses are numbered ANTHRO 179 through ANTHRO 185.
5. *Research courses—*
   Courses listed are recommended for students writing a research paper in the major:
   - ANTHRO 92. Undergraduate Research Proposal Writing Workshop
   - ANTHRO 93. Prefield Research Seminar
   - ANTHRO 94. Postfield Research Seminar
   - ANTHRO 95A. Research in Anthropology
6. *Senior courses*—ANTHRO 95B. Senior Paper

SENIOR PAPER

The senior paper program in Anthropology provides majors the opportunity to conduct original research under the guidance of an Anthropology faculty member. All Anthropology majors are encouraged to write a senior paper. Interested Anthropology majors of junior standing may apply to the senior paper program by submitting a senior paper application form, including a research topic/title of the proposed senior paper project, a two page abstract/proposal, and a letter of reference from their faculty adviser to the undergraduate student service specialist on or by the second Monday of February in the junior year. Enrollment in ANTHRO 95A, Research in Anthropology, is recommended during Autumn and Winter quarters of the senior year. Students must enroll in ANTHRO 95B, Senior Paper, in the final quarter of the undergraduate degree program before graduating. The senior paper is submitted in the final quarter before graduation. For more information, see the undergraduate student services specialist.

HONORS PROGRAM

The honors program in Anthropology provides eligible Anthropology majors with an opportunity to conduct original ethnographic, field, laboratory, or library-based research under the guidance of an Anthropology faculty member. All Anthropology majors are urged to consider applying to the departmental honors program in Anthropology. Interested Anthropology majors of junior standing may apply for admission to the honors program by submitting an honors application form, including a research topic/title of the proposed honors project, a two page abstract/proposal, a transcript, and a letter of reference from their faculty or honors adviser to the undergraduate student services specialist on or by the second Monday of February in the junior year. Department majors are eligible to apply for honors candidacy with a 3.4 GPA in the department major, a 3.0 GPA in overall course work, and with no more than one incomplete listed on the transcript at the time of application. Students interested in the honors program are encouraged to apply for summer research funding through the Department of Anthropology, Undergraduate Advising and Research, and area studies centers. This process requires planning as the Spring Quarter research deadline falls before the honors application due date. In most case, honors students apply for such funding early in the junior year.

1. *Required Courses—*
   a. The theory and methods course appropriate to the student's chosen emphasis of study.
   b. ANTHRO 95B. Senior Paper, is required in the final quarter of the student's B.A. degree program. Senior papers with a letter grade of 'A-' or higher may be awarded departmental honors. Honors students may enroll for a minimum of 5 units and up to a maximum of 10 units.
2. *Optional Courses—*
   a. ANTHRO 92. Undergraduate Research Proposal Writing Workshop, is recommended during Autumn and Winter quarters of the junior year.
   b. ANTHRO 93. Prefield Research Seminar
   c. ANTHRO 94. Postfield Seminar, is given in Autumn Quarter only. Student researchers may choose to enroll in ANTHRO 94 or to attend Summer Honors College in the summer following their junior year.
   d. ANTHRO 95A. Research in Anthropology, is recommended during Autumn and Winter quarters of the senior year.

FIELD SCHOOL AND RESEARCH OPPORTUNITIES IN ANTHROPOLOGY

Students majoring in Anthropology are encouraged to develop field research projects under the supervision of a department faculty member. The department offers research grants to support individually-designed and other summer field research in Anthropology. The department research grants may be used to support field research as a supplement to other field research grants such as the UAR research grants. The department also offers opportunities to participate in faculty-led research projects.

See http://anthropology.stanford.edu for information about the department's summer research opportunities, including the following: Beagle II Award, Tambopata, Franz Boas and Pritzker summer scholars programs, the Georgia Sea Islands Cultural Heritage Preservation Project, and Michelle Z. Rosaldo Summer Field Research Grant program. The VPUE-funded departmental grants program supports students' participation in faculty-led research projects such as the Georgia Sea Islands Cultural Preservation Project. Other field school opportunities include the following: Catalhoyuk, El Presidio de San Francisco, Pueblo of Abo, and South Africa Heritage.

Note: Required courses for the Franz Boas and Pritzker summer scholars programs and the Michelle Z. Rosaldo grant program

include ANTHRO 93, Prefield Research Seminar, or ANTHRO 93B, Prefield Research Seminar for Non-majors, and ANTHRO 94, Postfield Research Seminar.

For more information about research opportunities and deadlines, please see http://anthropology.stanford.edu.

MINOR IN ANTHROPOLOGY

To declare a minor in Anthropology, contact the department's student peer adviser(s) or the undergraduate student services specialist to prepare the minor checklist and the minor planning form. These forms are available at http://anthropology.stanford.edu. Apply in Axess for the B.A. Minor in Anthropology; submit the required forms to the undergraduate student services specialist; request a faculty adviser assignment; and meet with the assigned faculty adviser for approval of the checklist and minor planning form. Students must apply in Axess for the B.A. Minor in Anthropology by the last day of the quarter at least two quarters before degree conferral.

Requirements for the minor in Anthropology include the following:

1. A faculty adviser appointed in the Department of Anthropology.
2. A program of 30 units, with a minimum grade of 'C' or higher:
   a. Of the 30 units, 10 units may be approved from related areas of study, overseas studies, and transfer units.
   b. Of the 30 units, a minimum of 15 units must be ANTHRO courses numbered 100 or above.
   c. No more than 5 units of directed reading-style course work may be counted towards the minor and may only be included among the 10 related units permitted for the minor.
   d. No more than 5 units may be taken for a satisfactory/no credit grade.
3. A self-designed course of study chosen from an Anthropology emphasis listed below and approved by the faculty adviser:
   a. Archaeology and Heritage
   b. Culture and Society
   c. Ecology, Environment and Evolution
   d. Medical Anthropology
4. A grade of 'C' or higher in two ANTHRO essential courses listed at the 100 level or higher and taught by Anthropology faculty.
5. At least two quarters of enrollment in the minor. Each candidate for the B.A. Minor in Anthropology should declare by the last day of the quarter at least two quarters before the quarter of degree conferral.

Advising milestones for the minor include the following:

1. In the quarter in which the minor is declared, the student must meet with his or her assigned adviser, create a rigorous course of study based on topical breadth, and obtain adviser approval for the checklist.
2. Any revisions to the initial checklist must be approved by the faculty adviser.
3. An updated minor checklist and planning form must be submitted to the undergraduate student services specialist before the student graduates.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN ANTHROPOLOGY

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

The University minimum requirements for the coterminal bachelor's/master's program are 180 units for the bachelor's degree plus 45 (or higher departmental requirement, as determined by each graduate department) unduplicated units for the master's degree. The requirements for the coterminal program with dual undergraduate degrees are 225 units for the two bachelor's degrees, and 45 units for the master's degree. For the 45-unit University minimum for the master's degree, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students (typically at least at the 200 level). Department requirements may be higher. Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

Graduate enrollment at Stanford University for three consecutive quarters of full tuition for at least 45 units is required of all candidates for the coterminal master's degree. M.A. students in Anthropology must take a minimum of 45 units of Anthropology course work beyond the undergraduate degree with an overall grade point average of 3.0 or higher. 45 units constitute the University minimum for the M.A. degree, and courses must be at or above the 100 level.

The M.A. program usually requires more than one year of study. However, full-time students entering the program with appropriate background should complete the M.A. degree program within three consecutive calendar quarters after the student's first quarter of master's-level enrollment. The University allows no transfer units into the master's program. To provide a meaningful master's program within one year, advance planning of course work with an adviser is required. Requirements for the coterminal master's program must be completed within three years.

For further information about the department's coterminal master's degree program requirements, see http://anthropology.stanford.edu.

ADMISSION TO THE COTERMINAL MASTER'S DEGREE PROGRAM

The deadline for graduate applications to the coterminal M.A. degree program in Anthropology is December 14, 2010. Stanford University undergraduate majors are eligible to apply for the coterminal masters degree program if they have a 3.5 GPA in their department major, a 3.0 GPA in overall course work, and have no more than one incomplete listed on the transcript at the time of application. Successful applicants to the M.A. program may enter only in the following Autumn Quarter. Coterminal master's degree applicants are not required to submit their Graduate Record Examination scores. Prospective applicants should see http://anthropology.stanford.edu for further information about the application process and the department's requirements for the coterminal master's program.

For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

Degree Options—Students may pursue one of three possible department tracks in the Anthropology M.A. degree program. The tracks are 1) Archaeology, 2) Culture and Society, or 3) Ecology and Environment. The tracks are not declarable in Axess.

MASTER OF ARTS IN ANTHROPOLOGY

University requirements for the terminal M.A. are described in the "Graduate Degrees" section of this bulletin.

The Department of Anthropology offers the terminal master's degree to the following:

1. Stanford graduate students, taking advanced degrees in other departments or schools at Stanford, who are admitted to the terminal M.A. program in Anthropology.
2. Anthropology Ph.D. students at Stanford University who fulfill the terminal M.A. requirements on the way to the Ph.D. degree.
3. Graduate applicants who apply from outside the University for admission to the terminal M.A. program in Anthropology.

Applicants whose ultimate goal is the Ph.D. degree should apply directly to the Ph.D. program. Students accepted for the terminal M.A. degree program cannot transfer to the Ph.D. program; they must reapply on the same basis as other Ph.D. applicants and

in competition with the Ph.D. applicants. Ph.D. students who decide to take the M.A. on the way to the Ph.D. are governed by separate requirements described in the department's handbook for the Ph.D. Program.

Graduate enrollment at Stanford University for three consecutive quarters of full tuition for at least 45 units is required of all candidates for the terminal master's degree. M.A. students in Anthropology must take a minimum of 45 units of Anthropology course work beyond the undergraduate degree with an overall grade point average of 3.0 or higher. 45 units constitute the University minimum for the M.A. degree, and courses must be at or above the 100 level.

The M.A. program usually requires more than one year of study. However, full-time students entering the program with appropriate background should complete the M.A. degree program within three consecutive calendar quarters after the student's first quarter of master's-level enrollment. The University allows no transfer units into the master's program. To provide a meaningful master's program within one year, advance planning of course work with an adviser is required. Requirements for the terminal master's program must be completed within three years.

For further information about the department's master's degree program requirements, see http://anthropology.stanford.edu.

ADMISSION TO THE MASTER'S DEGREE PROGRAM

The deadline for graduate applications to the M.A. degree program in Anthropology is December 14, 2010. Successful applicants to the M.A. program may enter only in the following Autumn Quarter. Master's degree applicants must file a report of their Graduate Record Examination score electronically. Prospective applicants should see http://anthropology.stanford.edu for further information about the application process and the department's requirements to the terminal master's program.

No financial support is available to students enrolled for the M.A. degree.

Degree Options—Students may pursue one of three possible department tracks in the Anthropology M.A. degree program. The tracks are 1) Archaeology, 2) Culture and Society, or 3) Ecology and Environment. The tracks are not declarable in Axess.

DEGREE REQUIREMENTS

Requirements for the coterminal and terminal master's degree program include the following:

1. A faculty adviser appointed in the Department of Anthropology.
2. A program of 45 units, taken at the 100 level or higher with a minimum grade of 'B' or higher:
   a. of the 45 units, no more than 15 units may be approved from related areas of study or overseas studies.
   b. of the 45 units, no more than 10 units of directed reading-style course work may be counted towards the degree.
   c. of the 45 units, no more than 5 units may be taken for a satisfactory/no credit grade.
3. A grade of 'B' or higher in an ANTHRO theory course from the chosen track.
4. A grade of 'B' or higher in an ANTHRO methods course from the chosen track.
5. A grade of 'B' or higher in four ANTHRO review courses from the chosen track that are listed at the 200 level or higher and taught by Anthropology faculty.
6. A self-designed course of study chosen from the Anthropology tracks listed below:
   a. Archaeology
   b. Culture and Society
   c. Ecology and Environment
7. Submission of a Graduate Research Paper Proposal approved by the faculty adviser by the end of the first quarter of the master's degree program.
8. Submission of a Master's Degree Program Proposal form approved by the faculty adviser by the end of the first quarter of the master's degree program.
9. Presentation of the master's research project at the department's master's (honors) presentation event in Spring Quarter.
10. Submission of the master's paper reviewed by two faculty members. For the Culture and Society track the thesis can be a field research or library research paper. For the Archaeology and the Ecology and Environment tracks, the thesis can also be a laboratory research paper.

Required Courses—

1. *Archaeology Track*—Four departmental review courses which must include ANTHRO 303, Introduction to Archaeology Theory, and one additional theory course. Students must also take ANTHRO 307, Archaeology Methods and Research Design.
2. *Culture and Society Track*—Four departmental review courses which must include ANTHRO 301, History of Anthropological Theory, and ANTHRO 300, Reading Theory through Ethnography. Students must also take ANTHRO 306, Anthropological Research Methods.
3. *Ecology and Environment Track*—Four departmental review courses which must include ANTHRO 302, History and Theory in Evolution and Ecology (or comparable, approved 200 level course), plus ANTHRO 305, Research Methods in Ecological Anthropology (or comparable, approved 200 level course).

Recommended Courses—For all tracks, attendance at the departmental colloquium each quarter is recommended for all master's students. Students can enroll in ANTHRO 444, Anthropology Colloquium. For the Ecology and Environment track, students may also take ANTHRO 312G, Problems in Ecology, Evolution and Environment, for one quarter, in place of attendance at one quarter of the departmental colloquium.

DOCTOR OF PHILOSOPHY IN ANTHROPOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

ADMISSION

The deadline for graduate application to the Ph.D. degree program is December 14, 2010. Prospective applicants should see http://anthropology.stanford.edu for information about application for graduate admission. Successful applicants for the Ph.D. program may enter only in Autumn Quarter. It is department policy not to defer graduate admission. Applicants must file a report of their Graduate Record Examination score electronically, submit a writing sample in English that demonstrates the ability to produce original analytical work at the graduate level, and provide a statement of purpose. In addition to a clear statement of research interests in the statement of purpose, it is especially important for applicants to provide a detailed description of the area of specialization as well as the topical interests for dissertation research. Applicants should also submit three letters of reference and recent, original transcripts.

FINANCIAL SUPPORT

The department endeavors to provide needed financial support (through fellowships, teaching and research assistantships, and tuition grants) to all students admitted to the Ph.D. program who maintain satisfactory degree progress. Applicants for the Ph.D. program must file a request for financial aid http://www.stanford.edu/dept/finaid/grad/apply/grad_loans/form.html if they wish to be considered for funding support.

First-year students who have not obtained a higher degree previous to entering the Ph.D. degree program and who have not obtained extramural funding previous to entering the Ph.D. degree program are required to submit one extramural funding application by the first day of finals week in the Autumn Quarter of the first year.

Second-year students are required to perform one teaching assistantship quarter. Second-year students who have not secured funding for the second year summer for pre-dissertation field research are advised to make at least two pre-dissertation field research or area/language studies funding applications for summer funding support in the second year.

In order to be eligible for department funding for summer field research (usually taken in either the first year and again in the third year of the Ph.D. degree program), first-year students must submit the department's Graduate Research Proposal application establishing eligibility for summer funding.

Third-year students who have not secured fourth-year field research funding are required to make at least three extramural funding applications to support dissertation research by the end of Autumn Quarter of the third year. If receiving department funding, fourth-year students must submit a department application for funding as a predoctoral research affiliate before leaving for field work and must make quarterly reports on their degree progress to their dissertation reading committee as well as a fourth-year doctoral program report of degree progress to maintain their eligibility to receive funds.

Fifth-year students are required to perform at least one quarter of teaching assistantship. Depending upon department need, fifth-year students may be asked to serve a second quarter of teaching assistantship. Fifth-year students who have not secured extramural funding for the sixth year are required to make at least two dissertation write-up funding applications to secure extramural or intramural funding for dissertation write-up in order to be eligible for consideration of a department teaching affiliateship in the sixth year.

PROGRAM

The Ph.D. program allows the student to develop a flexible program reflecting special research interests, under the supervision of a faculty committee chosen by the student. Students are encouraged to plan for completion of all work for the Ph.D. in five years.

Ph.D. students in Anthropology must complete a minimum of 135 quarter units with a minimum grade point average (GPA) of 3.0 (B). The maximum allowable number of transfer units is 45.

Degree Options—Students may pursue three different tracks in the Anthropology Ph.D. degree program. The tracks are not declarable in Axess; they do not appear on the transcript or the diploma. The three tracks are:

- Archaeology
- Culture and Society
- Ecology and Environment.

DEGREE REQUIREMENTS

For students who matriculate beginning 2010-11, the requirements for the doctoral degree program include the following:

1. For the first year in the degree program, students must submit a plan of study detailing the autumn quarter courses, signed by their faculty adviser, prior to the Autumn Quarter course enrollment deadline. At this time students confirm their chosen track from Archaeology, Culture and Society, or Ecology and Environment.
2. Within the first two years, pass with a grade of 'B+' or higher six graduate level ANTHRO subject code review courses appropriate to the student's chosen track.
3. In the first year of the program:
   a. pass with a grade of 'B+' or higher the theory course(s) appropriate for the chosen track:
      1. *Archaeology track*—ANTHRO 303, Introduction to Archaeological Theory
      2. *Culture and Society track*—ANTHRO 300, Reading Theory Through Ethnography, and ANTHRO 301, History of Anthropological Theory
      3. *Ecology and Environment track*—ANTHRO 302, History and Theory in Evolution and Ecology, or comparable, approved course at the ANTHRO 200 level.
   b. pass with a grade of 'B+' or higher at least one track-designated methods course:
      1. *Archaeology track*—ANTHRO 307, Archaeological Methods and Research Design
      2. *Culture and Society track*—ANTHRO 306, Anthropological Research Methods
      3. *Ecology and Environment track*—within the first year, pass at least one of two required methods courses:
   a. ANTHRO 304, Data Analysis for Quantitative Research
   b. ANTHRO 305, Research Methods in Ecological Anthropology
   c. *or* comparable, approved courses at the ANTHRO 200 level.
   c. complete at least 55 units overall (including 45 units of course work) by the end of Summer Quarter in the first year.
   d. satisfy the department ethics requirement for review of ethics in Anthropology by enrolling in a research methods course or by attending a specific meeting for the purpose of ethics review.
   e. enroll in ANTHRO 310G, Introduction to Graduate Studies in Anthropology, during Autumn Quarter.
   f. *Culture and Society track students only* enroll in ANTHRO 311G, Introduction to Culture and Society Graduate Studies in Anthropology, during Winter and Spring quarters for 1-2 units (no more than 5 units total over two quarters).
   g. enroll in ANTHRO 444, Anthropology Colloquium, and attend the departmental colloquia series each quarter.
   h. submit a Graduate Research Proposal to the adviser and the graduate committee on or before May 15 in Spring Quarter of the first year. Receive approval for the proposal from the adviser and the graduate committee by the first day of finals week in Spring quarter of the first year.
   i. submit at least one extramural funding application within the first year.
   j. complete the appropriate CITI tutorial and submit a non-medical human subjects protocol, based on the pre-dissertation research proposal, to the Institutional Review Board before departing for summer field research in the first year.
   k. complete the appropriate CITI tutorial for Responsible Conduct of Research on or by May 15 in Spring Quarter.
4. In the second year:
   a. as required by the chosen track, pass with a grade of 'B+' or higher: ANTHRO 308, Proposal Writing Seminar (offered Spring Quarter). For all tracks, submit the dissertation proposal to the adviser and the graduate committee by the first day of finals week in Spring quarter of the second year. Receive approval for the proposal from the adviser and the graduate committee on or by the first day of the following Summer Quarter.
   b. complete at least 40 units of course work in the second year for a total of at least 85 units of course work (95 units overall) by the end of the second year.
   c. pass with grade of 'B+' or better remaining ANTHRO subject code review courses to complete the six course requirement.
   d. *Ecology and Environment students track only*—pass the second of two required methods courses, if both were not completed in the first year:
      1. ANTHRO 304, Data Analysis for Quantitative Research
      2. ANTHRO 305, Research Methods in Ecological Anthropology
      3. *or* comparable, approved courses at the ANTHRO 200 level.
   e. at the beginning of Autumn Quarter in the second year, attend the teaching assistantship training workshop.
   f. serve as a teaching assistant for at least one quarter in the second year.

g. submit a second-year doctoral program report of degree progress on or by May 15 in Spring Quarter of the second year. Receive approval from the adviser and the graduate committee by the first day of finals week in Spring Quarter of the second year.
h. For those whose language is English, either pass a foreign language exam or petition the department's language committee for exemption from a foreign research or field language examination, based on a description of previous field or research training.
For those whose native language is not English, demonstrate satisfactory command of English, as evidenced by completion of the first two years of graduate study.
i. Upon completion of the above requirements, and upon recommendation of the Anthropology faculty, petition the University for candidacy by the end of Spring Quarter of the second year.
j. Upon completion of the above requirements, and upon recommendation of the Anthropology faculty, request the Master's degree on the way to the Ph.D. degree program by the end of Spring Quarter of the second year.

5. In the third year, complete the following:
a. by the end of finals week in Autumn Quarter in the third year, submit three dissertation research grant proposals, the grant application, and the approved non-medical human subjects protocol, to the faculty adviser.
b. by the first day of finals in the Autumn Quarter of the third year, provide a statement to the graduate committee declaring the proposed date planned for the oral examination and submit a declaration of the oral examination committee, inclusive of the external committee chair, the committee adviser, and the three committee members.
c. complete the qualifying examinations for topic and area (two separate exams to be scheduled approximately one week apart) by the last day of the second week in Spring Quarter of the third year.
d. by the last day of of the fourth week in Spring Quarter of the third year, complete the University oral examination. During this exam, file the dissertation reading committee form and confirm the committee's required revisions for the dissertation proposal to begin fieldwork and dissertation research.
e. confirm approval for the revised dissertation proposal; confirm approval of non-medical human subjects protocol status; and obtain approval if necessary before leaving for dissertation fieldwork.

6. In the fourth year, complete the following requirements:
a. submit a fourth-year Doctoral Program Report of degree progress on or by May 15 in the Spring Quarter of the fourth year.

7. In the fifth year, complete the following requirements:
a. during the fifth year and after returning from field work, complete one or more teaching assistant quarters in the department.
b. during Autumn, Winter, Spring quarters in the fifth year, students attend a minimum of four of five class meetings of ANTHRO 400, Dissertation Writers Seminar (required of Culture and Society track, recommended for students in both the Archaeology and the Ecology and Environment tracks). Each quarter, chapter drafts of the dissertations must be handed in to the dissertation reading committed for review. Eligibility for department support is based on seminar attendance as well as on San Francisco Bay Area residency (the Bay Area is defined as Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, or Sonoma counties).
c. after submission of the penultimate draft of the dissertation and before the quarter preceding the quarter in which the dissertation is to be submitted for the Ph.D. degree, students may schedule and deliver an oral presentation of the dissertation in the department.

REQUIRED COURSES

1. *Archaeology Track*—Required courses include the following:
ANTHRO 310G. Introduction to Graduate Studies in Anthropology
ANTHRO 311G. Introduction to Culture and Society Studies in Anthropology (recommended)
ANTHRO 303. Introduction to Archaeological Theory
ANTHRO 307. Archaeological Methods and Research Design
ANTHRO 308. Proposal Writing Seminar (recommended)
ANTHRO 444. Anthropology Colloquium
2. *Culture and Society Track*—Required courses include the following:
ANTHRO 310G. Introduction to Graduate Studies in Anthropology
ANTHRO 311G. Introduction to Culture and Society Studies in Anthropology
ANTHRO 301. History of Anthropological Theory
ANTHRO 300. Reading Theory through Ethnography
ANTHRO 306. Anthropological Research Methods
ANTHRO 308. Proposal Writing Seminar
ANTHRO 444. Anthropology Colloquium
3. *Ecology and Environment Track*—Required courses include the following:
ANTHRO 310G. Introduction to Graduate Studies in Anthropology
ANTHRO 302. History and Theory in Evolution and Ecology (or comparable, approved ANTHRO 200 level course)
ANTHRO 304. Data Analysis in the Anthropological Sciences (or comparable, approved ANTHRO 200 level course)
ANTHRO 305. Research Methods in Ecological Anthropology (or comparable, approved ANTHRO 200 level course)
ANTHRO 444. Anthropology Colloquium

PH.D. MINOR IN ANTHROPOLOGY

Prospective applicants should see http://anthropology.stanford.edu for further information about the application process and the department's requirements for the Ph.D. Minor in Anthropology. The requirements for a Ph.D. minor in Anthropology include the following:

1. Complete 30 units of ANTHRO subject code courses at the 300 level with a grade of 3.0 ('B') or higher. Course work for a minor cannot also be used to meet requirements for a master's degree.
2. Enlist a faculty member within the Department of Anthropology who will provide written consent to serve as the adviser for the minor and serve on the student's oral examination and dissertation.
3. In conjunction with the program adviser, determine a coherent course of study related to the Ph.D. degree program.
4. Pass with a grade of 'B+' or higher three ANTHRO theory courses, and one ANTHRO course in a geographical or theoretical area.

OVERSEAS STUDIES COURSES IN ANTHROPOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

SANTIAGO

OSPSANTG 104X. Modernization and Culture in Latin America. 5 units, Bernardo Subercaseaux, GER:DB:SocSci, EC:GlobalCom

SPRING QUARTER

CAPE TOWN

OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers. 5 units, John Parkington

KYOTO

OSPKYOTO 47. Introduction to Japanese Anthropology. 5 units, Miyako Inoue

OSPKYOTO 48. City and Sounds in Kyoto. 5 units, Miyako Inoue

APPLIED PHYSICS

Emeriti: (Professors) Malcolm R. Beasley, Arthur Bienenstock, Steven Chu, Alexander L. Fetter, Theodore H. Geballe, Stephen E. Harris, Walter A. Harrison, Peter A. Sturrock; (*Professors, Research*) Calvin F. Quate, Helmut Wiedemann, Herman Winick; (*Courtesy*) Gordon S. Kino

Chair: Hideo Mabuchi

Professors: Steven M. Block, Philip H. Bucksbaum, Robert L. Byer, Sebastian Doniach, Martin M. Fejer, Daniel S. Fisher, Harold Y. Hwang, Aharon Kapitulnik, Mark A. Kasevich, Hideo Mabuchi, Vahé Petrosian, Zhi-Xun Shen, Yoshihisa Yamamoto

Associate Professors: Ian R. Fisher, Kathryn A. Moler, David A. Reis, Mark J. Schnitzer

Professor (Research): Michel J-F. Digonnet

Lecturer: Tobias Beetz

Visiting Professor: Assa Auerbach

Courtesy Professors: Bruce M. Clemens, James S. Harris, Lambertus Hesselink, David A. B. Miller, W. E. Moerner, Douglas D. Osheroff, Stephen R. Quake, Shoucheng Zhang

Consulting Professors: Thomas M. Baer, Raymond G. Beausoleil, Richard G. Brewer, John D. Fox, Bernardo A. Huberman, John R. Kirtley, Richard M. Martin, Stuart S. P. Parkin, Daniel Rugar

Department Office: 348 Via Pueblo Mall - Applied Physics Room 116

Mail Code: 94305-4090

Phone: (650) 723-4027

Web Site: http://appliedphysics.stanford.edu

Courses offered by the Department of Applied Physics are listed under the subject code APPPHYS on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Applied Physics offers qualified students with backgrounds in physics or engineering the opportunity to do graduate course work and research in the physics relevant to technical applications and natural phenomena. These areas include accelerator physics, biophysics, condensed matter physics, nanostructured materials, quantum electronics and photonics, quantum optics and quantum information, space science and astrophysics, synchrotron radiation and applications. Student research is supervised by the faculty members listed above and also by various members of other departments such as Biology, Chemistry, Electrical Engineering, Materials Science and Engineering, Physics, the SLAC National Accelerator Laboratory, and faculty of the Medical School who are engaged in related research fields. Research activities are carried out in laboratories including the Geballe Laboratory for Advanced Materials, the Edward L. Ginzton Laboratory, the Hansen Experimental Physics Laboratory, the SLAC National Accelerator Laboratory, the Center for Probing the Nanoscale, and the Stanford Institute for Materials and Energy Science.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by January 4, 2011. Graduate students normally enter the department only in Autumn Quarter.

GRADUATE PROGRAMS IN APPLIED PHYSICS

Admission requirements for graduate work in Applied Physics include a bachelor's degree in Physics or an equivalent engineering degree. Students entering the program from an engineering curriculum should expect to spend at least an additional quarter of study acquiring the background to meet the requirements for advanced degrees in Applied Physics.

MASTER OF SCIENCE IN APPLIED PHYSICS

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. The minimum requirements for the degree are 45 units, of which at least 39 units must be graduate-level courses in applied physics, engineering, mathematics, and physics. The required program consists of the following:

1. Courses in Physics and Mathematics to overcome deficiencies, if any, in undergraduate preparation.
2. Basic graduate courses (letter grade required):
   a. *Advanced Mechanics*—one quarter, 3 units: PHYSICS 210, *or* approved substitute 211
   b. *Electrodynamics*—two quarters, 6 units: PHYSICS 220, 221
   c. *Quantum Mechanics*—two quarters, 6 units: PHYSICS 230, 231, *or* approved substitutes 232, 330, 331, 332, 370
3. 30 units of additional advanced courses in science and/or engineering. 15 of the 30 units may be any combination of advanced courses, Directed Study (APPPHYS 290), and 1-unit seminar courses, to complete the requirement of 45 units. Examples of suitable courses include BIO 217; EE 222, 223, 231, 232, 248, 268, 346; PHYSICS 372, 373. At least 15 of these 30 units must be taken for a letter grade.
4. A final overall grade point average (GPA) of 3.0 (B) is required for courses used to fulfill degree requirements.

There are no department or University examinations, and a thesis is not required. If a student is admitted to the M.S. program only, but later wishes to change to the Ph.D. program, the student must apply to the department's admissions committee.

DOCTOR OF PHILOSOPHY IN APPLIED PHYSICS

The University's basic requirements for the Ph.D. including residency, dissertation, and examinations are discussed in the "Graduate Degrees" section of this bulletin. The program leading to a Ph.D. in Applied Physics consists of course work, research, qualifying for Ph.D. candidacy, a research progress report, a University oral examination, and a dissertation as follows:

1. Course Work:
   a. Courses in Physics and Mathematics to overcome deficiencies, if any, in undergraduate preparation.
   b. Basic graduate courses* (letter grades required):
      1. *Advanced Mechanics*—one quarter: PHYSICS 210, *or* approved substitute 211
      1. *Statistical Physics*—one quarter: PHYSICS 212
      2. *Electrodynamics*—two quarters: PHYSICS 220, 221
      3. *Quantum Mechanics*—two quarters: PHYSICS 230, 231, *or* approved substitutes 232, 330, 331, 332, 370
      4. *Laboratory*—one quarter: APPPHYS 207, 208, 232, 304, 305; EE 234, 410; MATSCI 171, 172, 173; PHYSICS 301.
   c. 18 units of additional advanced courses in science and/or engineering, not including Directed Study (APPPHYS 290), Dissertation Research (APPPHYS 390), and 1-unit seminar courses. Examples of suitable courses include BIO 217; EE 222, 223, 231, 232, 248, 268, 346; PHYSICS 372, 373. Only 3 units at the 300 or above level may be taken on a satisfactory/no credit basis.

   d. 96 units of additional courses to meet the minimum residency requirement of 135. Directed study and research units as well as 1-unit seminar courses can be included.
   e. A final average overall grade point average (GPA) of 3.0 (B) is required for courses used to fulfill degree requirements.
   f. Students are normally expected to complete the specified course requirements by the end of their third year of graduate study.
2. *Research:* may be conducted in a science/engineering field under the supervision of a member of the Applied Physics faculty or appropriate faculty from other departments.
3. *Ph.D. Candidacy:* satisfactory progress in academic and research work, together with passing the Ph.D. candidacy qualifying examination, qualifies the student to apply for Ph.D. candidacy, and must be completed before the third year of graduate registration. The examination consists of a seminar on a suitable subject delivered by the student before the faculty academic adviser (or an approved substitute) and two other members of the faculty selected by the department.
4. *Research Progress Report:* normally before the end of the Winter Quarter of the fourth year of enrollment in graduate study at Stanford, the student arranges to give an oral research progress report of approximately 45 minutes, of which a minimum of 15 minutes should be devoted to questions from the Ph.D. reading committee.
5. *University Ph.D. Oral Examination*: consists of a public seminar in defense of the dissertation, followed by private questioning of the candidate by the University examining committee.
6. *Dissertation:* must be approved and signed by the Ph.D. reading committee.

* Requirements for item '1b' may be totally or partly satisfied with equivalent courses taken elsewhere, pending the approval of the graduate study committee.

ARCHAEOLOGY

Director: Lynn Meskell (Anthropology)
Professors: Ian Hodder (Anthropology), Richard Klein (Anthropology), Mark Lewis (History, Asian Languages), Li Liu (East Asian Languages and Cultures), Mike Moldowan (Geological and Environmental Sciences), Gail Mahood (Geological and Environmental Sciences), Ian Morris (Classics, History), Amos Nur (Geophysics), Michael Shanks (Classics), Peter Vitousek (Biology)
Associate Professors: Rebecca Bird (Anthropology), Jody Maxmin (Art and Art History, Classics), John Rick (Anthropology), Jennifer Trimble (Classics), Barb Voss (Anthropology)
Assistant Professors: Doug Bird (Anthropology), Giovanna Ceserani (Classics), Ian Robertson (Anthropology), Michael Wilcox (Anthropology)
Lecturers: Nigel Crook, James Truncer
Post Doctoral Fellows: Melissa Chatfield
Teaching Affiliates: Ignacio Cancino, Joshua Samuels, Bryn Williams
Associated Staff: Laura Jones (Campus Archaeologist), Lisa Newble (Collections Manager), Tom Seligman (Cantor Arts Center)
Fellow: Bill Rathje (on leave)
Program Offices: Building 500
Mail Code: 94305-2170
Program Phone: (650) 723-5731
Web Site: http://archaeology.stanford.edu

Courses offered by the Archaeology Program are listed under the subject code ARCHLGY on the *Stanford Bulletin's* ExploreCourses web site.

Archaeology is the study of the past through its material remains that survive into the present. Archaeology is a discipline that offers direct access to the experiences of a wide range of people in numerous cultures across the globe. Increasingly, archaeology bridges past and present societies through the study of the human heritage and its role in contemporary societies. Stanford's Archaeology Program provides students with an interdisciplinary approach to the material remains of past societies, drawing in equal parts on the humanities, social sciences, and natural sciences.

The Archaeology curriculum draws on faculty from a wide range of University departments and schools. To complete the requirements for the major, students must take courses from the offerings of the program and from the listings of other University departments. The program culminates in a B.A. in Archaeology.

MISSION OF THE UNDERGRADUATE PROGRAM IN ARCHAEOLOGY

The mission of the undergraduate program in Archaeology is to provide students with a broad and rigorous introduction to the analysis of the material culture of past societies, drawing on the questions and methods of the humanities, social sciences, and natural sciences. Students in the major learn to relate these analyses to the practice of archaeology in the contemporary world. The program seeks to help each student achieve a high level of understanding through concentrated study of a particular research area. Courses in the major complete a comprehensive curriculum that draws on faculty from a wide range of University departments and programs. Archaeology majors are well prepared for advanced training in professional schools such as education, law, and journalism and, depending upon their choice of upper-division course, graduate programs in the humanities, social sciences, and natural sciences.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of the material culture of past societies, drawing on the questions and methods of the humanities, social sciences, and natural sciences.
2. an ability to relate this analysis and understanding to the practice of archaeology in the contemporary world.
3. a high level of understanding in a particular research area.

BACHELOR OF ARTS IN ARCHAEOLOGY

To declare a major in Archaeology, students should contact the student services specialist at (650) 721-1361, who provides an application form, answers initial questions, and helps the student choose a faculty adviser and area of concentration. All majors must complete 65 units, which must form a coherent program of study and be approved by the student's faculty adviser and the program director.

Students who plan to pursue graduate work in Archaeology should be aware of the admission requirements of the particular departments to which they intend to apply. These vary greatly. Early planning is advisable to guarantee completion of major and graduate school requirements.

REQUIREMENTS

The B.A. in Archaeology requires a minimum of 65 units in the major, divided among five components:

1. *Core Courses (20 units)—*
   a. Gateway: ARCHLGY 1, Introduction to Prehistoric Archaeology (5 units)
   b. Intermediate: ARCHLGY 102, Archaeological Methods and Research Design (5 units)
   c. Intermediate: ARCHLGY 103, History of Archaeological Thought (5 units; Writing in the Major)
   d. Capstone: ARCHLGY 107A, Archaeology as a Profession (5 units)

   ARCHLGY 1 is recommended as a first course, and many upper-level courses in Archaeology require this course as a

prerequisite. Students should normally take the capstone course in their final year of course work in the major.

2. *Analytical Methods and Computing* (at least 3-5 units)—Quantitative skills and computing ability are indispensable to archaeologists. It is recommended that students take ANTHRO 98B, General Methods in Archaeology. Other courses that may be used to satisfy this requirement are PSYCH 10/STATS 60, ECON 102A, and EESS 161.
3. *Archaeological Skills (at least 10 units)*—Archaeological skills include archaeological formation processes, botanical analysis, cartography, ceramic analysis, dating methods, faunal analysis, geographic information systems, geology, geophysics, genetics, osteology, remote sensing, soil chemistry, and statistics. With the approval of the instructor and Archaeology director, undergraduates may fulfill part of this requirement from graduate-level courses (typically courses with catalog numbers of 200 or higher).
   - ARCHLGY 106. Museums and Collections, 5 units
   - ARCHLGY 112. Roman Archaeology and Heritage, 5 units
   - ARCHLGY 125. Archaeological Survey Methods, 5 units
   - ANTHRO 91A. Archaeological Methods and Research Design, 5 units
   - ANTHRO 98B. Digital Methods in Archaeology, 5 units
   - ANTHRO 113. Faunal Analysis, 5 units
   - ANTHRO 115. Introduction to Archaeological Geophysical Prospection, 5 units
   - ANTHRO 214. Prehistoric Stone Tools, 5 units
   - CLASSART 114. Ceramics: Art and Science, 5 units
   - GES 1A. Fundamentals of Geology, 5 units
   - GES 49N. Field Trip to Death Valley and Owens Valley, 5 units
   - GES 102. Earth Materials, 5 units
   - EESS 164. Fundamentals of Geographic Information Science, 5 units
   - EESS 161. Statistical Methods for Earth and Environmental Sciences, 5 units
4. *Theory* (at least 10 units)—Topics include archaeological, art-historical, sociocultural, historical, and material culture theory. With the approval of the instructor, undergraduates may fulfill part of this requirement from graduate-level courses (typically courses with catalog numbers of 200 or higher).
   - ARCHLGY 137. Ethnographic Archaeologies
   - ANTHRO 135H. Race, Gender and Class at Stanford, 5 units
   - ANTHRO 90B. Theory of Social and Cultural Anthropology, 5 units
   - CLASS ART 113. Ten Things: An Archaeology of Design, 5 units
   - ANTHRO 103. The Archaeology of Modern Urbanism, 5 units
   - ANTHRO 134. Object Lessons, 5 units
   - ANTHRO 121. Language and Prehistory, 5 units
1. *Area of Concentration (at least 20 units)*—In consultation with their faculty advisers, students choose an area of concentration in archaeological research. Concentrations can be defined in terms of time and space such as small-scale societies or the archaeology of complex societies, or in terms of research problems such as new world archaeology or Mediterranean archaeology. An area of concentration should provide both breadth and depth in a specific research area. Courses should be chosen from the list below. Courses other than those on this list can be used to fulfill this requirement with the prior approval of the student's faculty adviser and the program director. With the approval of the instructor, undergraduates may fulfill part of this requirement from graduate-level courses, typically courses numbered 200 or higher. However, each course may only count toward one component of the program. Students are encouraged to design their own area of concentration, with the prior approval of the student's faculty adviser and the program director.
   a. Small Scale Societies—
      - ANTHRO 16. Native Americans in the 21st Century, 5 units
      - ANTHRO 22. Archaeology of North America, 5 units
   b. *Archaeology of Complex Societies*—
      - ARCHLGY 111. Emergence of Chinese Civilizations from Caves to Palaces, 5 units
      - ARCHLGY 112. Roman Archaeology and Heritage, 5 units
      - ARCHLGY 201. Art & Archaeology of Korea
      - ANTHRO 100C. Chavin de Huantar Research Seminar, 5 units
      - ANTHRO 106. Incas and Their Ancestors, 5 units
      - ARTHIST 203. Greek Art In and Out of Context, 5 units
      - ARTHIST 204A. Appropriations of Greek Art, 5 units
      - CLASSART 21Q. Eight Great Archaeological Sites in Europe, 5 units
      - CLASSART 101. Archaic Greek Art , 5 units
      - CLASSART 112. Ancient Urbanism, 5 units
      - CLASSGEN 123. Urban Sustainability: Long Term Archaeological Perspectives, 5 units
      - CLASSHIST 135A. Ancient War, 5 units
   c. *Mediterranean Archaeology*—
      - ARTHIST 203. Greek Art In and Out of Context, 5 units
      - ARTHIST 204A. Appropriations of Greek Art, 5 units
      - CLASSART 101. Archaic Greek Art, 5 units
      - CLASSART 142. The Archaeology of Roman Slavery, 5 units
   d. *New World Archaeologyy*—
      - ANTHRO 200C. Chavin de Huantar Research Seminar, 5 units
      - ANTHRO 16. Native Americans in the 21st Century, 5 units
      - ANTHRO 106. Incas and Their Ancestors, 5 units
      - ANTHRO 22. Archaeology of North America, 5 units
   e. *Heritage*-
      - ANTHRO 134. Object Lessons
      - ANTHRO 16. Native American's in the 21st Century
      - ARCHLGY 112. Roman Archaeology and Heritage
   f. *Urbanism & Cities*-
      - ANTHRO 100A. India's Forgotten Empire
      - ANTHRO 205. Ancient Cities in the New World
      - CLASSART 21Q. Eight Great Archaeological Sites
      - CLASSSGEN 123. Urban Sustainability
2. *Archaeological Fieldwork*—Students may meet this requirement in two ways:
   a. Taking part in a month-long field project directed by a Stanford faculty member, and taking a directed reading during the returning academic year for credit. In 2010, field projects were underway in Peru, New Mexico, England, Jordan, and Turkey.
   b. Completing a field school offered by another institution. Such field schools must be approved in advance by the student's undergraduate adviser and by the director of the Archaeology Center.
3. *Collateral Language Requirement*—All Archaeology majors must demonstrate competence in a foreign language beyond the first-year level. Students can meet this requirement by completing a course beyond the first-year level with a grade of 'B' or better, and are encouraged to choose a language that has relevance to their archaeological region or topic of interest. Students may petition to take an introductory-level course in a second language to fulfill this requirement by demonstrating the connection between the language(s) and their research interest(s).

HONORS PROGRAM

The honors program in Archaeology gives qualified majors the chance to work closely with faculty on an individual research pro-

ject culminating in an honors thesis. Students may begin honors research from a number of starting points, including topics introduced in the core or upper-division courses, independent interests, research on artifacts in Stanford's collections, or fieldwork experiences.

Interested Archaeology majors of junior standing may apply for admission by submitting an honors application form, including a 4-5 page statement of the project, a transcript, and a letter of recommendation from the faculty member supervising the honors thesis to the student services specialist, no later than the end of the fourth week of the Spring Quarter. Archaeology majors are eligible to apply for honors candidacy. The thesis is due in early May of the senior year and is read by the candidates advisor and a second reader appointed ny the undergraduate committee.

COGNATE COURSES

Students are advised to meet with their adviser about degree requirements and the applicability of these courses to a major or minor program.

ANTHRO 1. Introduction to Cultural and Social Anthropology
ANTHRO 3. Introduction to Prehistoric Archaeology
ANTHRO 4. Language and Culture
ANTHRO 15. Sex and Gender
ANTHRO 22. Archaeology of North America
ANTHRO 22N. Ethnographies of North America
ANTHRO 90C. Introduction to Theory in Ecological and Environmental Anthropology
ANTHRO 98B. Digital Methods in Archaeology
ANTHRO 100A. India's Forgotten Empire: The Rise and Fall of Indus Civilization
ANTHRO 100C. Chavin de Huantar Research Seminar
ANTHRO 102A. Ancient Civilizations: Complexity and Collapse
ANTHRO 103. Archaeology of Modern Urbanism
ANTHRO 106. Incas and Their Ancestors
ANTHRO 113. Faunal Analysis
ANTHRO 115A. Environmental Crisis and State Collapse
ANTHRO 116. Quantitative Analysis in Archaeological and Anthropological Research
ANTHRO 118. Heritage, Environment and Sovereignty in Hawaii
ANTHRO 134. Object Lessons
ANTHRO 135H. CSRE House Seminar: Race, Gender, and Class at Stanford
ARTHIST 101. Archaic Greek Art (same as CLASSART 101)
ARTHIST 203. Greek Art in and out of Context (same as CLASSART 109)
ARTHIST 204A. Appropriations of Greek Art (same as CLASSART 110)
CLASSART 21Q. Eight Great Archaeological Sites in Europe
CLASSART 42. Pompeii
CLASSART 112. Ancient Urbanism
CLASSART 113. Ten Things: Science, Technology, and Design (same as STS 112)
CLASSART 114. Ceramics: Art and Science
CLASSART 142. The Archaeology of Roman Slavery
CLASSGEN 119. Gender and Power in Ancient Rome
CLASSGEN 123. Urban Sustainability: Long-Term Archaeological Perspectives
CLASSHIST 235B. Ancient War
ECON 102A. Introduction to Statistical Methods (Postcalculus) for Social Scientists
EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction
EESS 164. Fundamentals of Geographic Information Science (GIS) (same as EARTHSYS 144)
EE 140. The Earth From Space: Introduction to Remote Sensing (same as GEOPHYS 140)
GEOPHYS 190. Introduction to Geophysical Field Methods
GES 1. Dynamic Earth: Fundamentals of Earth Science
GES 49N. Field Trip to Death Valley and Owens Valley
GES 102. Earth Materials
STATS 60. Introduction to Statistical Methods: Precalculus (same as PSYCH 10)
URBANST 115. Urban Sustainability: Long-Term Archaeological Perspectives

MINOR IN ARCHAEOLOGY

A minor in Archaeology provides an introduction to the study of the material cultures of past societies. It can complement many majors, including but not limited to Anthropology, Applied Physics, Art and Art History, Classics, Earth Systems, Geological and Environmental Sciences, History, and Religious Studies.

Students must complete the declaration process, including the planning form submission and Axess registration, by the last day of the quarter, two quarters prior to degree conferral; for example, by the last day of Autumn Quarter if Spring graduation is the intended quarter of graduation.

To minor in Archaeology, the student must complete at least 27 units of relevant course work, including:

1. *Core Program (10 units)*—
   a. Gateway Course: ARCHLGY 1. Introduction to Prehistoric Archaeology (5 units)
   b. Capstone Course: ARCHLGY 103. History of Archaeological Thought (5 units)

   ARCHLGY 1 is recommended as a first course, and many of the upper-level courses in Archaeology require this course as a prerequisite. Students should normally take the capstone course in their final year of course work in the minor.
2. *Archaeological Skills* (2-5 units)—
   Archaeological skills include dating methods, faunal analysis, botanical analysis, ceramic analysis, geology, geophysics, soil chemistry, remote sensing, osteology, genetics, statistics, cartography, and geographic information systems. The course(s) must be chosen from the list of courses under Archaeological Skills (requirement 3) in the "Bachelor of Arts in Archaeology" section of this bulletin.
3. *Theory (5 units)*—
   Topics include archaeological, art historical, sociocultural, historical, and material culture theory. The course(s) must be chosen from the list of courses under Theory (requirement 4) in the "Bachelor of Arts in Archaeology" section of this bulletin.
4. *Area of Concentration* (10 units)—
   In consultation with their faculty advisers, students choose an area of concentration in archaeological research. Concentrations can be defined in terms of time and space such as small-scale societies or the archaeology of complex societies, or in terms of research problems such as new world archaeology or Mediterranean archaeology. An area of concentration should provide both breadth and depth in a specific research area.
   Courses must be chosen from the lists of courses under Area of Concentration (requirement 5) in the "Bachelor of Arts in Archaeology" section of this bulletin. Students are encouraged to design their own area of concentration, with the prior approval of both the student's faculty adviser and the program director.

OVERSEAS STUDIES COURSES IN ARCHAEOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

AUSTRALIA

OSPAUSTL 40. Australian Studies. 3 units, Bill Casey, Ian Lilley, GER:DB:SocSci, EC:GlobalCom

WINTER QUARTER

CAPETOWN

OSPCPTWN 65. Western Cape Sites of Memory. 3-5 units, Grant Parker, GER:EC:GlobalCom

SPRING QUARTER

CAPETOWN

OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers. 5 units, John Parkington

ART AND ART HISTORY

Emeriti: (Professors) Keith Boyle, Kristina Branch, Wanda M. Corn, Elliot Eisner, David Hannah, Matthew S. Kahn, Suzanne Lewis, Frank Lobdell, Dwight C. Miller, Nathan Oliveira, Richard Randell, Michael Sullivan, Paul V. Turner

Chair: Nancy Troy

Area Director for Art History: Nancy Troy

Area Director for Film and Media Studies: Kristine Samuelson

Area Director for Art Practice: Joel Leivick

Director of Undergraduate Studies in Art History: Jody Maxmin

Director of Undergraduate Studies in Art Practice: Terry Berlier

Director of Undergraduate Studies in Film and Media Studies: Scott Bukatman

Director of Graduate Studies in Art History: Bissera Pencheva

Director of Graduate Studies in Art Practice: Paul DeMarinis

Director of Graduate Studies in Documentary Film: Jan Krawitz

Professors: Enrique Chagoya (Painting/Drawing/Printmaking), Paul DeMarinis (Electronic Media), Jan Krawitz (Documentary Film), Pamela M. Lee (Contemporary Art, on leave), Michael Marrinan (18th- and 19th-century European Art, on leave Winter, Spring), Kristine Samuelson (Documentary Film), Melinda Takeuchi (Japanese Art), Richard Vinograd (Chinese Art), Bryan Wolf (American Art), Xiaoze Xie (Painting/Drawing)

Associate Professors: Scott Bukatman (Film Studies), Jody Maxmin (Ancient Art), Bissera Pentcheva (Medieval Art), Gail Wight (Electronic Media)

Assistant Professors: Terry Berlier (Sculpture), Morten Steen Hansen (Renaissance Art), Pavle Levi (Film Studies), Jean Ma (Film Studies, on leave), Barbaro Martinez-Ruiz (African Art), Jamie Meltzer (Documentary Film)

Professor (Teaching): Joel Leivick (Photography)

Lecturers: Kevin Bean (Drawing/Painting), Robert Dawson (Photography), John Edmark (Design), Brendan Fay (History of Photography), Lukas Felzmann (Photography), Julie Russo (Media Studies), Adam Tobin (Screenwriting)

Affiliated Professor: John H. Merryman (Law, emeritus)

Department Offices: Room 101, Cummings Art Building

Mail Code: 94305-2018

Phone: (650) 723-3404

Web Site: http://art.stanford.edu

Courses offered by the Department of Art & Art History are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes ARTHIST (Art History), ARTSTUDI (Art Practice), FILMSTUD (Film Studies), and FILMPROD (Film Practice).

MISSION OF THE DEPARTMENT OF ART AND ART HISTORY

The department offers courses of study in: (1) the history of art, (2) the practice of art (studio), and (3) film and media studies, leading to the following degrees: B.A. degree in Art History; B.A. degree in Art Practice; B.A. degree in Film and Media Studies; M.F.A. degree in Art Practice; M.F.A. degree in Design; M.F.A. degree in Documentary Film and Video; Ph.D. degree in Art History.

The undergraduate program is designed to help students think critically about the visual arts and visual culture. Courses focus on the meaning of images and media, and their historical development, roles in society, and relationships to disciplines such as literature, music, and philosophy. Work performed in the classroom, studio, and screening room is designed to develop a student's powers of perception, capacity for visual analysis, and knowledge of technical processes.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. knowledge and awareness of art terminology and concepts.
2. ability to develop effective and nuanced lines of interpretation.
3. improved critical thinking skills using primary and secondary source materials.
4. improvement in analytical writing skills and close reading skills.
5. ability to form and validate their own and others' opinions through knowledge of artistic movements and sociohistorical events.

IRIS AND B. GERALD CANTOR CENTER FOR VISUAL ARTS

The Iris and B. Gerald Cantor Center for Visual Arts at Stanford University is a major resource for the department. The center offers a 22,000-object collection on view in rotating installations in 18 galleries, the Rodin Sculpture Garden, and special exhibitions, educational programs, and events. Through collaborations with the teaching program, student internships, and student activities, the Center provides a rich resource for Stanford students.

ART HISTORY

UNDERGRADUATE PROGRAMS IN ART HISTORY

The discipline of Art History teaches students how to analyze and interpret works of fine art (paintings, drawings, prints, and sculpture), photography and moving image media (film, video, television, and digital art), material culture (ritual objects, fashion, advertisements, and the decorative, applied, and industrial arts), and the built environment (architecture, urbanism, and design). The department takes it as axiomatic that the skills of visual literacy and analysis are not innate but may be acquired through training and practice. Objects of study are drawn from the cultures of Africa, Asia, the Americas, from the Middle East; from Western, Central, and Eastern Europe; and from antiquity to the present.

Art History is a historical discipline that seeks to reintegrate the work of art into the original context of its making and reception, foregrounding its significant status as both historical document and act of social communication. At the same time, Art History seeks to understand the ways in which the work of art transcends the historical moment of its production, taking on different meanings in later historical periods, including the present. As part of their visual training, students of Art History become proficient in cultural analysis and historical interpretation. Art History thus envisions itself as uniquely well positioned to train students from a variety of disciplines in the light of the dramatic visual turn that has gripped the humanities and the sciences over the course of the last decade, with more and more disciplines becoming vitally interested in visual forms and modes of communication.

GRADUATE PROGRAMS IN ART HISTORY

The doctoral program in Art History at Stanford is relatively small, and affords the graduate student the opportunity to work intensively with individual members of the faculty. The Doctor of Philosophy degree is taken in a particular field, supported by a background in the general history of art. Doctoral candidates also

undertake collateral studies in other graduate departments or in one of the University's interdisciplinary programs.

BACHELOR OF ARTS IN ART HISTORY

SUGGESTED PREPARATION FOR THE MAJOR

Students considering a major in art history should take ARTHIST 1, Introduction to the Visual Arts (WIM course), during their freshman or sophomore year.

FIELDS OF STUDY OR DEGREE OPTIONS

Students who wish to major in Art History declare the Art History major on Axess. Concentrations within the major are approved by the faculty adviser and are not declared on Axess. Sample concentrations include:

1. Topical concentrations: art and gender; art, politics, race, and ethnicity; art, science, and technology; urban studies
2. Genre concentrations: architecture; painting; sculpture; film studies; prints and media; decorative arts and material culture
3. Historical and national concentrations: ancient and medieval; Renaissance and early modern; modern and contemporary; America; Africa; Asia; the Americas
4. Interdisciplinary concentrations: art and literature; art and history; art and religion; art and economics; art and medicine (with adviser consent a maximum of two concentration courses may be taken outside the department).

DEGREE REQUIREMENTS

All undergraduate majors complete a minimum of 61 units (14 courses of 4-5 units each). Students are required to complete two foundation courses (including ARTHIST 1), five Art History distribution courses, five concentration courses, one studio course, and the junior seminar. Courses must be taken for a letter grade. To declare the major, students must meet with the undergraduate coordinator. At that time the student selects a faculty adviser. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

Required Courses—

1. Foundation Courses (10 units):
   a. ARTHIST 1. Introduction to the Visual Arts (WIM course)
   b. One other course from ARTHIST 2, ARTHIST 3, FILMSTUD 4
2. Distribution Courses (20 units): In order that students acquire a broad overview of different historical periods and different geographic regions, majors must take five Art History lecture courses, one from each of the following five categories:
   a. Ancient and medieval: ARTHIST 101, 102, 105, 106, 106A, 107, 108, 204A
   b. Renaissance and early modern: ARTHIST 111, 114, 116, 117, 118, 120, 121, 122, 124, 126, 132, 133
   c. Modern, contemporary, and the U.S.: ARTHIST 142, 145, 147, 149, 155, 158A, 159B, 162A, 173, 176, 182
   d. Asia, Africa, and the Americas: ARTHIST 182, 184, 185, 185B, 187, 188A, 190, 194, 196
   e. Film studies: FILMSTUD 100A, 100B, 100C, 101, 102, 111, 112, 113, 115, 116, 120B, 130, 131, 132, 137, 141, 150, 156, 167
3. Area of Concentration (22 units): The department encourages students to pursue their interests by designing an area of concentration tailored to their own intellectual concerns. This area of concentration provides the student with an in-depth understanding of a coherent topic in Art History. It must consist of five Art History courses: two must be seminars or colloquia; four of the five courses must be in a single field or concentration constructed by the student in consultation with their faculty adviser. Students must submit an area of concentration form, signed by their faculty adviser, during Winter Quarter of their junior year.
4. Capstone Seminar (5 units): ARTHIST 296, Junior Seminar: Methods and Historiography of Art History. This course is designed to introduce majors to methods and theories underlying the practice of Art History. The seminar is offered annually, typically during Autumn Quarter.
5. Studio Course (4 units): Majors are required to complete at least one introductory Studio Art course.

HONORS PROGRAM

The purpose of the honors thesis is to extend and deepen work done in an Art History class; the topic should have focus and clear parameters. Typically an honors thesis is not an exploration of a new area that the student has never studied before. The minimum requirement for admission to the honors program is an overall GPA of 3.7, and at least 3.7 in Art History courses. Students must complete at least five Art History courses at Stanford by the end of their junior year; four must be completed by the end of winter quarter. Students interested in the honors program should consult their potential adviser by the beginning of junior year. Thesis advisers must be in residence during fall quarter senior year, and it is highly recommended that they are in residence during the rest of senior year. Students wishing to write an honors thesis must announce their intention by submitting an intent form signed by their thesis adviser (who need not be the student's academic adviser) by February 1 of their junior year.

Candidates for the honors program must submit to the Art History faculty a five-page thesis proposal, including bibliography and illustrations, and one completed paper that demonstrates the student's ability to conceptualize and write about issues. The complete proposal must be submitted to the department's undergraduate coordinator no later than the third week of Spring Quarter of the candidate's junior year so it can be read, discussed, and voted upon at the faculty's regular meeting in early May. A candidate is accepted into the honors program by a simple majority.

Once admitted to the honors program, students work with their thesis advisers to define the scope of study, establish a research and writing timetable, and enlist one other faculty member to serve on the thesis reading committee. The summer between junior and senior years is usually devoted to refining the topic and pursuing any off-campus research. Students may apply for UAR research grants to help finance trips or expenses related to preparing the research for their honors thesis.

During their senior year, students must register for 10 units of ARTHIST 297, Honors Thesis Writing, 5 units of which may count towards the student's concentration in Art History. Students are required to register for two to five units each quarter during their senior year, for a total of ten units. To aid the process of research and writing, students preparing an honors thesis are paired with a graduate student mentor. Students must contact the graduate student mentor in their junior year as soon as they begin to think about writing an honors thesis. Through regular meetings, mentors guide students through the proposal process and the research and writing year.

Students and thesis advisers should plan their work so that a complete, final manuscript is in the hands of each member of the student's reading committee by the beginning of the seventh week of the student's final quarter at Stanford (one year from proposal to final manuscript). The thesis adviser assigns a letter grade; both faculty readers must approve the thesis for honors before the student is qualified to graduate with honors.

Required Courses—

- ARTHIST 297. Honors Thesis Writing

MINOR IN ART HISTORY

A student declaring a minor in Art History must complete 25 units of course work in one of the following four tracks: Open, Modern, Asian, or Architecture. Upon declaring the minor, students are assigned an adviser with whom they plan their course of study and electives. A proposed course of study must be approved by the adviser and placed in the student's departmental file. Only one class may be taken for credit outside of the Stanford campus;

this includes courses taken in the Overseas Studies Program. Minors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the minor declaration.

Requirements—A student with a minor in Art History must complete six Art History courses for a total of 25 units.

1. *Open Track*—ARTHIST 1 plus five Art History lecture courses, colloquia, or seminars in any field.
2. *Modern Track*—ARTHIST 1 plus five Art History lecture courses, colloquia, or seminars in any aspect of 19th- to 20th-century art.
3. *Asian Track*—ARTHIST 2 plus five Art History lecture courses, colloquia, or seminars in Asian Art (ARTHIST 1 may be one of the five courses).
4. *Architecture Track*—ARTHIST 3 plus five Art History lecture courses, colloquia, or seminars in architectural history (ARTHIST 1 may be one of the five courses).

MASTER OF ARTS IN ART HISTORY

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

ADMISSION

The department offers M.A. and Ph.D. degrees, although the M.A. is only granted as a step toward fulfilling requirements for the Ph.D. The department does not admit students who wish to work only toward the M.A. degree. Please see the Ph.D. section for admissions information.

DEGREE REQUIREMENTS

1. *Units*—completing a total of at least 45 units of graduate work at Stanford in the history of art in courses at the 200 level and above, including a seminar in art historiography/visual theory.
2. *Languages*—reading knowledge of two foreign languages, preferably German and French or Italian. Students in Chinese and Japanese art are ordinarily expected to demonstrate reading competence in modern and classical Chinese or Japanese, depending on the student's area of focus. Final determination is made in consultation with the student's primary adviser.
3. *Papers*—submission for consideration by the faculty two papers from among those written during the year.
4. *Area Coverage*—demonstration to the faculty, by course work and/or examination, that the student has adequate knowledge of the major areas of the history of art.

DOCTOR OF PHILOSOPHY IN ART HISTORY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. An expanded explanation of department requirements is given in the Art History Graduate Student Handbook.

ADMISSION

In addition to University requirements, the department requires a research paper of approximately 15-20 pages demonstrating the student's capacity to pursue independent investigation of an art historical problem as part of the application. All applicants must have been awarded a B.A., B.F.A., or B.S. from an accredited university.

DEGREE REQUIREMENTS

To be eligible for the doctoral degree, the student must complete a minimum of three years of full-time graduate work in Art History, at least two years of which must be in residence at Stanford. Doctoral students must complete a minimum of 135 units. Of these 135, the student must complete at least 100 units of graduate course work at the 200 level or above, including all required courses, with a minimum of 62 units in Art History lecture courses and seminars.

1. *Collateral Studies*—The student is required to take at least three courses in supporting fields of study (such as anthropology, classics, history, literature, or philosophy), determined in consultation with the department advisers. These courses are intended to strengthen the student's interdisciplinary study of art history.
2. *Graduate Student Teaching*—As a required part of their training, graduate students in Art History, regardless of their source of funding, must participate in the department's teaching program. At least one, one-quarter assignment in ARTHIST 1, 2, 3, or FILMSTUD 4 is required (with concurrent registration in ARTHIST 610, Seminar in Teaching Praxis for ARTHIST 1 only). Students receiving financial aid are required to serve as a teaching assistant for a minimum of four quarters. Further opportunities for teaching may be available.
3. *Admission to Candidacy*—A graduate student's progress is formally reviewed at the end of Spring Quarter of the second year. The applicant for candidacy must put together a candidacy file showing that he/she has completed the requirements governing the M.A. program in the History of Art (see above), and at least an additional 18-24 units by the end of Winter Quarter of the second year. The graduate student does not become a formal candidate for the Ph.D. degree until he/she has fully satisfied these requirements and has been accepted as a candidate by the department.
4. *Area Core Examination (ACE)*—All graduate students conceptualize an area core and bibliography in consultation with their primary adviser and two other Stanford faculty members, one of whom is drawn from a field other than Art History, or, if in Art History, has expertise outside of the student's main area of interdisciplinary concentration. Students are required to pass an area core examination, in either written or oral form, at some time in the third year of study. To prepare for the exam, students may enroll in up to three, 5-unit reading courses (ARTHIST 620), no more than one per quarter.
5. *Dissertation and Oral Defense Requirements*—
   a. Reading Committee—After passing the Area Core Examination (ACE), each student is responsible for the formation of a dissertation reading committee consisting of a principal adviser and three readers. Normally, at least two of the three readers are drawn from the department and one may come from outside the department.
   b. Dissertation Proposal—By the beginning of the fourth year, students should have defined a dissertation subject and written a proposal in consultation with their principal adviser. To prepare the proposal, students may take one 5-unit independent study course (ARTHIST 640) and apply for a funded Summer Quarter to research and write the proposal. The proposal is submitted to the Art History faculty at the beginning of the fourth year for comments. The student then meets with the adviser to discuss the proposal and faculty comments no later than 30 days after the submission of the proposal, at which time necessary revisions are determined.
   c. Dissertation—A member of the Art History faculty acts as the student's dissertation adviser and as chair of the reading committee. The final draft of the dissertation must be in all the readers' hands at least four weeks before the date of the oral defense. The dissertation must be completed within five years from the date of the student's admission to candidacy for the Ph.D. degree. A candidate taking more than five years must apply for an extension of candidacy.
   d. Oral Defense Examinations—Each student arranges an oral examination with the four members of the reading committee and a chair chosen from outside the department. The oral examination consists mainly of a defense of the dissertation but may range, at the committee's discretion, over a wider field. The student is required to discuss research methods and findings at some length and to answer all questions and criticisms put by members of the examining committee. At the end of the defense, the committee

votes to pass or fail the student on the defense. The committee also makes recommendations for changes in the dissertation manuscript before it is submitted to the University as the final requirement for the granting of the Ph.D. degree in the History of Art. After incorporating the changes, the manuscript is given a final review and approval by the student's principal adviser.

PH.D. MINOR IN ART HISTORY

For a minor in Art History, a candidate is required to complete 24 units of graduate-level Art History courses (200 level or above) in consultation with a department adviser.

PH.D. IN ART HISTORY AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Art History and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact Denise Winters at 650-724-1333 for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

ART PRACTICE (STUDIO)

UNDERGRADUATE PROGRAMS IN ART PRACTICE (STUDIO)

The Art Practice program offers production-based courses founded on the concepts, skills and cultural viewpoints that characterize contemporary art practice. The goal is to educate students, both majors and minors, in the craft, culture, and theory of current fine art practices to prepare them for successful careers as artists. The art practice program is designed to develop in-depth skills in more than one area of the visual arts. It emphasizes the expressive potential of an integration of media, often via a cross-disciplinary, interactive path. Through collaboration and connections with scientists, engineers, and humanities scholars, the program addresses a breadth of topical and artistic concerns central to a vital undergraduate education.

GRADUATE PROGRAM IN ART PRACTICE (STUDIO)

The program provides a demanding course of study designed to challenge advanced students. Participants are chosen for the program on the basis of work that indicates high artistic individuality, achievement, and promise. Candidates should embody the intellectual curiosity and broad interests appropriate to, and best served by, work and study within the University context.

BACHELOR OF ARTS IN ART PRACTICE (STUDIO)

DEGREE REQUIREMENTS

All undergraduate majors complete a minimum of 65 units including six lower level courses, six upper level courses, and four art history courses. All courses must be taken for a letter grade. University units earned by placement tests or advanced placement work in secondary school are not counted within the 65 units. The studio requirements are divided into lower level (introductory) and upper level (advanced) course work. At the lower level, students focus on a range of subject matter from historical motifs (figure, still life, landscape) to contemporary ideas in art. Upper level courses are designed to stretch the student's understanding of materials, techniques, site, and social relevance. Experimental and challenging in nature, these courses cross area boundaries. Independent study supervised by a member of the permanent faculty is also available to the advanced student.

Students are encouraged to move through the requirements for the major in the sequence outlined. Students are exposed to a range of practices early in their development in order to have a good basis of comparison if they choose to focus on a particular medium. This sequence of courses also broadens the students' skills and enables them to combine materials and methods. In all courses, students are expected to pass mid-term and final reviews and critiques of their work.

To declare the major, students must meet with the undergraduate coordinator. At that time the student selects a faculty adviser. Art Practice majors are required to meet with both their adviser and the undergraduate coordinator during the first two weeks of each quarter to have course work approved and make certain they are meeting degree requirements. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

Required Courses—

1. Six lower level courses (24 units): Six courses from ARTSTUDI 60, 70, 80, 130, 131, 136, 138, 140, 141, 145, 148, 148A, 149B, 151, 153, 154, 155, 161, 167, 170, 173, 177, 178, 179, 276.
2. Six upper level courses (24 units):
   a. ARTSTUDI 230. Interdisciplinary Art Survey: Concepts and Strategies. Focus is on direct experiences of multidisciplinary art and art practices.
   b. ARTSTUDI 249. Advanced Undergraduate Seminar. Emphasis is on investigation of visual concepts interpreted by a single medium, by cross-practices, or by collaboration among students working in a variety of materials. This seminar gives the student an opportunity to be exposed to the work of other majors in a critique-based forum directed by a visiting artist or critic.
   c. Four other courses from ARTSTUDI 139, 141, 146, 149, 152, 160, 169, 172, 175A, 177A, 179A, 184, 185, 248, 268, 265A, 269, 270, 271.
3. Four Art History courses (17 units): ARTHIST 1 (WIM course) and three other art history courses. At least one course must be in the modern art series, ARTHIST 140-159. Students may substitute one Art History course with a Film Studies course.

Transfer Credit Evaluation—Upon declaring an Art Practice major, a student transferring from another school must have his or her work evaluated by a Department of Art and Art History adviser. A maximum of 13 transfer units are applied toward the 65 total units required for the major. A student wishing to have more than 13 units applied toward the major must submit a petition to the adviser and then have his or her work reviewed by a studio committee.

OVERSEAS STUDY OR STUDY ABROAD

A minimum of 52 of the 65 units required for the Art Practice major and a minimum of 32 of the 36 units required for the Art Practice minor must be taken at the Stanford campus. A student must meet with his or her adviser and undergraduate coordinator before planning an overseas campus program.

MINOR IN ART PRACTICE (STUDIO)

A student declaring a minor in Art Practice must complete 36 units of Art Practice and Art History course work. All minors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the internet. Minors are required to meet with both their adviser and the undergraduate coordinator during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements.

Requirements—A student with a minor in Art Practice must complete nine courses for a total of 36 units.

1. Three lower level courses (12 units) selected from ARTSTUDI 60, 70, 80, 130, 131, 136, 138, 140, 141, 145, 148, 148A, 149B, 151, 153, 154, 155, 161, 167, 170, 173, 177, 178, 179, 276.
2. Three upper level courses (11 units):
   a. ARTSTUDI 249: Advanced Undergraduate Seminar. Emphasis is on investigation of visual concepts interpreted by a single medium, by cross-practices, or by collaboration among students working in a variety of materials. This seminar gives the student an opportunity to be exposed to the work of other majors in a critique-based forum directed by a visiting artist or critic. Minors should enroll for three units.
   b. Two other courses from ARTSTUDI 139, 141, 146, 149, 152, 160, 169, 172, 175A, 177A, 179A, 184, 185, 230, 248, 265A, 268, 269, 270, 271.
3. Three Art History Courses (13 units): ARTHIST 1 and two other art history courses. At least one of the courses must be in the modern art series, ARTHIST 140-159.

MASTER OF FINE ARTS IN ART PRACTICE (STUDIO)

University requirements for the M.F.A. are described in the "Graduate Degrees" section of this bulletin.

THE GRADUATE PROGRAM IN PAINTING, SCULPTURE, NEW GENRES, AND PHOTOGRAPHY

ADMISSION

The applicant must have a B.A., B.F.A, or B.S. from an accredited school. It is expected that the applicant will have a strong background in art practice, either an undergraduate degree or at least three years of independent studio practice. Applications and portfolios for the Art Practice program must be received by January 11, 2011. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.

*Portfolio Specifications—S*ee the department web site at http://art.stanford.edu/graduate/admission/ for portfolio requirements.

FIELDS OF STUDY OR DEGREE OPTIONS

Fields of study for the M.F.A. degree are offered in Painting, Sculpture, New Genres, and Photography. These fields of study are not declared on Axess; they are not printed on the transcript or the diploma.

DEGREE REQUIREMENTS

1. *Residency*—Completing a minimum of two years (six quarters) of graduate work in residence at Stanford.
2. *Units*—The student must complete 48 units of study. Students must discuss their programs of study with their academic adviser and the department's student services administrator to ensure that an appropriate program of study is chosen.
   a. *Seminar Requirement*—Six quarters (36 units) of ARTSTUDI 342, Master's Project, which includes two weekly seminars (the Object Seminar and the Concept Seminar) and Studio Practice, which is an individual tutorial with a selected member of the faculty.
   b. *Elective Requirement*—Three courses of academic electives (12 units) are required in the first year. These courses can be chosen from a large variety of disciplines in consultation with the Director of Graduate Studies.
3. *Faculty Reviews*—The student is expected to pass three faculty reviews:
   a. at the end of the first quarter; any student judged to be making inadequate progress is placed on probation and requires an additional review at the end of the second quarter
   b. at the end of the third quarter
   c. at the time of the M.F.A. exhibition

   The purpose of these reviews is to evaluate development and to assess the progress of the student.
4. *Thesis*—During the fifth quarter in the program, students must write a thesis paper addressing the development of their work over the two-year period at Stanford. Participation in the M.F.A. exhibition at the end of the year is required.
5. *Graduate Student Teaching*—Regardless of their source of funding, students are required to assist with the department's teaching program for a minimum of eight hours per week over the period of six quarters; the particulars of this assignment are at the department's convenience.

The studio faculty reserves the right to make use of graduate paintings, sculptures, and photographs in exhibitions serving the interests of the graduate program.

Graduate students must remain in residence at Stanford for the duration of the program.

MASTER OF FINE ARTS IN DESIGN

University requirements for the M.F.A. are described in the "Graduate Degrees" section of this bulletin.

THE GRADUATE PROGRAM IN DESIGN

Working jointly, the departments of Art and Art History and Mechanical Engineering offer graduate degrees in product and visual design. A large physical environment, the Design Yard, provides professional studio space and well-equipped shops. Flexible programs may include graduate courses in fields such as engineering design, biotechnology, marketing, microcomputers, or the studio and art history curriculum. The program centers on a master's project and may also include work in advanced art and design. The program is structured to balance independent concentration with the use of the University and community, and interaction with the students and faculty of the graduate Design program. Crossdisciplinary interaction is encouraged by a four-person graduate Design faculty.

ADMISSION

1. The applicant must have a B.A., B.F.A., or B.S. from an accredited school. It is expected that the applicant will have a strong background in studio art, either an undergraduate degree or at least three years of independent studio practice.
2. Applications and portfolios for the design program must be received by January 11, 2011. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.
3. Portfolio Specifications:
   a. A portfolio or book containing 12-24 photographs, originals, or printouts of creative work, appropriately labeled and identified.
   b. A DVD showing works in action. Total run time should not exceed five minutes, and the disc should be playable in any standard DVD player. CD-ROMs are not accepted.

FIELDS OF STUDY OR DEGREE OPTIONS

Fields of study for the M.F.A. degree are offered in Product or Visual Design.

These fields of study are not declared on Axess; they are not printed on the transcript or the diploma.

DEGREE REQUIREMENTS

1. *Residency*—The student must complete a minimum of two years (six quarters) of graduate work in residence at Stanford.
2. *Units*—The student must complete 57 units of course work chosen in consultation with an adviser in the department. At least 18 of the 57 units must be in ARTSTUDI 360A,B,C, Master's Project: Design and ME 316A,B,C, Product Design: MS Project (9 units in the ARTSTUDI series and 9 units in the ME series). Typically, students working for the M.F.A. degree are encouraged to take full advantage of both sides of the Joint

Program in Design, as well as courses that tap the broader resources of the university.

3. *Required Courses (6 courses, 19-22 units)—*
   1. ARTSTUDI 60. Design I: Fundamental Visual Language
   2. ARTSTUDI 160. Design II: The Bridge
   3. ME 203. Design and Manufacturing
   4. ME 312. Advanced Product Design: Formgiving
   5. ME 313. Human Values and Innovation in Design
   6. Any one course sponsored by the d.school
4. *One course from the following (4 units)—*
   1. ARTSTUDI 169. Professional Design Exploration
   2. ARTSTUDI 268. Design Synthesis
   3. ARTSTUDI 269. Advanced Creative Studies
5. *Two courses from the following (6-8 units)—*
   1. ARTSTUDI 80. Color
   2. ARTSTUDI 161. Catalyst for Design
   3. ARTSTUDI 163. Paper
   4. ARTSTUDI 166. Design in Motion
   5. ARTSTUDI 167. Introduction to Animation
   6. ME 120. History and Philosophy of Design
   7. ME 216A. Advanced Product Design: Needfinding
6. *Thesis Requirements (6 courses, 18 units)—*
   1. ARTSTUDI 360A,B,C (9 units)
   2. ME 316A,B,C (9 units)
7. *Electives (2 courses, 6 units)*—Any two courses at student's discretion.

FILM AND MEDIA STUDIES

UNDERGRADUATE PROGRAMS IN FILM AND MEDIA STUDIES

The Bachelor of Arts in Film and Media Studies provides an introduction to film aesthetics, national cinematic traditions, modes of production in narrative, documentary, and experimental films, the incorporation of moving image media by contemporary artists, and the proliferation of new forms of digital media. The program is designed to develop the critical vocabulary and intellectual framework for understanding the role of cinema and related media within broad cultural and historical concepts.

GRADUATE PROGRAMS IN DOCUMENTARY FILM AND VIDEO

The Master of Fine Arts program in documentary production provides a historical, theoretical, and critical framework within which students master the conceptual and practical skills for producing nonfiction film and video. The M.F.A. is a terminal degree program with a two-year, full-time curriculum representing a synthesis of film praxis and film and media history, theory, and criticism. Courses provide an intellectual and theoretical framework within which students' creative work is developed. Students proceed through the program as a cohort. The program does not permit leaves of absence.

The M.F.A. degree is designed to prepare graduate students for professional careers in film, video, and digital media. Graduates are qualified to teach at the university level. The philosophy of the program is predicated on a paradigm of independent media that values artistic expression, social awareness, and an articulated perspective. Students become conversant with the documentary tradition as well as with alternative media and new directions in documentary. Training in documentary production is combined with the development of research skills in film criticism and analysis. Electives in film studies, art history, and studio art provide an intellectual and theoretical framework within which creative work is realized. The parallel focus on production and studies prepares students for an academic position that may require teaching both film studies and production.

BACHELOR OF ARTS IN FILM AND MEDIA STUDIES

SUGGESTED PREPARATION FOR THE MAJOR

Students considering a major in film and media studies should take ARTHIST 1, Introduction to the Visual Arts, and FILMSTUD 4, Introduction to Film Study, during their freshman or sophomore year. These courses anchor the major through exposure to film language, genre, and visual and narrative structures. Majors are required to take one course in the fundamentals of film and video production.

Suggested or Recommended Courses—

- ARTHIST 1. Introduction to the Visual Arts (WIM course for Art History)
- FILMSTUD 4. Introduction to Film Study

FIELDS OF STUDY OR DEGREE OPTIONS

Advanced undergraduate courses are offered in five fields of study:

- Film History
- Film and Culture
- Film, Media, and Technology
- Writing, Criticism, and Practice
- Aesthetics and Performance

Working with a faculty adviser, students choose five courses in their field from course offerings in Art and Art History and one course from another department in the University. These fields are declared on Axess.

DEGREE REQUIREMENTS

All undergraduate majors complete a minimum of 65 units (16 courses of 3-5 units each), or 15 courses plus an honors thesis. All courses for the major must be taken for a letter grade. To declare the major, students must meet with the undergraduate coordinator. At that time the student selects a faculty adviser. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

Required Courses—

1. ARTHIST 1. Introduction to the Visual Arts (preferred) *or* an Art History elective
2. FILMSTUD 4. Introduction to Film Study
3. FILMSTUD 6. Introduction to Digital Media
4. FILMSTUD 100A, B, C. History of World Cinema I, II, III
5. FILMSTUD 101. Fundamentals of Cinematic Analysis (WIM course)
6. FILMSTUD 102. Theories of the Moving Image
7. FILMPROD 114. Introduction to Film and Video Production
8. *Concentration*—Five courses, four of which must be in a single film and media studies concentration developed by the student in consultation with an adviser. Concentration areas are: film history; film and culture; aesthetics and performance; film, media, and technology; and writing, criticism, and practice. The remaining course must be related, situating the student's concentration in a broader context.
9. *Capstone Experience*—FILMSTUD 290. Senior Seminar: Movies and Methods, offered once a year. The Senior Seminar represents the culminating intellectual experience for Film Studies majors choosing not to write an honors thesis. Honors thesis writers may also take the senior seminar. Seniors who may not be in residence in the quarter that the senior seminar is offered may enroll in their junior year. Movies and Methods provides majors with an opportunity to synthesize their previous work in Film Studies and work in an advanced setting with a faculty member.

HONORS PROGRAM

Students who want to write an honors thesis should consult with a potential adviser by the beginning of junior year. The adviser must be a faculty member in residence during the student's senior year who can oversee the student's progress throughout the project.

The minimum requirements for admission to the honors program in the department are an overall GPA of 3.7 and at least 3.7 in Film and Media Studies courses. Students must complete at least five Film and Media Studies courses at Stanford by the end of their junior year; four must be completed by the end of Winter Quarter. Students wishing to write an honors thesis must announce their intention by submitting a form signed by the thesis adviser, who need not be the student's academic adviser, by February 1 of their junior year.

Candidates for the honors program must submit to the Film and Media Studies faculty a 3-5 page thesis proposal outlining the themes of the thesis, a bibliography, a tentative schedule for research and writing, and one completed paper that demonstrates the student's ability to conceptualize and write about ideas. This complete proposal must be submitted to the department's undergraduate coordinator no later than the third week of Spring Quarter of the candidate's junior year so that it can be read, discussed, and voted upon at the faculty's regular meeting in early May. A candidate is accepted into the honors program by a simple majority.

Once admitted to the honors program, students work with their thesis advisers to research, organize, and write the thesis, and to enlist one other faculty member to serve on the thesis reading committee.

To aid the process of research and writing, students preparing an honors thesis are paired with a graduate student mentor. Students should contact the graduate student mentor in their junior year as soon as they begin to think about writing an honors thesis. Honors thesis writers must register for 10 units of FILMSTUD 297, Honors Thesis Writing, while working on the thesis. Students are required to register for two to five units each quarter during their senior year, for a total of ten units. Students may apply for UAR research grants to help finance trips or expenses related to preparing the research for their honors thesis.

Students and thesis advisers should plan the work schedule so that a final manuscript is in the hands of each member of the thesis reading committee by the beginning of the seventh week of the student's final quarter at Stanford (one year from proposal to final manuscript). The thesis adviser assigns a letter grade; both faculty readers must approve the thesis for honors before the student is qualified to graduate with honors.

Required Courses—

- FILMSTUD 297. Honors Thesis Writing

MINOR IN FILM AND MEDIA STUDIES

A minor in Film Studies requires four core courses and three elective courses for a total of seven courses. Courses must focus on film and use the method of film study to be used towards completion of the minor; courses that use film to illustrate a cultural topic are not eligible. Film Production and Studio Art courses may not be used towards the requirements.

Upon declaring the minor, students are assigned an adviser with whom they plan their course of study and electives. A proposed course of study must be approved by the adviser and placed in the student's departmental file. Only one class may be taken for credit outside the Stanford campus, including Stanford Overseas Studies programs. Minors are required to attend an orientation session presented by the professional staff of the Art Library, which introduces the many tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the minor declaration.

Requirements—The minor in Film Studies requires seven courses for a minimum of 29 units.

Required Courses for the Minor—

FILMSTUD 4. Introduction to Film Study
FILMSTUD 102. Theories of the Moving Image
One course from FILMSTUD 100A,B,C. History of World Cinema I, II, III
One course in a national cinema or an additional course in film history

Optional Courses for the Minor—Three elective courses. Electives can be chosen from courses in other departments and must be approved for the Film Studies minor by the Film Studies coordinator and core faculty for their stress on methods of film analysis. These may include courses in national cinemas, film genres, experimental and documentary film, or film theory.

MASTER OF FINE ARTS IN DOCUMENTARY FILM AND VIDEO

University requirements for the M.F.A. are described in the "Graduate Degrees" section of this bulletin.

ADMISSION

The program requires residency for two consecutive years. The admissions committee seeks applicants who have some work experience beyond their undergraduate years and can articulate why they want to learn documentary film and video production. The committee looks for evidence of the likelihood of success in a rigorous academic program that emphasizes creative work. The conceptual and technical skills required for documentary work are sufficiently different from fictional narrative to make the Stanford program inappropriate for students interested in narrative filmmaking. Each year, eight students are admitted to the program. Applications and portfolios must be received by January 11, 2011. Students accepted into the program must enroll in Autumn Quarter of 2011. The program does not allow for deferred admission or a mid-year enrollment.

Portfolio—The department requires a DVD (NTSC only) copy of film or video work for which the applicant has had creative control. The sample work must be well labeled and accompanied by a brief synopsis, running time of the clips, the circumstances of production, and the applicant's role. Total running time for the work sample should not exceed 15 minutes and may consist of more than one project. Work on which the applicant had only a production assistant role is not appropriate for submission. Student work, however, is appropriate for consideration. Applicants who have had only minimal film or video production experience should submit an example of their best creative work in any medium.

FIELDS OF STUDY OR DEGREE OPTIONS

Fields of study for the M.F.A. degree are offered in Documentary Film.

DEGREE REQUIREMENTS

1. *Residency*—Completing two years (six quarters) of graduate work in residence at Stanford.
2. *Units*—A minimum of 80 units is required for the M.F.A. degree. In the production core, students are required to conceptualize and visualize their ideas in a series of writing and producing courses that focus on documentary story structure. These courses are taken in tandem with project-based production courses that provide training in the technical and conceptual aspects of cinematography, sound recording, and editing. Discussion of form and content is a signature component of the writing and production courses. The production core is complemented by a series of required film studies courses in documentary plus elective courses in the history, aesthetics, ideology, and theory of all genres of moving image media. Core film production courses are offered S/NC only. All other courses must be taken for a letter grade.
3. *M.F.A. Thesis Project*—In the second year of the program, each student produces a 20-minute film or video documentary that constitutes the thesis project. In FILMPROD 405, students choose a topic, research and develop their project, and write a

proposal for submission. A project may not begin production until the final proposal has been approved. Most of the production and post-production occurs in FILMPROD 406A and 406B in Winter and Spring quarters.

4. *Required Courses—*
   a. *Core Production courses (eight courses, 32 units)*—Core courses must be taken in sequence.
      - FILMPROD 400. Film/Video Writing and Directing
      - FILMPROD 401. Nonfiction Film Production
      - FILMPROD 402. Digital Video
      - FILMPROD 403. Advanced Documentary Directing
      - FILMPROD 404. Advanced Film and Video Production
      - FILMPROD 405. Producing Practicum
      - FILMPROD 406A,B. Documentary MFA Thesis Seminar I and II

   b. *Core Film Studies courses (six courses, 25 units)—*
      - FILMSTUD 302. Theories of the Moving Image
      - FILMSTUD 315. Documentary Issues and Traditions
      - FILMSTUD 316. International Documentary
      - FILMSTUD 410A,B. Documentary Perspectives I and II

   c. *Electives (seven courses, 28 units)*—To be chosen in consultation with the student's adviser
      1. Art History—one course, 4 units
      2. Studio Art and/or Communications—two courses, 8 units
      3. Film Studies—three courses, 12 units
      4. Choice Elective—one course, 4 units

ART HISTORY AND FILM STUDIES COURSE CATALOG NUMBERING SYSTEM

The first digit of the ARTHIST and FILMSTUD course number indicates its general level of sophistication.

001-099	Introductory
100-199	Undergraduate level lectures
200-299	Undergraduate seminars/individual work
300-399	Graduate level lectures
400-599	Graduate seminars/individual work

The course numbers below indicate the area of Art History and Film Studies addressed.

Art History

001-099	Introductory
100-104	Ancient
105-109	Medieval
110-119	Renaissance
120-139	Early Modern
140-159	Modern
160-179	Contemporary
180-189	Asia
190-195	Africa and the Americas
200-299	Seminars and Colloquia
410-499	Historical Studies
500-599	Critical Studies
600-699	Graduate Research

Film Studies

004-103	Introductory
111-118	Genre
130-139	National Cinemas
140-149	Aesthetics
150-159	Other
220-299	Seminars
400-660	Graduate Seminars

OVERSEAS STUDIES COURSES IN ART AND ART HISTORY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

- OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin. 5 units, Matthias Pabsch, GER:DB:Hum

FLORENCE

- OSPFLOR 34. The Woman in Florentine Art. 4 units, Timothy Verdon, GER:DB:Hum, EC:Gender
- OSPFLOR 41. The Contemporary Art Scene in Tuscany: Theory and Practice. 3-5 units, Filippo Rossi
- OSPFLOR 55. Academy of Fine Arts: Studio Art. 1-3 units, Ermelinda Campani
- OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization. 4 units, Timothy Verdon, GER:DB:Hum
- OSPFLOR 134F. Modernist Italian Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

MADRID

- OSPMADRD 37. Madrid in Film. 3-5 units, Jorge Ruffinelli, GER:DB:Hum
- OSPMADRD 46. Drawing with Four Spanish Masters: Goya, Velázquez, Picasso and Dalí. 3 units, Oscar Sánchez Fuster

OXFORD

- OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850. 4-5 units, Geoffrey Tyack, GER:DB:Hum

PARIS

- OSPPARIS 42. EAP: Drawing with Live Model. 2 units, Staff
- OSPPARIS 43. EAP: Painting and Use of Color. 2 units, Staff
- OSPPARIS 44. EAP: Graphic Art. 2 units, Staff
- OSPPARIS 107Y. The Age of Cathedrals: Religious Art and Architecture in Medieval France. 4 units, Colette Deremble, Jean Paul Deremble, GER:DB:Hum

WINTER QUARTER

BERLIN

- OSPBER 17. Split Images: A Century in Cinema. 4 units, Karen Kramer, GER:DB:Hum, EC:GlobalCom

FLORENCE

- OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition. 4 units, Filippo Rossi, Timothy Verdon, GER:DB:Hum
- OSPFLOR 49. The Cinema Goes to War: Fascism and World War II As Represented in Italian and European Cinema. 5 units, Ermelinda Campani, GER:DB:Hum
- OSPFLOR 55. Academy of Fine Arts: Studio Art. 1-5 units, Ermelinda Campani
- OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence. 4 units, Timothy Verdon, GER:DB:Hum

OXFORD

- OSPOXFRD 67. Art in Oxford. 3 units, Geoffrey Tyack

MADRID

- OSPMADRD 45. Women in Art: Case Study in the Madrid Museums. 4 units, Julia Doménech López, GER:DB:Hum, EC:Gender

PARIS

- OSPPARIS 42. EAP: Drawing with Live Model. 2 units, Staff

- OSPPARIS 43. EAP: Painting and Use of Color. 2 units, Staff
- OSPPARIS 44. EAP: Graphic Art. 2 units, Staff
- OSPPARIS 54. The Artist's World: The Workshop, Patronage and Public in 19th and 20th Century France. 4 units, Estelle Halevi, GER:DB:Hum

SPRING QUARTER

FLORENCE

- OSPFLOR 54. High Renaissance and Maniera. 5 units, Timothy Verdon, GER:DB:Hum
- OSPFLOR 55. Academy of Fine Arts: Studio Art. 1-5 units, Ermelinda Campani
- OSPFLOR 58. Space as History: Urban Change and Social Vision: Florence 1059-2008. 4 units, Filippo Rossi, Timothy Verdon, GER:DB:Hum
- OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality and the Image. 4 units, Ermelinda Campani, GER:DB:Hum, EC:Gender
- OSPFLOR 71. Becoming an Artist in Florence: The Contemporary Artistic Craftmanship in Tuscany and the New Tendencies in the Visual Future. 3-5 units, Filippo Rossi, GER:

OXFORD

- OSPOXFRD 61.Castles and Satanic Mills: the Medieval in British Art, Architecture and Literature, 1750-1914. 4 units, Rosemary Hill

PARIS

- OSPPARIS 42. EAP: Drawing with Live Model. 2-2 units, Staff
- OSPPARIS 43. EAP: Painting and Use of Color. 2-2 units, Staff
- OSPPARIS 44. EAP: Graphic Art. 2-2 units, Staff
- OSPPARIS 60. Representation of Women in Christian Art: Boldness and Virtue. 4 units, Brigitte Gallini
- OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design. 4-4 units, Estelle Halevi, GER:DB:Hum

ASTRONOMY

Emeriti: (Professors) Von R. Eshleman, Peter A. Sturrock, G. Leonard Tyler, Robert V. Wagoner
Committee in Charge: Vahé Petrosian *(Director)*, Roger W. Romani, Sarah Church
Professors: Roger Blandford (Physics, SLAC), Blas Cabrera (Physics), Sarah Church (Physics), Steven Kahn (Physics, SLAC), Peter Michelson (Physics, SLAC), Vahé Petrosian (Physics, Applied Physics), Roger W. Romani (Physics)
Associate Professors: Steve Allen (Physics, SLAC), Tom Abel (Physics, SLAC),
Assistant Professors: Stefan Funk (Physics, SLAC), Chau-Lin Kuo (Physics, SLAC), Risa Wechsler (Physics, SLAC)
Professor (Research): Philip H. Scherrer (Physics)
Program Offices: Varian, Room 316
Mail Code: 94305-4060
Phone: (650) 723-1439
Web Site: http://www.stanford.edu/dept/astro

Astronomy courses are offered primarily through the Physics department, with subject code PHYSICS on the *Stanford Bulletin's* ExploreCourses web site.

Although Stanford University does not have a degree program in astronomy or astrophysics, teaching and research in various branches of these disciplines are ongoing activities in the departments of Applied Physics, Electrical Engineering, and Physics.

For the convenience of students interested in astronomy, astrophysics, and cosmology, a course program for undergraduate and graduate study is listed in the "Astronomy Cognate Courses" section of this bulletin. The list provides introductory courses for the student who wishes to be informed about the fields of astronomy without the need for prerequisites beyond high school algebra and physics. Courses in astronomy numbered below 100 are designed to serve this group of students. Astronomy courses numbered 100-199 serve the student interested in an initial scientific study of astronomy. The courses numbered 200 and above are for graduate students and advanced undergraduates, subject to prior approval by the course instructor.

UNDERGRADUATE PROGRAMS IN ASTRONOMY

The University does not offer a separate undergraduate major in Astronomy. Students who intend to pursue graduate study in astronomy or space science are encouraged to major in physics, following the advanced sequence if possible, or in electrical engineering if the student has a strongly developed interest in radioscience. The course descriptions for these basic studies are listed under the appropriate department sections of this bulletin. Students desiring guidance in developing an astronomy-oriented course of study should contact the chair of the Astronomy Program Committee. The following courses are suitable for undergraduates and are recommended to students considering advanced study in astronomy or astrophysics: PHYSICS 100, Introduction to Observational and Laboratory Astronomy; PHYSICS 160, Introduction to Stellar and Galactic Astrophysics; PHYSICS 161, Introduction to Extragalactic Astrophysics and Cosmology; GES 222, Planetary Systems: Dynamics and Origins. Students planning study in astronomy beyond the B.S. are urged to take PHYSICS 260 and 262, Introduction to Astrophysics and to Gravitation, and to consider an undergraduate thesis (PHYSICS 169) or honors thesis in an astrophysics related area. The above-mentioned courses are required for physics majors who choose the curriculum with a concentration in astrophysics (see the "Physics" section of this bulletin). The student observatory, located in the hills to the west of the campus and equipped with a 24-inch and other small reflecting telescopes, is used for instruction of the observation-oriented courses.

MINOR IN ASTRONOMY

The minor program in Astronomy is described in the "Physics" section of this bulletin. The non-technical minor, intended for students whose major does not require the PHYSICS 40 series, requires 10 units of Physics courses (PHYSICS 21, 23, 25/26) and 9-10 units of Astronomy courses (3-4 units of PHYSICS 50 or 100, and 6 units of PHYSICS 15, 16, 17). The technical minor for other students consists of 14 units of PHYSICS 70, 100, 160, 161, and EE 106, in addition to the 40 or 60 series.

To be accepted to the minor program, students need to obtain an adviser selected from the faculty in the Astronomy Course Program. The minor declaration deadline is three quarters before graduation (that is, beginning Autumn Quarter if the student is graduating at the end of Spring Quarter). All courses for the minor must be taken at Stanford University, and a letter grade of 'C-' or better must be received for all units applied toward the minor.

GRADUATE PROGRAMS IN ASTRONOMY

Graduate programs in astronomy and astrophysics and related topics are carried out primarily in the Department of Physics but also the departments of Applied Physics and Electrical Engineering. Students should consult the course listings, degree requirements, and research programs of these departments for more detailed information. Graduate research opportunities are available in many areas of theoretical and observational astronomy, including research projects using the Hobby Eberly telescope, a 10-meter-class telescope located at McDonald Observatory in Texas. Other observational and experimental opportunities are in ground-based observations of CMB and space-based gamma-ray observations with Fermi and in the future, X-ray observations with NuSTAR. For further information on graduate research opportunities, see the

"Center for Space Science and Astrophysics" section of this bulletin and the Kavli Institute of Particle Astrophysics and Cosmology at http://kipac.stanford.edu.

Students planning to conduct research in astronomy and astrophysics are required to take PHYSICS 360, Physics of Astrophysics, and at least one of the following: PHYSICS 361, Stellar and Galactic Astrophysics; 362, Extragalactic Astrophysics and Cosmology; or 363, Solar and Solar-Terrestrial Physics. Students lacking a background in astrophysics, gravitation, and plasma physics should take PHYSICS 260 and 262, Introduction to Astrophysics and to Gravitation, and PHYSICS 312, Basic Plasma Physics. Students with special interests in gravitation should take PHYSICS 364, Advanced Gravitation.

Students interested in research programs in space physics involving spacecraft studies of the planets, their satellites, and their near-space environments should see the "Center for Space Science and Astrophysics" section of this bulletin.

ASTRONOMY COGNATE COURSES

ELEMENTARY LECTURES

The following courses provide a descriptive knowledge of astronomical objects and astrophysics of the universe. PHYSICS 15, 16, and 17 are for students not majoring in the sciences and are taught in different quarters by different instructors, and may be taken individually or in any order.

PHYSICS 15. The Nature of the Universe
PHYSICS 16. Cosmic Horizons
PHYSICS 17. Black Holes

OBSERVATORY

The following courses are intended to familiarize students with observational methods and analysis of astronomical data. PHYSICS 100 involves more advanced observations and is intended for students with a college level background in physics.

PHYSICS 50. Astronomy Laboratory and Observational Astronomy
PHYSICS 100. Introduction to Observational and Laboratory Astronomy

ADVANCED UNDERGRADUATE

The following courses are for students with a more advanced knowledge of basic physics and mathematics, and form the core courses for a concentration in astrophysics for Physics majors.

EE 106. Planetary Exploration
PHYSICS 160. Introduction to Stellar and Galactic Astrophysics
PHYSICS 161. Introduction to Extragalactic Astrophysics and Cosmology
PHYSICS 169A,B,C. Independent Study in Astrophysics and Honors Thesis: Selection of the Problem

GRADUATE

GES 222. Planetary Systems: Dynamics and Origins
PHYSICS 260. Introduction to Astrophysics and Cosmology
PHYSICS 262. Introduction to Gravitation
PHYSICS 301. Observational and Laboratory Astronomy
PHYSICS 312. Basic Plasma Physics
PHYSICS 360. Physics of Astrophysics
PHYSICS 361. Stellar and Galactic Astrophysics
PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology
PHYSICS 363. Solar and Solar-Terrestrial Physics
PHYSICS 364. Advanced Gravitation
PHYSICS 463. Special Topics in Astrophysics: Theoretical Cosmology

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Emeriti: (Professor) Wesley K. Ruff; *(Associate Director)* Robert C. Young; *(Assistant Director)* Shirley Schoof; (*Athletic Director*) Ted Leland
Athletic Director: Bob Bowlsby
Deputy Athletic Director: Ray Purpur
Senior Associate Athletic Director, Intercollegiate Services/Senior Woman Administrator: Beth Goode
Senior Associate Athletic Director, External Relations: Chris Hutchins
Senior Associate Athletic Director, Intercollegiate Sports: Earl Koberlein
Senior Associate Athletic Director, Program Services: Darrin Nelson
Senior Associate Athletic Director, Development: Jeff Shilling
Senior Associate Athletic Director, Physical Education, Recreation, and Wellness: Eric Stein
Associate Director of Development for Major Gifts: Scott Alexander
Associate Director of Development for Major Gifts: Darcie Bransford
Senior Assistant Athletic Director, Media Relations: Jim Young
Assistant Athletic Director, Compliance Services: Megan Boone
Assistant Athletic Director, Marketing: Marie Vasquez
Assistant Athletic Director, Human Resources: Ron Coverson
Assistant Athletic Director, Capital Planning: David Schinski
Sport Directors: Al Acosta (Lightweight Crew, women), Craig Amerkhanian (Crew, men), Amy Bokker (Lacrosse), Jason Borrelli (Wrestling), Johnny Dawkins (Basketball, men), Jason Dunn (Cross Country), John Dunning (Volleyball, women), Yasmin Farooq (Crew, women), Edrick Floreal (Track and Field, women), Lele Forood (Tennis, women), Thom Glielmi (Gymnastics, men), Jim Harbaugh (Football), Lesley Irvine (Field Hockey), Skip Kenney (Swimming, men), John Kosty (Volleyball, men), Mark Marquess (Baseball), Lea Maurer (Swimming, women), Lisa Milgram (Fencing), Caroline O'Connor (Golf, women), Heather Olson (Synchronized Swimming), George Pogosov (Fencing), Paul Ratcliffe (Soccer, women), Conrad Ray (Golf, men), John Rittman (Softball), Richard Schavone (Diving), Bret Simon (Soccer, men), Kristen Smyth (Gymnastics, women), Mark Talbott (Squash, women), John Tanner (Water Polo, women), John Vandemoer (Sailing), Tara VanDerveer (Basketball, women), John Vargas (Water Polo, men), John Whitlinger (Tennis, men)
Sport Assistant Coaches: Lance Anderson (Football), Jon Barnea (Water Polo, men), Rob Becerra (Soccer, men), Frankie Brennan (Tennis, women), Andy Buh (Football), Jay Cooney (Soccer, women), Denise Corlett (Volleyball, women), Ray Blake (Wrestling), Brandon Coupe (Tennis, men), Dick Davey (Basketball, men), Tim Drevno (Football), DJ Durkin (Football), Trisha Ford (Softball), Matt Gentry (Wrestling), Mandy Hart (Field Hockey), Vaclav Kacir (Crew, women), Bobbie Kelsey (Basketball, women), Ted Knapp (Swimming, men), Sara Lowe (Synchronized Swimming), Jason Mansfield (Volleyball, women), Salimah Mussani (Golf, women), Dave Nakama (Baseball), Andrew Ninow (Track and Field), Gregg Olson (Soccer, men), Susan Ortwein (Water Polo, women), Kate Paye (Basketball, women), J. D. Reive (Gymnastics, men), Greg Roman (Football), David Shaw (Football), Ken Shibuya (Volleyball, men), Jordan Steele Marotta (Field Hockey), Dean Stotz (Baseball), Katherine Sweet (Lightweight Crew, women), Chris Swircek (Gymnastics, women), Willie Taggart (Football)
Department Offices: Arrillaga Family Sports Center
Mail Code: 94305-6150
Phone: (650) 723-4591
Web Site: http://suwellness.stanford.edu

Courses offered by the Department of Athletics, Physical Education, and Recreation are listed under the subject code ATHLETIC on the *Stanford Bulletin's* ExploreCourses web site.

From the founding of the University, Stanford's leaders have believed physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department provides a broad range of instructional, recreational, and intramural competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the department's programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, sports, and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition.

PROGRAMS IN ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

No degrees are offered in Physical Education.

INTERCOLLEGIATE ATHLETICS

In keeping with American university tradition, Stanford offers a broad intercollegiate athletic program. The objectives are to provide the opportunity to compete at the highest possible level without jeopardizing the integrity of the individual or the institution; to adhere strictly to all University, association, and conference rules governing athletic participation; and to encourage effectively the achievement of academic goals by student athletes at the same rate as other University students. As a member of the National Collegiate Athletic Association (NCAA), Stanford fields both men's and women's varsity teams. Those for men are baseball, basketball, crew, cross country, fencing, football, golf, gymnastics, sailing, soccer, swimming and diving, tennis, track and field, volleyball, water polo, and wrestling. Those for women are basketball, crew, cross country, fencing, field hockey, golf, gymnastics, lacrosse, sailing, soccer, softball, squash, swimming and diving, synchronized swimming, tennis, track and field, volleyball, and water polo.

Both men's and women's teams are affiliated with the Pacific Ten Conference, one of the premier athletic conferences in the nation. Additional or alternative intercollegiate athletic competition is available for all teams.

CLUB SPORTS

The Stanford Club Sports program provides competition in sports not included in the intercollegiate varsity program and instruction in classes or activities not included in the Physical Education program. It also develops student leadership in organizing, administering, and funding activities. The club program is actively supervised by the Coordinator of Club Sports, but the emphasis is on student interest and leadership to initiate, organize, and conduct the respective clubs. Those students in clubs that meet the criteria for inclusion in the formal curriculum may apply for units of credit.

INTRAMURAL SPORTS (IM)

Students interested in participating in intramural sports should visit the intramural web site: http://www.stanford.edu/group/ intramurals for more information. They may visit the IM Office in Ford/Burnham. The program includes formal competition in fifteen team and individual sports, using both league and single elimination tournament play structure. Individuals are encouraged to check the web site at the beginning of each quarter to obtain registration and league information. Registration occurs on the second Monday and Tuesday of each quarter, with mandatory captain meetings held that Thursday evening. Intramural leagues are offered in Autumn, Winter, Spring, and Summer quarters.

RECREATION

The department provides facility use for faculty, staff, and students (and, for some activities, their immediate families) to participate in aquatics, conditioning, and sports for general recreation. Specific recreation hours for all the facilities are posted throughout the year at the respective facilities and at http://suwellness.stanford.edu.

The golf course and driving range are available for faculty, staff, and student use on a fee basis; information is available from the Golf Pro Shop.

Recreational classes are offered in areas such as rock climbing, indoor cycling, and golf.

FACILITIES

Athletic facilities are located throughout the campus. On the west side of campus are the Golf Course, the Golf Driving Range, the Red Barn Stables, Roble Field and Pool, the Sand Hill Intramural Fields, and the West Campus Tennis Courts. Centrally located is the Tresidder Fitness Center. On the east side of campus are the Arrillaga Center for Sports and Recreation, the Arrillaga Family Racquetball Center, the Arrillaga Family Sports Center, Avery Aquatic Center, Burnham Pavilion, Cobb Track and Angell Field, the Ford Center for Sports and Recreation, the Manzanita Basketball Court and Field, Maples Pavilion, Taube South Tennis Courts, and Taube Tennis Stadium.

Off-campus facilities include the Morrison Boathouse, a sailing and rowing facility.

CURRICULUM AND SERVICES

The diverse instructional program strives to accommodate the sports interests of all undergraduates and graduate students. Only intercollegiate varsity men's and women's teams are limited to undergraduates. Skill groupings and limited class sizes enable the beginning student or the advanced performer to achieve success within the limits of individual motivation and potential. Skill level in, and knowledge about, a specific activity as well as available space are the only limitations to enrollment. Physically disabled students are encouraged to contact Eric Stein (elstein@stanford.edu) for enrollment advice.

Academic Credit—Activity classes carry 1 unit of credit for satisfactory completion of work. Although there is no limitation on the number of activity classes in which a student may enroll, no more than 8 units of these activity classes (and/or other University activity classes) may be applied toward undergraduate graduation requirements (see the "Undergraduate Degrees" section of this bulletin).

Auditing—No auditing is allowed in activity classes. Faculty and staff may take an activity class as space is available with instructor consent after student enrollment is completed.

Class Fees—Fees are charged for enrollment in all physical education activity classes and club sports. Class fees are posted directly to the student's university account.

Class Sign-ups—Students sign up for classes on Axess. For classes with limited enrollment, students must attend the first class meeting or contact the instructor to guarantee their space in class.

Deadline for Adding a Class—Students who have never appeared in a class may not enroll in that class after the fourth class meeting has passed. Students may add the class after the fourth meeting if they have been in regular attendance, but must add the class to their study list by the study list deadline, Friday of the third week of the quarter.

Equipment—Information on equipment and recommended class attire is available from the department or instructor.

Lockers—Lockers are available for rent to faculty/staff and students at the Arrillaga Family Sports Center, Ford Center and Roble Gym. The fee for faculty/staff is $20 per quarter or $50 per year. The fee for students is $15 per quarter or $35 per year.

BIOLOGY

Emeriti: (Professors) Bruce S. Baker, Winslow R. Briggs, Allan M. Campbell, David Epel, Donald Kennedy, Peter Ray, Robert Schimke, Norman K. Wessells, Dow O. Woodward, Charles Yanofsky

Chair: Robert D. Simoni

Professors: Barbara A. Block, Steven M. Block, Martha S. Cyert, Gretchen C. Daily, Mark W. Denny, Rodolfo Dirzo, Paul R. Ehrlich, Marcus W. Feldman, Russell D. Fernald, Christopher B. Field, Judith Frydman, William F. Gilly, Deborah M. Gordon, Elizabeth A. Hadly, Philip C. Hanawalt, H. Craig Heller, Patricia P. Jones, Richard G. Klein, Ron R. Kopito, Sharon R. Long, Liqun Luo, Susan K. McConnell, Fiorenza Micheli, Harold A. Mooney, W. James Nelson, Stephen R. Palumbi, Dmitri Petrov, Joan Roughgarden, Robert M. Sapolsky, Carla J. Shatz, Michael A. Simon, Robert D. Simoni, George N. Somero, Tim P. Stearns, Stuart H. Thompson, Shripad Tuljapurkar, Peter Vitousek, Virginia Walbot, Ward B. Watt

Professor (Teaching): Carol L. Boggs

Associate Professors: Mary Beth Mudgett, Kang Shen

Assistant Professors: Dominique Bergmann, Hunter B. Fraser, Tadashi Fukami, Or Gozani, Christopher Lowe, Ashby Morrison, Mark J. Schnitzer, Jan M. Skotheim

Courtesy Professors: Joseph Berry, Daniel Fisher, Wolf Frommer, Arthur R. Grossman, Irving Weissman, Wing Wong

Courtesy Associate Professors: Kathryn Barton, Zhiyong Wang

Courtesy Assistant Professors: David Ehrhardt, Sue Rhee

Lecturers: Daria Hekmat-Scafe, Waheeda Khalfan, Shyamala D. Malladi, Patricia Seawell, Andrew Todhunter, James Watanabe

Consulting Professors: Cathy Laurie, Marc Tessier-Lavigne

Librarian: Michael Newman

Main Department Office and Phone: Gilbert Building, Room 109 – (650) 723-2413

Student Services Office and Phone: Gilbert Building, Room 108 – (650) 723-1826

Mail Code: 94305-5020

Web Site: http://biology.stanford.edu

Courses offered by the Department of Biology are listed under the subject code BIO on the *Stanford Bulletin's* ExploreCourses web site.

The department provides: (1) a major program leading to the B.S. degree; (2) a minor program; (3) a coterminal program leading to the M.S. degree; (4) a doctoral program leading to the Ph.D. degree; and (5) courses designed for the non-major.

MISSION OF THE UNDERGRADUATE PROGRAM IN BIOLOGY

The mission of the undergraduate program in Biology is to provide students with in-depth knowledge in the discipline, from molecular biology to ecology. Students in the program learn to think and analyze information critically, to draw connections among the different areas of biology, and to communicate their ideas effectively to the scientific community. The major exposes students to the scientific process through a set of core courses and electives from a range of subdisciplines. The Biology major serves as preparation for professional careers, including medicine, dentistry, veterinary sciences, teaching, consulting, research, and field studies.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to use discipline-specific tools and content knowledge to analyze and interpret scientific data, to evaluate the significance of the data, and to articulate conclusions supportable by the data.
2. the ability, independently and collaboratively, to formulate testable scientific hypotheses and to design approaches to obtain data to test the respective hypotheses.
3. the ability to communicate content understanding and research outcomes effectively using various media.

GRADUATE MISSION STATEMENT

For graduate-level students, the department offers resources and experience learning from and working with world-renowned faculty involved in research on ecology, neurobiology, population biology, plant and animal physiology, biochemistry, immunology, cell and developmental biology, genetics, and molecular biology.

The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience.

The training for a Ph.D. in Biology is focused on learning skills required to be a successful research scientist and teacher, including how to ask important questions and then devise and carry out experiments to answer these questions. Students work closely with an established adviser and meet regularly with a committee of faculty members to ensure that they understand the importance of diverse perspectives on experimental questions and approaches. Students learn how to evaluate critically pertinent original literature in order to stay abreast of scientific progress in their areas of interest. They also learn how to make professional presentations, write manuscripts for publication, and become effective teachers.

FACILITIES

The facilities and personnel of the Department of Biology are housed in the Gilbert Biological Sciences Building, Herrin Laboratories, Herrin Hall, Jasper Ridge Biological Preserve, James H. Clark Center, Lorry I. Lokey Laboratory Building, Jerry Yang and Akiko Yamazaki Environment & Energy Building, and the Carnegie Institution of Washington (all on the main campus); and Hopkins Marine Station in Pacific Grove on Monterey Bay.

Jasper Ridge Biological Preserve (JRBP) is located near Stanford University's campus in the eastern foothills of the Santa Cruz Mountains. The preserve encompasses geologic, topographic, and biotic diversity within its 1,189 acres and provides a natural laboratory for researchers from around the world, educational experiences for students and docent-led visitors, and refuge for native plants and animals. See http://jrbp.stanford.edu.

Hopkins Marine Station, located 90 miles from the main University campus in Pacific Grove, was founded in 1892 as the first marine laboratory on the west coast of North America. For more information, including courses taught at Hopkins Marine Station with the subject code BIOHOPK, see the "Biology, Hopkins Marine Station" section of this bulletin.

The department's large collections of plants (Dudley Herbarium), fish, reptiles, and amphibians, as well as smaller collections of birds, mammals, and invertebrates, are housed at the California Academy of Sciences in San Francisco, where they, and extensive collections of the academy, are available to those interested in the systematics of these groups. Entomological collections, restricted to those being used in particular research projects, are housed in the Herrin Laboratories. No general collections are maintained except for teaching purposes.

The Falconer Biology Library in Herrin Hall (http://library.stanford.edu/depts/falconer) contains over 1,200 current subscriptions and an extensive collection of monographs and reference works. A specialized library is maintained at Hopkins Marine Station.

BACHELOR OF SCIENCE IN BIOLOGY

The undergraduate major in Biology can serve as a stepping-stone for a wide variety of career opportunities. For students planning to attend medical, dental, or veterinary school, or graduate school in biological and applied sciences, the biology major provides a strong foundation in the basic life sciences. This foundation of knowledge, plus laboratory experience, also prepares students well for research and technical positions in universities, government, and industry.

While a major in Biology provides an excellent background for these technical careers, it can also serve as a valuable and satisfying focus of a liberal arts education for those not planning careers in science-related fields. An understanding of basic biological principles is of increasing importance in today's world. A knowledgeable and concerned citizenry is the best guarantee that these issues will be resolved most effectively. Finally, an understanding of the processes of life can heighten our perception and appreciation of the world around us, in terms of its beauty, variety, and uniqueness.

ADVISING

Members of the Biology faculty are available for advising on such academic matters as choice of courses, research, suggested readings, and career plans. The student services office maintains a current list of faculty advisers, advising availability, and research interests.

The student services office staff and BioBridge, the department's peer advising group, are prepared to answer questions on administrative matters, such as requirements for the major, approved out-of-department electives, transfer course evaluations, and petition procedures. This office also distributes the department's *Bachelor of Science Handbook*, which delineates policies and requirements, as well as other department forms and informational handouts.

Each undergraduate interested in the Biology major is required to select a department faculty adviser as part of the major declaration process.

REQUIREMENTS

Candidates for the general Biology B.S. degree must complete the following, which range from 90-105 total units:

Core Courses—must be taken for a letter grade:

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5
BIO 44X	5
BIO *or* BIOHOPK 44Y*	5
may be replaced by 4 units of BIOHOPK 175H	

* BIO 44Y not required if completing honors program. Failure to complete honors program results in student being required to complete BIO 44Y.

Required Foundational Breadth Courses—two courses may be taken credit/no credit:

Subject and Catalog Number	*Units*
CHEM 31A,B, *or* 31X	4-8
CHEM 33, 35, 36, 130*, 131	18
CHEM 135 *or* 171	3
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 19, 20, 21 *or* 41, 42 *or* 51**	5-10
*may not also count as foundational breadth	
One additional Foundational Breadth Course from this list:	
BIOHOPK 174H***	3
BIO/STATS 141***	4-5
CS 106A *or* 106X	3-5
MATH 51** or beyond	5
STATS 60/PSYCH 10	5

* May be substituted with MATH 100 or beyond if student is interested in the fields of ecology and evolutionary biology.

** May be counted either toward the math requirement or foundational breadth, but not both.

*** If taken to fulfill the foundational breadth requirement, these courses do not count toward the 24 elective unit requirement.

Electives—24 units required, distributed as follows:

- Biology (BIO) or Hopkins Marine Station (BIOHOPK) courses numbered 100 or above.
- Approved out-of-department electives (list also available in the student services office).
- No more than 6 units from any combination of individual instruction courses (BIO 198, 198X, 199, 199X, 290, 290X, 291; BIOHOPK 175H, 198H, 199H, or 290H) may be applied toward the total number of elective units. No more than 6 units applied toward the elective unit requirement may be taken CR/NC.
- One course from at least three of the four central menu areas (listed below). The purpose of the central menu is to expose students to a wide range of topics studied within the field of biology and is intended to give students a breadth of knowledge. Please note—this requirement is only for the general major. Students pursuing a specialized field of study should consult the specific degree requirements listed in the "Fields of Study" section below.

Central Menu Areas:

1. *Molecular (Area 1)*
   - BIO 104. Advanced Molecular Biology
   - BIO 113. Fundamentals of Molecular Evolution[3]
   - BIO 118. Genetic Analysis of Biological Processes[1]
   - BIO 160A. Developmental Biology I[1]
   - BIO 160B. Developmental Biology II[1]
   - BIO 188. Biochemistry I
   - BIO 189. Biochemistry II
   - BIO 230. Molecular and Cellular Immunology[1]
   - CBIO 101. Cancer Biology[1]
   - CEE 274A. Environmental Microbiology I
2. *Cell/Developmental (Area 2)*
   - BIO 118. Genetic Analysis of Biological Processes[1]
   - BIO 129A. Cellular Dynamics I: Cell Motility and Adhesion
   - BIO 129B. Cellular Dynamics II: Building a Cell
   - BIO 137. Plant Genetics[1]
   - BIO 154. Molecular and Cellular Neurobiology[2]
   - BIO 158. Developmental Neurobiology[2]
   - BIO 160A. Developmental Biology I[1]
   - BIO 160B. Developmental Biology II[1]
   - BIO 171. Principles of Cell Cycle Control
   - BIO 230. Molecular and Cellular Immunology[1]
   - CBIO 101. Cancer Biology[1]
   - CEE 274A. Environmental Microbiology I
3. *Organismal (Area 3)*
   - BIO 112. Human Physiology
   - BIO 153. Cellular Neuroscience
   - BIO 154. Molecular and Cellular Neurobiology[2]
   - BIO 158. Developmental Neurobiology[2]
   - BIO 163. Neural Systems and Behavior
   - BIOHOPK 161H. Invertebrate Zoology
   - BIOHOPK 162H. Comparative Animal Physiology
   - BIOHOPK 167H. Nerve, Muscle, and Synapse
   - BIOHOPK 169H. Neurobiology and Behavior
   - BIOHOPK 171H. Ecological and Evolutionary Physiology
   - MI 185. Topics in Microbiology
4. *Ecology and Evolution (Area 4)*
   - BIO 101. Ecology
   - BIO 113. Fundamentals of Molecular Evolution
   - BIO 121. Biogeography
   - BIO 136. Evolutionary Paleobiology
   - BIO 143. Evolution
   - BIO 144. Conservation Biology
   - BIO 145. Behavioral Ecology
   - BIOHOPK 163H. Oceanic Biology

- BIOHOPK 185H. Ecology and Conservation of Kelp Forest Communities
- BIOHOPK 172H. Marine Ecology
- CEE 274A. Environmental Microbiology I

1. May be used to satisfy either area I or area II requirement.
2. May be used to satisfy either area II or area III requirement.
3. May be used to satisfy either area I or area IV requirement.
4. May be used to satisfy either area III or area IV requirement.
5. May be used to satisfy area I, area II, or area IV requirement.

Students intending to pursue research careers in biology, especially in ecology, population genetics, or theoretical biology, should be aware that MATH 19, 20, 21, or MATH 41, 42 are minimum mathematics requirements for the B.S. degree in Biology. Substantial additional training in mathematics, including differential equations, linear algebra, and probability theory, is often highly advisable. Students should consult the Biology faculty to discuss individual needs.

Additionally, even though only two or three quarters of physics are required, students should be aware that many graduate and professional schools (for example, Medicine) require a year of general physics with lab. Biology majors are therefore advised to take the year-long physics sequence PHYSICS 21, 22, 23, 24, 25, 26 if they plan to attend graduate or medical school.

For students considering study at Hopkins Marine Station or an overseas program, the department recommends fulfilling as many University General Education Requirements as possible in the first two years at Stanford.

HOPKINS MARINE STATION

For more information on the Hopkins Marine Station, see the "Hopkins Marine Station" section of this bulletin. Students can go to Hopkins as early as Spring Quarter in the sophomore year, and can also go in the junior and/or senior year to take elective courses. Full descriptions of Hopkins Marine Station courses may be viewed on the *Stanford Bulletin's* Explore Courses web site. The following Hopkins Marine Station courses may be used toward the Biology degree requirements:

Core—

- BIOHOPK 43. Plant Biology, Evolution, and Ecology (equivalent to BIO 43)
- BIOHOPK 44Y. Core Experimental Laboratory (equivalent to BIO 44Y)
- BIOHOPK 175H. Problems in Marine Ecology and Ecophysiology (can be used in place of BIO 44Y)*

* 4 units count toward the BIO 44Y requirement, with the remaining units counting as research/teaching under the upper-division elective requirement.

Electives—

- BIOHOPK 161H. Invertebrate Zoology (central menu area 3)
- BIOHOPK 162H. Comparative Animal Physiology (central menu area 3)
- BIOHOPK 163H. Oceanic Biology (central menu area 4)
- BIOHOPK 164H. Marine Botany
- BIOHOPK 166H. Molecular Ecology
- BIOHOPK 167H. Nerve, Muscle, and Synapse (central menu area 3)
- BIOHOPK 170H. Topics in Marine Biology
- BIOHOPK 171H. Ecological and Evolutionary Physiology (central menu area 3)
- BIOHOPK 172H. Marine Ecology (central menu area 4)
- BIOHOPK 173H. Marine Conservation Biology
- BIOHOPK 174H. Experimental Design and Probability
- BIOHOPK 178H. Polar Biology
- BIOHOPK 182H. Stanford at Sea (6 units maximum)
- BIOHOPK 184H. Holistic Biology: Monterey Bay and the Sea of Cortez (6 units maximum)
- BIOHOPK 185H. Ecology and Conservation of Kelp Forest Ecology
- BIOHOPK 187H. Sensory Ecology
- BIOHOPK 274. Hopkins Microbiology Course (6 units maximum)
- BIOHOPK 277H. Biomechanics, Ecological Physiology, and Genetics of Intertidal Communities

Research and/or Teaching (maximum 6 units combined)—

- BIOHOPK 175H. Problems in Marine Ecology and Ecophysiology
- BIOHOPK 198H. Directed Instruction or Teaching
- BIOHOPK 199H. Undergraduate Research
- BIOHOPK 290H. Teaching of Biological Science
- BIOHOPK 300H. Research

See Biology degree requirements above for further information. Many of the Hopkins Marine Station courses may be used to fulfill department major requirements.

TYPICAL SCHEDULE FOR A FOUR-YEAR PROGRAM

FIRST YEAR

Subject and Catalog Number	*Qtr. and Units*		
	A	W	S
CHEM 31X*, 33, 35, 36. Chemical Principles and Organic Chemistry	4	4	7
MATH 19, 20, 21. Calculus and Analytic Geometry	3	3	4
Freshman requirements, seminars, or GERs	8	8	6
Totals	15	15	17

* This schedule varies slightly if the student takes CHEM 31A,B.

SECOND YEAR

BIO 41. Genetics, Biochemistry, and Molecular Biology*	5		
BIO 42. Cell Biology and Animal Physiology*		5	
BIO *or* BIOHOPK 43. Plant Biology, Evolution, and Ecology*			5
BIO 44X. Core Experimental Laboratory		5	
BIO *or* BIOHOPK 44Y. Core Experimental Laboratory			5
CHEM 130, 131. Organic Chemistry	4	3	
General Education Requirements	6	5	8
Totals	15	17	18

* Letter grade only.

THIRD YEAR

CHEM 135 (or 171). Physical Chemistry	3		
PHYSICS 21, 22, 23, 24. Introductory Physics	4	4	
General Education Requirements and/or electives	8	11	15
Totals	15	15	15

FOURTH YEAR

General Education requirements and/or Electives	15	15	15

FIELDS OF STUDY

In addition to the undergraduate major program described above, the department offers these six fields of study for students wishing to concentrate their studies in particular areas of biology:

1. Biochemistry and Biophysics
2. Ecology and Evolution
3. Marine Biology
4. Microbes and Immunity
5. Molecular and Cellular Biology
6. Neurobiology

These fields of study are declared on Axess at the time of the major declaration; they appear on the transcript but not on the diploma. Candidates for the B.S. degree in Biology with a field of study are required to complete the departmental honors program as well as the set of requirements outlined below.

BIOCHEMISTRY AND BIOPHYSICS

Candidates for the Biochemistry and Biophysics field of study must complete the following, which range from 99-115 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5

BIO *or* BIOHOPK 43	5

WRITING IN THE MAJOR (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIO 145*	4
BIOHOPK175H*	10

* These courses can also be used to count toward the elective requirement.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36, 130	15
CHEM 135 *or* 171	3
PHYSICS 41, 43, 45	12
MATH 51, 52	10
STATS 60 *or* BIO 141	4-5

REQUIRED BIOLOGY COURSES (MUST BE TAKEN FOR A LETTER GRADE):

BIO 104	3
BIO 118	5
BIO 129A *or* 129B	4
BIO 188	3

APPROVED BIOCHEMISTRY AND BIOPHYSICS COURSES (THREE OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

APPPHYS 136/BIOC 236	3
APPPHYS 192/292	3
BIO 132/232/APPPHYS/BIOPHYS/MCP 232	4
BIO 152/MCP 222	3
BIO 154/254/NBIO 254	4
BIO 189/289/CHEM 183/CHEMENG 183/283	3
BIO 214/BIOC 224	2-5
BIO 217	4
BIOE/RAD 220	3
BIOMEDIN 210	3
BIOMEDIN/BIOE/GENE 214/CS 274	3-4
BIOPHYS/SBIO 228	3
BIOPHYS/SBIO 241	3-5
CHEM 184	4
CHEM 185	3
EE 268	3
MCP 256	4
PHYSICS 105	4

Electives—7 units required. Electives must be 100-level or above and chosen from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

ECOLOGY AND EVOLUTION

Candidates for the Ecology and Evolution field of study must complete the following, which range from 97-126 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5
BIO 101* *or* BIOHOPK 172H*	3 or 5

* This course cannot also be used to count toward the elective requirement.

WRITING IN THE MAJOR (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIO 145*	4
BIOHOPK 175H*	10

* This course can also be used to count toward the elective requirement.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36	11
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 41, 42 *or* 51	5-10

REQUIRED EVOLUTIONARY BIOLOGY COURSE (ONE OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

BIO 113	4
BIO 136	4
BIO 143	3
BIOHOPK 166H	5

REQUIRED QUANTITATIVE METHODS COURSE (ONE OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

BIO 141	4-5
BIOHOPK 174H	3
CS 106A *or* 106X	3-5
STATS 60 *or* beyond	5

Electives—30 units required. Only one course can be taken credit/no credit. Electives must be from this approved list: BIO 101, 102, 117, 118, 121, 122, 125, 139, 144, 145, 146, 147, 175, 183, 184, 186, 215, 216; BIOHOPK 161H, 162H***, 163H, 166H, 171H, 172H, 173H*, 174H, 175H***, 182H***, 185H***; CHEM 130, 131; EARTHSYS 144/EESS 164; EESS 134, 158; GES 123, 240; OSPAUSTL 10**, 20**, 30**.

* Only 1 unit can count.

** Only 2 units can count.

***Only 6 units can count.

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

MARINE BIOLOGY

Candidates for the Marine Biology field of study must complete the following, which range from 92-129 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5

WRITING IN THE MAJOR (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIO 145	4
BIOHOPK 175H*	10

* This courses can also be used to count toward the approved courses.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 41, 42 *or* 19, 20, 21 *or* 51	5-10
STATS 60 *or* BIO 141 *or* BIOHOPK 174H	3-5

REQUIRED BIOLOGY COURSES (MUST BE TAKEN FOR A LETTER GRADE):

BIO 101	3
BIO 118	5
BIO 143	3

APPROVED COURSES (THREE OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

BIOHOPK 161H	5
BIOHOPK 162H	5-8
BIOHOPK 163H	4
BIOHOPK 164H	5
BIOHOPK 166H	5
BIOHOPK 171H	4

BIOHOPK 172H	5
OSPAUSTL 10, 20, and 30	9

APPROVED COURSES (ONE OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

BIOHOPK 175H	10
BIOHOPK 182H	16
BIOHOPK 184H	16

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

MICROBES AND IMMUNITY

Candidates for the Microbes and Immunity field of study must complete the following, which range from 87-121 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5

WRITING IN THE MAJOR AND INTRODUCTION TO LABORATORY SCIENCE (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIOHOPK 175H*	10

* This course can also be used to count toward the elective requirement.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 19, 20, 21 *or* 41, 42 *or* 51	5-10
BIO 141* *or* BIOHOPK 174H*	3-5

* This course cannot also be used to count toward the elective requirement.

REQUIRED COURSES IN MICROBIOLOGY, IMMUNOLOGY, MOLECULAR EVOLUTION (FOUR OF THE FOLLOWING; MUST BE TAKEN FOR A LETTER GRADE):

BIO 113	4
BIO 177	3
BIO 230	4
BIOHOPK 274	9-12
CEE 177	4
CEE 274A	3
CEE 274B	3
CEE 274D	3
IMMUNOL 185	3
IMMUNOL 202	3
MI 104	3
MI 211	3

REQUIRED COURSE IN READING SCIENTIFIC LITERATURE (ONE OF THE FOLLOWING, MUST BE TAKEN FOR A LETTER GRADE):

BIO 178	3
MI 185	3

Electives—12 units required. Electives must be 100-level or above and selected from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

MOLECULAR AND CELL BIOLOGY

Candidates for the Molecular and Cell Biology field of study must complete the following, which range from 97-118 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5

WRITING IN THE MAJOR (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIO 145*	4
BIOHOPK175H*	10

* These courses can also be used to count toward the elective requirement.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36, 130, 131	18
CHEM 135 *or* 171	3
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 41, 42 *or* 19, 20, 21 *or* 51	10
STATS 60 *or* BIO 141*	4-5

* This course cannot also be used to count toward the elective requirement.

REQUIRED BIOLOGY COURSES (MUST BE TAKEN FOR A LETTER GRADE):

BIO 104	3
BIO 118	5
BIO 129A, 129B	8
or BIO 160A, 160B	8

Electives—15 units required. Electives must be 100-level or above and selected from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

NEUROBIOLOGY

Candidates for the Neurobiology field of study must complete the following, which range from 98-120 total units:

CORE COURSES (MUST BE TAKEN FOR A LETTER GRADE):

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO *or* BIOHOPK 43	5

WRITING IN THE MAJOR (ONE OF THE FOLLOWING):

BIO 44X	5
BIO *or* BIOHOPK 44Y	5
BIO 145*	4
BIOHOPK175H*	10

* These courses can also be used to count toward the elective requirement.

REQUIRED FOUNDATIONAL BREADTH COURSES (TWO COURSES MAY BE TAKEN CREDIT/NO CREDIT):

CHEM 31A,B *or* 31X	4-8
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 *or* 28, 29	8-12
MATH 41, 42 *or* 19, 20, 21 *or* 51	10
STATS 60 *or* BIO 141*	4-5

* This course cannot also be used to count toward the elective requirement.

REQUIRED BIOLOGY COURSES (MUST BE TAKEN FOR A LETTER GRADE):

BIO 118 *or* 104	5
BIO 129A *or* 129B *or* 160A *or* 160B	4
BIO 150 *or* 163	4-5
BIO 154	4
BIO 158	4

Electives—15 units required. Electives must be at the 100-level or above and selected from the offerings in the Department of Bi-

ology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and/or research are allowed. Only one course can be taken credit/no credit.

Research Requirement—Admission to the departmental honors program; 10 units of BIO 199, 199X, or BIOHOPK 199H; poster or oral presentation; and honors thesis. Only research units from BIO or BIOHOPK are permitted.

HONORS

To graduate with departmental honors, a student must conduct an independent research project typically over the course of at least one year; projects are started no later than Autumn or Winter quarter of the junior year. Research must be done in a Biology Department lab or a lab in the Medical School for which the student has obtained prior approval. Administrative steps include:

1. Submit an honors proposal to the department's student services office two quarters prior to graduation. For instance, students graduating Spring Quarter must submit petitions no later than mid-Autumn Quarter.
2. Complete at least 10 units of an approved research project in BIO 199, 199X, or BIOHOPK 199H. Only research units from BIO or BIOHOPK are permitted.
3. Obtain at least a 3.0 (B) grade point average (GPA) in all Biology major requirements taken at Stanford (foundational breadth, core, and elective courses). Grades earned from teaching (BIO or BIOHOPK 290 and BIO 291) and research (BIOHOPK 175H, 199H; BIO 199, 199X) are not computed into this GPA.
4. If graduating in June, participate in the Biology Honors Symposium by presenting a poster or giving an oral presentation. The symposium is typically at the end of May. If graduating Autumn, Winter, or Summer Quarter, produce a poster to be displayed at the symposium.
5. Complete and submit, by the end of the quarter of graduation, two signed and bound copies of an honors thesis approved by at least two readers (one of whom must be from the faculty of the Department of Biology and both must be Academic Council members). In addition, students must submit two copies of the honors thesis abstract (one paper copy and one electronic copy), which include student name, thesis title, research sponsor, and sponsor's department.

Further information on the honors program is available in the student services office in Gilbert 108, as well as on the web at http://biohonors.stanford.edu.

MINOR IN BIOLOGY

Students interested in the minor in Biology must declare the minor and submit their course plan online via Axess no later than two quarters prior to the student's intended quarter of degree conferral. The Biology minor requires a minimum of six courses meeting the following criteria:

1. All courses must be taken for a letter grade.
2. All courses must be worth 3 or more units.
3. All courses, other than the Biology Core (41, 42, 43), must be at or above the 100-level. Stanford Introductory Seminars may not be used to fulfill the minor requirements.
4. Courses used to fulfill the minor may not be used to fulfill any other department degree requirements (minor or major).
5. At least one course from the Biology Core (41, 42 or 43) must be taken.
6. The Biology Core Laboratory courses (BIO 44X and BIO/BIOHOPK 44Y) do not count towards the minor.
7. Courses must be chosen from the offerings of the Department of Biology or the Hopkins Marine Station, or from the list of approved out-of-department electives (also available in the student services office).
8. Elective credit for research (BIO 199 or BIOHOPK 199H) is limited to a maximum of 3 units. BIO 199X is not allowable.

MASTER OF SCIENCE IN BIOLOGY

For information on the University's basic requirements for the M.S. degree, see the "Graduate Degrees" section of this bulletin. Students considering this degree option should meet with staff in the student services office prior to applying.

The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience. Students who have majored in related fields are eligible to apply, but course work equivalent to the preparation of a Stanford B.S. in Biology is strongly recommended. This includes course work in biology, chemistry, physics, and mathematics. The M.S. program does not have an M.S. with thesis option.

ADMISSIONS

The department only accepts M.S. program applications from matriculated Stanford students:

1. undergraduates wishing to pursue a coterminal MS degree.
2. graduate students from other Stanford programs wishing to pursue an MS degree.
3. current Biology PhD students wishing to leave the PhD program with an MS degree.

Undergraduates must apply in mid-January to start the program in Spring, Autumn, or the following Winter Quarter. Graduate students may apply by the third week of any academic quarter.

Required application materials—

1. Application for Admission, Preliminary Program Proposal, and Course Transfer Form
2. A statement of purpose which explains why the student wishes to enter the program and what the student plans to accomplish while in the program. The statement should also supply information about the student's science capabilities if his or her undergraduate academic record does not accurately reflect them.
3. Unofficial Stanford transcript
4. Two letters of recommendation, preferably from Biology faculty members in this department (if two such letters are not available, letters from faculty familiar with the student's ability to succeed in a graduate science curriculum are acceptable).
5. Application fee: an application fee is charged to all students regardless of outcome; application fee is applied directly to students' accounts.

GENERAL REQUIREMENTS

The M.S. program consists of Department of Biology and/or Hopkins Marine Station course work, approved out-of-department electives, and foundational breadth courses totaling at least 45 units at or above the 100-level, distributed as follows:

1. A minimum of 23 of the 45 units must be courses designated primarily for graduate students (200-level or higher).
2. A minimum of 36 units must be chosen from the offerings in the Department of Biology (BIO), Hopkins Marine Station (BIOHOPK), the list of approved out-of-department electives, research and teaching, and/or foundational breadth courses.
   a. a maximum of 18 of the 36 units may be a combination of Biology research, directed reading, and/or teaching (BIO 198, 198X, 290, 290X, 291, 300, 300X; BIOHOPK 175H, 198H, 290H, or 300H).
   b. a maximum of 9 units may be foundational breadth courses in chemistry, mathematics, statistics, computer science, and/or physics beyond the level required for the undergraduate degree in Biology and at least at the 100-level.
3. No more than 9 units may be other Stanford course work relevant to a student's professional development. Students are required to petition for courses that fall into this category using the General Petition form, (also available in the student services office).

Each candidate designs a coherent program of study in consultation with her or his department adviser. Although there are no

specific courses required, program proposals must adhere to department parameters.

In addition to the unit requirements outlined above, students must adhere to the following:

1. A program proposal, signed by the student's adviser and approved by the chair of the M.S. committee, must be filed by the third week of the first quarter of enrollment.
2. Students may take only 6 units CR/NC.
3. Students must maintain a GPA of 3.0 or higher.
4. Students must receive a grade of 'B-' or better in all courses taken for the degree.

Students not meeting these minimum requirements are subject to departmental academic review and/or dismissal.

The department's *Master of Science Handbook* has additional information about the program, University policy, and the department.

DOCTOR OF PHILOSOPHY IN BIOLOGY

For information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees" section of this bulletin. The training for a Ph.D. in Biology is focused on learning skills required for being a successful research scientist and teacher, including how to ask important questions and then devise and carry out experiments to answer these questions. Students work closely with an established adviser and meet regularly with a committee of faculty members to ensure that they understand the importance of diverse perspectives on experimental questions and approaches. Students learn how to evaluate critically pertinent original literature in order to stay abreast of scientific progress in their areas of interest. They also learn how to make professional presentations, write manuscripts for publication, and become effective teachers.

ADMISSIONS

Preparation for Graduate Study—Students seeking entrance to graduate study in Biology ordinarily should have the equivalent of an undergraduate major in Biology at Stanford. However, students from other disciplines, particularly the physical sciences, are also encouraged to apply. Such students are advised at the time of initial registration on how they should complete background training during the first year of graduate study. In addition to the usual basic undergraduate courses in biology, it is recommended that preparation for graduate work include courses in chemistry through organic chemistry, general physics, and mathematics through calculus.

Application, Admission, and Financial Aid—Prospective graduate students must apply via Stanford's online graduate application.

The department's program is divided into three separate areas of concentration:

- ecology/evolution/population studies
- integrative/organismal
- molecular/cellular/developmental/genetic/plant

Included in these concentrations is the option to conduct research at Hopkins Marine Station. These concentrations are recorded in the department as part of the admissions process and for tracking degree progress for admitted students; they do not appear on official university records.

Applicants are required to take the Graduate Record Examination (GRE) general test. The GRE subject test is not required. Applicants should plan on taking the GRE at least one month prior to the application deadline to ensure that official scores are available when applications are evaluated.

Admission to the Ph.D. program is competitive, and in recent years it has been possible to offer admission to approximately 10 percent of the applicants.

Applicants who are eligible should apply for nationally competitive predoctoral fellowships, especially those offered by the National Science Foundation.

Admitted students are typically offered financial support in the form of Stanford Graduate Fellowships, research assistantships, NIH traineeships, or Biology fellowships.

GENERAL REQUIREMENTS

The following requirements must be completed by all students:

1. *First year advising.* Each entering student meets with the first-year advising committee within the first two weeks of Autumn Quarter and again no later than May 15. The committee reviews the student's previous academic work and current goals and advises the student on a program of Stanford courses, some of which may be required and others recommended. Completion of the core curriculum listed below under "Track Specific Requirements" is required of all students.
2. *Ethics*. Students must take a course on the ethical conduct of research: BIO 312 for ecology/evolution/population studies; MED 255 for integrative/organismal and molecular/cellular/developmental/genetic/plant.
3. *Teaching.* Teaching experience and training are part of the graduate curriculum. Each student assists in teaching one course in the department's core lecture (41, 42, or 43) or lab (44X, 44Y) series, and a second course that can be either a core course or other Biology or Hopkins Marine Station course. A third quarter of teaching is required for ecology, evolution, and population studies students.
4. *Seminars.* Graduate seminars devoted to current literature and research in particular fields of biology are an important means of attaining professional perspective and competence. Seminars are presented under individual course listings or are announced by the various research groups. Topics of current biological interest are presented by speakers from Stanford and other institutions. During the first year of study, graduate students are required to attend seminars and make one formal seminar presentation which must be evaluated by a minimum of two Academic Council faculty members.
5. *Fellowship application.* All eligible first and second year students must apply for a National Science Foundation fellowship.
6. *Adviser/lab selection.* By April, each first-year student is required to have selected a lab in which to perform dissertation research and to have been accepted by the faculty member in charge.
7. *Qualifying exam and advancement to candidacy.* During the second year, students are required to write a dissertation proposal which is evaluated by a committee of three faculty (the dissertation advising committee) in an oral presentation. Track-specific deadlines are listed below. Advancement to candidacy depends on satisfactory completion of the dissertation proposal.
8. *Advising meetings.* Students must meet regularly with their advising committees. For more details, see the Biology PhD Handbook.
9. *Publishable manuscript.* Each student must complete one publishable manuscript (paper) for which s/he is the major contributor.
10. *Residency requirement.* A minimum of 135 units of graduate registration is required of each candidate at the time of graduation.
11. *Doctoral dissertation.* A completed draft of the dissertation must be turned in to the student's oral examination at least one month before the oral exam is scheduled to take place. The dissertation must be presented to an oral examination committee comprised of at least five faculty members. In addition, the final written dissertation must be approved by the student's reading committee (a minimum of three approved faculty), and submitted to the Registrar's Office. Upon completion of this final requirement, a student is eligible for conferral of the degree.

TRACK SPECIFIC REQUIREMENTS

In addition to the general requirements listed above, students must also complete requirements within their concentration.

Molecular, Cellular, Developmental, Genetic, and Plant—

1. *First year:*
   a. *core curriculum:** Students are required to take the following courses for a letter grade:
      BIO 203. Advanced Genetics
      BIO 214/BIOC 224/MCP 221. Advanced Cell Biology
      BIO 301. Frontiers in Biology
      (satisfies first-year talk requirement; must be taken Autumn and Winter quarters)
      And one of the following for a letter grade :
      BIOC/BIOPHYS/SBIO 241. Biological Macromolecules
      BIOC 201. Advanced Molecular Biology
      CSB 210. Signal Transduction Pathways and Networks
      MCP 256. How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
      And three additional courses in the student's area of interest, or as advised by committee. These courses must be offered for at least three units and must be taken for a letter grade.
   b. *lab rotations:** First-year students are required to complete rotations in at least two but not more than three different laboratories. The first rotation must be in a lab in the Department of Biology.

* Written petitions for exemptions to core curriculum and lab rotation requirements are considered by the advising committee and the chair of the graduate studies committee. Approval is contingent upon special circumstances and is not routinely granted.

2. *Second year:* Each student must pass a two-part qualifying exam.
   a. *dissertation proposal:* During Autumn quarter of the second year, the student must prepare a written dissertation proposal that outlines the student's projected dissertation research, including an expert assessment of the current literature; deadline is November 1. An oral examination is held after submission of the written proposal to the dissertation advising committee; deadline is November 15. The student's adviser is a silent member of the examination committee; the other members of the dissertation advising committee can provide feedback. Advancement to candidacy is contingent upon completion of the dissertation proposal and oral exam.

Integrative/Organismal—

1. *First year:*
   a. *core curriculum*: Students are required to take BIO 306. Current Topics in Integrative and Organismal Biology. Students specializing in integrative biology may also be asked to take appropriate graduate-level courses as advised by committee.
   b. *first-year paper:* Students must submit a paper that is evaluated by a minimum of two Academic Council faculty members by May 1. This paper should be a step toward the development of a dissertation proposal and may consist of an analysis of new data or a literature review and synthesis.
2. *Second year:* Each student must pass a two-part qualifying exam.
   a. *dissertation proposal:* During Spring Quarter of the second year, the student must prepare a written dissertation proposal that outlines the student's projected dissertation research, including an expert assessment of the current literature. An oral examination is held after submission of the written proposal to the dissertation advising committee comprised of three faculty members. Advancement to candidacy depends on completion of the dissertation proposal and oral exam. The written proposal is due by May 15, and the oral defense must take place no later than June 15. Advancement to candidacy depends on completion of the dissertation proposal and oral exam.

Ecology, Evolution, and Population Studies—

1. *First year:*
   a. *core curriculum:* Students are required to take BIO 302, 303, 304: Current Topics and Concepts in Population Biology, Ecology, and Evolution.
   b. *first-year paper:* The paper should be read, commented upon, and agreed to as satisfactory by two EcoEvo faculty by May 15. This can be satisfied in a number of ways which all involve new writing**,** undertaken since entering the Stanford program. These may include:
      1. a new draft research manuscript (a previously published paper is not acceptable).
      1. some other piece of new writing, such as a review paper from a course, or an initial literature review of a potential thesis topic. In this case the paper should ordinarily be not less than 10 double-spaced pages in usual sized font, and not more than 10 single spaced pages, plus references. It should be written in the style of a standard scientific paper.
2. *Second year:* Each student must pass a two-part qualifying exam.
   a. *dissertation proposal:* The student should form her/his thesis committee well before the anticipated date of dissertation proposal defense, and should consult committee members in a timely manner to make sure their expectations are clearly understood, and to allow time to produce a professionally effective written proposal. In general, the student should prepare a written document and spoken presentation sufficient to support a 30 minute presentation of the goals of the thesis, typically including preliminary data, models, etc. as appropriate which are relevant to at least the first goal, and should be prepared thereafter to discuss questions raised by the committee in professional scientific depth. An oral examination is held after submission of the written proposal to the dissertation advising committee comprised of three faculty members. The written proposal is due by May 15, and the oral defense must take place no later than June 15. Advancement to candidacy depends on completion of the dissertation proposal and oral exam.

OVERSEAS STUDIES COURSES IN BIOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site or the Bing Overseas Studies web site. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

AUSTRALIA

OSPAUSTL 10. Coral Reef Ecosystems. 3 units (2 allowable for the Biology major), Kevin Arrigo, Sophie Dove, Selina Ward, GER:DB:EngrAppSci

OSPAUSTL 20. Coastal Resource Management. 3 units (2 allowable for the Biology major), Ron Johnstone, GER:DB:EngrAppSci

OSPAUSTL 30. Coastal Forest Ecosystems. 3 units (2 allowable for the Biology major), Norman Duke, John Hall, GER:DB:EngrAppSci

WINTER QUARTER

SANTIAGO

OSPSANTG 27. Humans and the Environment: the Great Transition. 3 units, Shripad Tuljapurkar, GER:DBHumanities

SPRING QUARTER

SANTIAGO

OSPSANTG 85. Marine Ecology of Chile and the South Pacific. 5 units, Alvaro Palma, GER:DB:NatSci

BIOLOGY, HOPKINS MARINE STATION

Emeritus: (Professor) David Epel
Director: Stephen R. Palumbi
Associate Director: George N. Somero
Professors: Barbara A. Block, Mark W. Denny, William F. Gilly, Fiorenza Micheli, Stephen R. Palumbi, George N. Somero, Stuart H. Thompson
Assistant Professor: Christopher J. Lowe
Lecturer: James Watanabe
Station Offices: 120 Oceanview Blvd., Pacific Grove, CA 93950
Phone: (831) 655-6200
Email: information@marine.stanford.edu
Web Site: http://hopkins.stanford.edu

Courses offered by Hopkins Marine Station have the subject code BIOHOPK, and are listed in the "Biology, Hopkins Marine Station [BIOHOPK] Courses" section of this bulletin.

The Hopkins Marine Station, located 90 miles from the main University campus in Pacific Grove, was founded in 1892 as the first marine laboratory on the west coast of North America. The modern laboratory facilities on the 11-acre campus on Cabrillo Point house nine faculty, all members of the Department of Biology. The Miller Library has a collection of literature in marine science. The Hopkins faculty offers undergraduate and graduate courses in biology which focus on the marine realm and involve topics including oceanography, environmental and comparative physiology, molecular evolution, biomechanics, cellular biology, conservation biology, and neurobiology and behavior. Most courses have laboratory sections that exploit the potential of working with readily available marine plants and animals. Small class sizes encourage close student-faculty interactions. Undergraduates have opportunities to carry out research projects with Hopkins faculty during the academic year or summer months. Courses are offered in Winter, Spring, and Summer quarters.

Courses at Hopkins Marine Station can satisfy many requirements, from the Natural Sciences GER to major and minor requirements in departments housed in the Schools of Engineering, Humanities and Sciences, and Earth Sciences. Students are encouraged to check with their department's student services office to see which courses at Hopkins may be used to fulfill major or minor requirements.

SUMMER PROGRAM AT HOPKINS MARINE STATION

The summer program is open to advanced undergraduate, graduate students, and postdoctoral students, and to teachers whose biological backgrounds, teaching, or research activities can benefit from a summer's study of marine life. Applications, deadlines, and further information are available at http://hopkins.stanford.edu.

BIOPHYSICS

Emeritus: Harden M. McConnell (Chemistry)
Director: Vijay Pande (Chemistry)
Professors: Russ Altman (Genetics, Medical Informatics), Steve Block (Applied Physics, Biology), Steven Boxer (Chemistry), Axel Brunger (Molecular and Cellular Physiology), Gilbert Chu (Oncology), Mark Davis (Microbiology and Immunology), Sebastian Doniach (Physics, Applied Physics), James Ferrell (Chemical and Systems Biology), Daniel Fisher (Applied Physics), K. Christopher Garcia (Molecular and Cellular Physiology, Structural Biology), Gary Glover (Radiology), Philip C. Hanawalt (Biology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Theodore Jardetzky (Structural Biology), Chaitan Khosla (Chemical Engineering, Chemistry), Brian Kobilka (Molecular and Cellular Physiology), Eric Kool (Chemistry), Ron Kopito (Biology), Roger D. Kornberg (Structural Biology), Michael Levitt (Structural Biology), Richard Lewis (Molecular and Cellular Physiology), Uel J. McMahan (Neurobiology), Tobias Meyer (Chemical and Systems Biology), W. E. Moerner (Chemistry), Norbert Pelc (Bioengineering, Radiology), Joseph D. Puglisi (Structural Biology), Stephen Quake (Bioengineering), Stephen J. Smith (Molecular and Cellular Physiology), Edward I. Solomon (Chemistry), James A. Spudich (Biochemistry, Developmental Biology), William I. Weis (Structural Biology, Molecular and Cellular Physiology), Richard N. Zare (Chemistry)
Associate Professors: Annelise Barron (Bioengineering), Judith Frydman (Biology), Pehr Harbury (Biochemistry), Craig Levin (Radiology), Vijay Pande (Chemistry), Julie Theriot (Biochemistry)
Assistant Professors: Zev Bryant (Bioengineering), Lynette Cegelski (Chemistry), Xiaoyuan Chen (Radiology), Jennifer Cochran (Bioengineering), Bianxiao Cui (Chemistry), Rhiju Das (Biochemistry), Alexander Dunn (Chemical Engineering), Miriam Goodman (Molecular and Cellular Physiology), KC Huang (Bioengineering), Merritt Maduke (Molecular and Cellular Physiology), Jianghong Rao (Radiology), Ingmar Riedel-Kruse (Bioengineering), Mark Schnitzer (Biology, Applied Physics), Jan Skotheim (Biology), Andrew Spakowitz (Chemical Engineering)

Program Offices: Fairchild Building D118
Mail Code: 94305-5126
Phone: (650) 723-7576
Email: biophysics@med.stanford.edu
Web Site: http://med.stanford.edu/biophysics

Courses offered by the Biophysics Program are listed under the subject code BIOPHYS on the *Stanford Bulletin's* ExploreCourses web site.

The Biophysics Program offers instruction and research opportunities leading to the Ph.D. in Biophysics. Students admitted to the program may perform their graduate research in any appropriate department.

GRADUATE PROGRAM IN BIOPHYSICS

For information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees" section of this bulletin.

A small number of qualified applicants are admitted to the program each year. Applicants should present strong undergraduate backgrounds in the physical sciences and mathematics. The graduate course program, beyond the stated requirements, is worked out for each student individually with the help of appropriate advisers from the Committee on Biophysics. The requirements and recommendations for the Ph.D. degree include:

1. Training in a major with connections to biophysics such as physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford.
2. Completion of the following background courses or their equivalents at other institutions:
   a. CHEM 131, 171, 173, and 175
   b. BIOC 200, 201
3. Completion of the following courses or their equivalents:
   a. SBIO 241 and 242
   b. at least four additional graduate level courses in physical or biological science, with at least one in physical science and one as a literature-based biological science course
   c. BIOPHYS 250
   d. MED 255
4. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.
5. The student must prepare a dissertation proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Winter Quarter of the third year, and it must be approved by a committee of at least

three members, including the principal research adviser and at least one member from the Biophysics Program. The candidate must defend the dissertation proposal in an oral examination. The dissertation reading committee normally evolves from the dissertation proposal review committee.

6. The student must present a Ph.D. dissertation as the result of independent investigation that expresses a contribution to knowledge in the field of biophysics.
7. The student must pass the University oral exam, taken only after the student has substantially completed the dissertation research. The examination is preceded by a public seminar in which the research is presented by the candidate.

CHEMISTRY

Emeriti: (Professors) Hans C. Andersen, John I. Brauman, James P. Collman, Carl Djerassi, Harden M. McConnell, Robert Pecora, John Ross
Chair: Richard N. Zare
Vice Chair: Wray H. Huestis
Professors: Steven G. Boxer, Hongjie Dai, Michael D. Fayer, Keith O. Hodgson, Wray H. Huestis, Chaitan Khosla, Eric T. Kool, Todd J. Martinez, W. E. Moerner, Edward I. Solomon, Barry M. Trost, Robert M. Waymouth, Paul A. Wender, Richard N. Zare
Associate Professors: Christopher E. D. Chidsey, Justin Du Bois, Vijay S. Pande, T. Daniel P. Stack
Assistant Professors: Lynette Cegelski, Bianxiao Cui, Matthew Kanan
Courtesy Professors: Stacey F. Bent, Curtis W. Frank, Daniel Herschlag, Thomas J. Wandless
Courtesy Associate Professors: James K. Chen, Karlene A. Cimprich
Courtesy Assistant Professor: Jianghong Rao
Lecturers: Charles Cox, John A. Flygare, Hillary Hua, Jennifer Schwartz
Director of Undergraduate Laboratories: Hillary Hua

* The curriculum leading to the B.S. degree in Chemical Engineering is described in the "School of Engineering" section of this bulletin.

Department Offices: 121 S. G. Mudd
Mail Code: 94305-5080
Phone: (650) 723-2501
Web Site: http://stanford.edu/dept/chemistry

Courses offered by the Department of Chemistry are listed under the subject code CHEM on the *Stanford Bulletin's* ExploreCourses web site.

Chemistry is central to many scientific disciplines and plays an important role in the emerging areas of biotechnology, catalysis, health, and materials science. Developing new probes of biological molecules, modeling of protein folding and reactivity, manipulation of carbon nanotubes, development of new oxidation and polymerization catalysts, and synthesis of organic molecules for probing ion-channels are all research areas that are pursued actively in the Chemistry Department. The overarching theme of these pursuits is a focus at the atomic and molecular levels, whether this concerns probing the electronic structure and reactivity of molecules as small as dihydrogen or synthesizing large polymer assemblies. The ability to synthesize new molecules and materials and to modify existing biological structures allows the exploration of properties of well-defined systems.

MISSION OF THE UNDERGRADUATE PROGRAM IN CHEMISTRY

The mission of the undergraduate program in Chemistry is to provide students with the fundamental concepts driving the molecular sciences. Students in the program acquire in-depth knowledge of the principles of chemistry, the methodologies necessary to solve problems in the field's subdisciplines through course work and laboratory experiences, and the ability to articulate their ideas effectively to the scientific community. The Chemistry program also has a long-standing tradition of encouraging undergraduate majors to become involved in research during the academic year and through a ten-week summer research program. The major is designed to provide students with excellent preparation for further study in graduate or professional schools as well as careers in chemistry.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. that they understand the mechanics of working problems by correctly solving basic problems using mathematical and theoretical tools.
2. a conceptual understanding of the theory required to execute problems.
3. that they are able to obtain chemical insight from working problems relevant to chemical questions.
4. that they are able to make connections between their solutions to theoretical problems and the physical world.
5. an understanding of the relationship between theory and experiment in order to use theory to determine chemically important information from experimental data.

CHEMISTRY PREMEDICAL RECOMMENDATIONS

The department recommends that students interested in a health profession take the following courses for a letter grade: 31A,B or 31X, 33, 35, 36, 130, 131, 135 or 171, and 181. Historically, these courses have fulfilled the chemistry requirements at most medical schools. For information on medical school advising and resources, please download the Undergraduate Advising and Research publication at http://ual.stanford.edu/pdf/uar_medschool.pdf.

GRADUATE PROGRAMS IN CHEMISTRY

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

CHEMISTRY GENERAL REQUIREMENTS

Placement Examinations—Each new graduate student must take placement examinations upon entrance. These consist of three written examinations of two hours each in the fields of inorganic, organic, and physical chemistry, and cover such material as ordinarily is given in a rigorous one-year undergraduate course in each of these subjects. Students majoring in biophysical chemistry or chemical physics must take examinations in biophysical or chemical physics, physical chemistry, and organic or inorganic chemistry. All placement examinations are given the week before instruction begins in Autumn Quarter, and must be taken at that time. Each new graduate student meets with a member of the graduate study committee to define a program of courses based on results of the placement examinations.

Candidates for advanced degrees must have a minimum grade point average (GPA) of 3.0 for all Chemistry lecture courses as well as for all courses taken during graduate study. Required courses must be taken for a letter grade. Most course work ends in the second year of studies, and students will then focus on full-time dissertation research. All prospective Ph.D. candidates, regardless of the source of financial support, are required to gain teaching experience as an integral part of graduate training. During the period in which a dissertation is being read by members of the faculty, candidates must be available for personal consultation until the dissertation has received final department approval.

CHEMISTRY FELLOWSHIPS AND SCHOLARSHIPS

In addition to school fellowships and scholarships open to properly qualified students, there are several department fellowships in chemistry. Undergraduate scholarships are administered through the Financial Aid Office. Teaching assistantships and research assistantships are open to graduate students. Graduate fellowships, scholarships, and teaching assistantships are administered through the Department of Chemistry.

BACHELOR OF SCIENCE IN CHEMISTRY

Entrance Preparation—Entrance credit in the preparatory subjects of chemistry, physics, and especially mathematics provides

flexibility in creating a four-year schedule for students intending to major in Chemistry.

Requirements—

Chemistry option: University Writing and General Education Requirements; CHEM 31A and B or 31X, 33, 35, 36, 130, 131, 132, 134, 151, 153, 171, 173, 174, 175, 176; MATH 41, 42, 51, 53, or CME 100, 102, 104; PHYSICS 41, 43, 44, 45, 46.

Biological chemistry option: University Writing and General Education Requirements; CHEM 31A and B or 31X, 33, 35, 36, 130, 131, 132, 134, 151, 171, 173, 176, 181, 183, 184, 185; BIO 42; MATH 41, 42, 51, 53, or CME 100, 102, 104; PHYSICS 41, 43; a graduate-level elective course related to the student's biochemical interests, selected from: CHEM 221, 223, 225, 227, 235, 255, 271, 285, 297, CSB 220, 260, BIOC 241, BIOPHYS 232, BIOE 214, 222B, 300A, 331, 335, BIO 203, 213, 214, 230, or 232; with a strong recommendation for CHEM 227.

In addition, CS 106A and B are recommended for students planning graduate study. All degree courses must be taken for a letter grade. For further information on the undergraduate program, see http://www.stanford.edu/dept/chemistry/academic/under.

TYPICAL SCHEDULE FOR A FOUR-YEAR PROGRAM: CHEMISTRY OPTION

FIRST YEAR

Subject and Catalog Number	*Qtr. and Units*		
	A	*W*	*S*
CHEM 31X. Chemical Principles	4		
CHEM 33. Structure and Reactivity		4	
CHEM 35. Organic Monofunctional Compounds			4
CHEM 36. Organic Chemistry Laboratory I			3
MATH 41,42,51. Calculus, Linear Equations	5	5	5

SECOND YEAR

CHEM 130. Organic Chemistry Laboratory II	4		
CHEM 131. Organic Polyfunctional Compounds	3		
CHEM 132. Synthesis Laboratory		3	
CHEM 134. Analytical Chemistry Laboratory			5
MATH 53. Differential Equations			5
PHYSICS 41,43,44. Mechanics, Electricity and Magnetism		4	5

THIRD AND FOURTH YEARS

CHEM 151,153. Inorganic Chemistry		3	3
CHEM 171,173,175. Physical Chemistry	3	3	3
CHEM 174,176. Physical Chemistry Laboratory		4	3
PHYSICS 45,46. Light and Heat	5		

* Elective courses must be used to complete the University Writing, General Education, and Language Requirements. They may also be used to broaden one's background in science and non-science areas and to provide an opportunity for advanced study in Chemistry. Courses offered by other departments that may be of interest to Chemistry majors include BIO 41, 42, 43; CHEMENG 20, 120A,B, 130; CS 106A,B; ECON 1; ENGR 50; MATH 52, 106, 109, 113, 131; MATSCI 50; PHYSICS 110; STATS 60, 110, 116.

American Chemical Society Certification

Students who wish to be certified as having met the minimum requirements of the American Chemical Society for professional training must complete, in addition to the above requirements, CHEM 181 and 183, and 6 units of CHEM 190.

HONORS PROGRAM

A B.S. degree in Chemistry with honors is available to those students interested in chemical research. Admission to the honors program requires a scientific grade point average (GPA) of 3.3 and an overall GPA of 3.0 in all University courses. Beyond the standard B.S. course requirements for each track, 9 units of CHEM 190 research credit, and 9 units of course work need to be completed during the junior and senior academic years. A thesis, approved by a Chemistry research adviser, must be completed during the senior year. Theses must be completed by May 15 to be considered for the Firestone or Golden award. The use of a single course for multiple requirements for honors, major, minor, or coterminal requirements is not allowed. Students who wish to be admitted to the honors program should register in the department student services office in the Mudd Chemistry Building in Spring Quarter of their junior year.

CHEM 190 research units towards honors may be completed, once accepted into the program, in any laboratory within Chemistry or with courtesy faculty in Chemistry. Other chemical research can be approved through a formal petitioning of the undergraduate studies committee. At least 3 units of CHEM 190 must be completed during the senior year. Participation in a summer research program in an academic setting between junior and senior years may be used in lieu of 3 units of CHEM 190. For each quarter, a progress report reflecting the units undertaken is required. This report must be signed by the Chemistry faculty adviser and filed in the department student services office in Mudd Chemistry before the last day of finals in the quarter during which the research is performed.

The 9 units of course work must be completed from courses approved by the undergraduate studies committee and taken for a letter grade. At least six of these units need to be taken from the following CHEM courses: 153, 174, 175, 181, 183, 185, 221, 223, 225, 235, 251, 253, 255, 271, 273, 275, 297. Courses from Mathematics (MATH 114 or higher), Physics (PHYSICS 100 or higher), Engineering, and Structural Biology or Biochemistry in the School of Medicine can be used to fulfill this requirement.

CHEMISTRY TEACHING CREDENTIALS

The requirements for certification to teach chemistry in the secondary schools of California may be ascertained by consulting the section on credentials under the "School of Education" section of this bulletin and the Credential Administrator of the School of Education.

MINOR IN CHEMISTRY

Courses required for a minor are CHEM 33, 35, 36, 130, 131, 134, 151, 171. MATH 51 is a pre-requisite for CHEM 171.

MASTER OF SCIENCE IN CHEMISTRY

The Master of Science is available only to current Ph.D. students or as part of a coterminal program. Applicants for the M.S. degree in Chemistry are required to complete, in addition to the requirements for the bachelor's degree, a minimum of 45 units of work and a M.S. thesis. Of the 45 units, approximately two-thirds must be in the department and must include at least 12 units of graduate level lecture courses exclusive of the thesis. Of the 12 units, at least 6 units must be from CHEM 221, 223, 225, 235, 251, 253, 255, 271, 273, 275, 276, 277, 280, 285, or 297.

PH.D. MINOR IN CHEMISTRY

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in chemistry must complete, with a GPA of 3.0 or higher, 20 graduate-level units in Chemistry including four lecture courses of at least 3 units each.

CHEMISTRY COURSES

WIM indicates that the course satisfies the Writing in the MAjor requirements.

Note—Lab fees are a minimum of $75 per quarter and are not refundable.

DOCTOR OF PHILOSOPHY IN CHEMISTRY

Graduate students are eligible to become formal candidates for the Ph.D. degree after taking the department placement examinations, satisfactorily completing most of the formal lecture course requirements, and beginning satisfactory progress on a dissertation research project. They then file for admission to candidacy for the Ph.D. degree. This filing must be done before June of the second year of graduate registration.

After taking the departmental placement examinations, students select research advisers by first interviewing members of the Chemistry faculty about their research. Students then file an Application to Start Research form with the Department of Chemistry

graduate study committee and begin research on their Ph.D. dissertation under the supervision of the adviser. All students in good standing are required to start research by the end of Winter Quarter of the first year of graduate registration.

There is no foreign language requirement for the Ph.D. degree.

Candidates for the Ph.D. degree are required to participate continually in the department colloquium (CHEM 300), and in the division seminar of the major subject. In addition, continuous enrollment in CHEM 301 is expected after the student has chosen a research supervisor. As part of graduate training, Ph.D. candidates are required to gain experience as teaching assistants.

Before candidates may request scheduling of the University oral examination, clearance must be obtained from the major professor and the chair of the department's Graduate Study Committee. Conditions that must be fulfilled before clearance is granted vary with the different divisions of the department and may be ascertained by consulting the chair of the committee.

It is the policy of the department to encourage and support in every possible way the pursuit of research and other advanced work by qualified students. Information about faculty members with lists of their recent research publications is found in *Chemistry at Stanford, the Directory of Graduate Research* published by the American Chemical Society, and at http://www.stanford.edu/dept/chemistry/faculty.html.

COURSE REQUIREMENTS

Students may major in biophysical, inorganic, organic, or physical chemistry. All graduate students are required to take six graduate-level lecture courses (course numbers greater than 199) of at least 3 units each in chemistry or related disciplines (for example, biochemistry, electrical engineering, mathematics, pharmacology, physics, and so on), to be selected in consultation with their research adviser and the Graduate Study Committee. At least four of these courses should be taken by the end of the first year. Required courses must be taken for a letter grade.

In addition, students majoring in organic chemistry must take 3 units of CHEM 231 in the second year and 3 units of 233 in the second and third year. Students in physical or biophysical chemistry or chemical physics must take CHEM 271, 273, and 275 in the first year, and 2 units of CHEM 278 in the second and third year. Students majoring in inorganic chemistry must take 3 units of CHEM 258 in the second, third, and fourth year.

CHEMICAL PHYSICS

Students with an exceptionally strong background in physics and mathematics may, upon special arrangement, pursue a program of studies in chemical physics.

CLASSICS

Emeriti: (Professors) Mark W. Edwards, Marsh H. McCall, Jr.,* Susan Treggiari, Michael Wigodsky; (*Professor, Teaching*) Edward Spofford
Chair: Richard Martin (Interim)
Graduate Director: Jennifer Trimble
Undergraduate Director: Maud Gleason
Professors: Alessandro Barchiesi, Andrew M. Devine, Richard P. Martin, Ian Morris (Classics, History), Reviel Netz, Andrea Nightingale (Classics, Comparative Literature; on leave Winter), Josiah Ober (Classics, Political Science), Anastasia-Erasmia Peponi (*Teaching*), M. Rush Rehm (Classics, Drama), Richard Saller (Classics, History), Walter Scheidel (on leave), Michael Shanks, Susan A. Stephens
Associate Professors: Jody Maxmin (Art and Art History, Classics), Grant Parker, Jennifer Trimble
Assistant Professors: Giovanna Ceserani, Christian Kaesser
Courtesy Professors: Chris Bobonich, Ian Hodder, Bissera Pentcheva, Yiqun Zhou
Lecturers: Maud Gleason, John Klopacz

* Recalled to active duty.

Department Offices: Building 110, Main Quad
Mail Code: 94305-2145
Phone: (650) 723-0479
Email: classics@stanford.edu
Web Site: http://classics.stanford.edu

Courses offered by the Department of Classics are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes CLASSART (Classics Art/Archaeology), CLASSGEN (Classics General), CLASSGRK (Classics Greek), CLASSHIS (Classics History), and CLASSLAT (Classics Latin).

The study of Classics has traditionally centered on the literature and material culture of ancient Greece and Rome, including Greek and Latin language, literature, philosophy, history, art, and archaeology. At Stanford, Classics also explores connections with other ancient cultures and with the modern world, as well as specialized fields such as ancient economics, law, papyrology, and science. The department's faculty approaches Classics from an interdisciplinary perspective that crosses geographical, temporal, and thematic territories. Studying ancient epic poetry can lead to looking at modern cinema afresh; ancient Athenian politics opens new perspectives on modern politics; and the study of Rome presents parallels with other empires just as Latin illuminates the history of English and the Romance languages. In short, Classics at Stanford is an interdisciplinary subject concerned not only with Greek and Roman civilization but also with the interaction of cultures and societies that influenced the ancient Mediterranean basin and continue to influence human society across the globe.

MISSION OF THE UNDERGRADUATE PROGRAM IN CLASSICS

The mission of the undergraduate program in Classics is to provide students with a broad background centered on the literature and material culture of ancient Greece and Rome, including Greek and Latin language, literature, philosophy, history, art, and archaeology. At Stanford, students in the Classics program also explore the connections between ancient cultures and the modern world as well as specialized fields such as ancient economics, law, papyrology, and science. The program's faculty approaches Classics from an interdisciplinary perspective that crosses geographical, temporal and thematic territories. The program is concerned not only with Greek and Roman civilization but also with the interaction of cultures and societies that influenced the ancient Mediterranean basin and continue to influence human society across the globe.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. The ability to develop effective and nuanced lines of interpretation.
2. Critical thinking skills using primary source materials.
3. Facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. Well-developed analytical writing skills and close reading skills.

The department offers the following fields of study for undergraduate degrees in Classics:

- Classical Studies
- Ancient History
- Greek
- Latin
- Greek and Latin

The Classical Studies, Greek, and Latin fields of study may also be taken with a Philosophy and Literature focus. The Classics major can be completed in conjunction with a second major in the

sciences or in other humanities departments.

The department also offers minors in: Classical Languages, Ancient History, Literature and Philosophy, and Classical Studies.

BACHELOR OF ARTS IN CLASSICS

Those interested in majoring in Classics are encouraged to declare by the beginning of their junior year, but are urged to discuss their plans with the undergraduate director as early as possible. Students who choose the Greek and Latin field of study (option 5 below) should begin the curriculum as soon as possible because it is difficult to complete the language requirements without an early start; those with no previous knowledge of Latin or Greek should begin study in the freshman year, in a summer program following freshman year, or at the beginning of the sophomore year.

To declare the major, a student must fill out the Declaration of Major on Axess and meet with the undergraduate director in the Department of Classics. At that time, the undergraduate director assigns the student a department adviser. To build a mentoring relationship, students meet with their adviser at least once a quarter. The student should then schedule an orientation with the student services officer. Each student's progress towards fulfillment of the major requirements is recorded in a file kept in the student services officer's office. It is the student's responsibility to work with the adviser to keep this file up to date.

A letter grade is required in all courses taken for the major. No course receiving a grade lower than 'C' is counted toward fulfilling major requirements. Enrollment in an independent study section (CLASSGEN 160) requires the prior approval of the undergraduate director, and a maximum of three such enrollments for a maximum total of 10 units may be counted toward the major.

The B.A. degree may be earned by fulfilling the requirements for one of the following fields of study. Option 6 below describes how to add a Philosophy and Literature focus to some of the maior plans.

1. *Classical Studies:* This field of study is declared on Axess. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region. This major is recommended for students who wish to study classical civilizations in depth but do not wish to study the languages to the extent required by options 4, 5 and 6. It is not suitable for students who wish to do graduate work in Classics or to teach Latin or Greek in high school, as the language work is insufficient for these purposes. Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar (WIM).
   b. at least two courses in Latin or Greek at the 100 level or higher, *or* one course in one of the languages at the 100 level or higher, plus the series 1, 2, 3, or 51, 52 in the other language (or an equivalent approved by the department).
   c. remaining units fulfilled by courses with the prefix CLASSART, CLASSGEN, CLASSHIS, CLASSLAT or CLASSGRK (or IHUM 39A,B or IHUM 69A). Courses listed in the department's cognate course list may also count towards the major with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.
2. *Ancient History:* This field of study is declared on Axess. Courses chosen must be approved in advance and in writing by the undergraduate director. Approval should be submitted to the student services officer for the student's academic file. With the written approval of the instructor and the undergraduate director, students may substitute graduate seminars in ancient history for some of these courses. Students are also encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region. Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses and must satisfy four requirements:
   a. CLASSGEN 176. Majors Seminar (WIM).
   b. *Core requirement:* majors must take at least two survey courses in ancient history.
   c. *Depth requirement:* majors must take at least 33 units of ancient history and civilization courses, drawn from courses with CLASSHIS, CLASSGEN and CLASSART prefixes. IHUM 39A,B, Inventing Classics, or IHUM 69A, History of the World, may be counted toward this requirement. CLASSGRK and CLASSLAT courses may also count toward this requirement if approved by the undergraduate director.
   d. *Breadth requirement:* majors must take at least 4 units in each of the following areas: archaeology and art; comparative ancient civilizations; and historical and social theory. IHUM 39A,B, Inventing Classics, may be counted toward this requirement. The courses chosen must be approved in advance by the undergraduate director, and are normally chosen from the list of areas below, although courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director. Written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.
      1. archaeology and art: for example, any CLASSART course; IHUM 40B, ARCHLGY 1/ANTHRO 3, or any 100-level archaeology course.
      2. comparative ancient civilizations: majors must take a course on the ancient world outside the Mediterranean and western Asia, such as ANTHRO 3, 97/297, 142, 100A.
      3. historical and social theory: for example, ANTHRO 1/201, 90B; SOC 1, 140, 142, 170.
3. *Greek:* This field of study is declared on Axess. Beginning courses in Greek, if required, may be counted towards the total of 60 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region. Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar (WIM).
   b. a minimum of 31 units in Greek courses at the 100 level or higher. It is recommended that one of these courses be CLASSGRK 175A, although this course should not be taken until students have completed three years of Greek.
   c. at least three courses with the prefix CLASSART, CLASSGEN, or CLASSHIS (also IHUM 39A,B or IHUM 69A). Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.
   d. the introductory Latin sequence CLASSLAT 1, 2, 3, *or* 51, 52, *or* one 100-level course in Latin (recommended); or the Sanskrit sequence SPECLANG 183A,B,C.
   e. it is recommended that students take a course in ancient history.
4. *Latin:* This field of study is declared on Axess. Beginning courses in Latin, if required, may be counted towards the total of 60 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region. Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses including:

a. CLASSGEN 176. Majors Seminar (WIM).
b. a minimum of 31 units in Latin courses at the 100 level or higher. It is recommended that one of these courses be CLASSLAT 175A, although this course should not be taken until students have completed three years of Latin.
c. at least three courses with the prefix CLASSART, CLASSGEN, or CLASSHIS. Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.
d. the introductory sequence CLASSGRK 1, 2, 3, *or* 51, 52, *or* one 100-level course in Greek (recommended); or the Sanskrit sequence SPECLANG 183A,B,C.
e. it is recommended that students take a course in ancient history.

5. *Greek and Latin:* This field of study is declared on Axess. Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region. Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar (WIM).
   b. 30 units in Greek courses and the same number in Latin. It is recommended that students take either or both CLASSGRK or CLASSLAT 175A, although these courses should not be taken until students have completed three years of the respective language.
   c. it is recommended that students take a course in ancient history and/or the Sanskrit sequence SPECLANG 183A,B,C.
6. *Philosophy and Literature Focus*: Students who wish to add a Philosophy and Literature focus to the Classical Studies, Greek, Latin, or Greek and Latin majors should also take the courses listed below:
   a. PHIL 81. Philosophy and Literature.
   b. PHIL 80. Writing in the Major (WIM) in the Philosophy department.
   c. one course in each of the following areas:
      1. aesthetics, ethics, and social and political philosophy (PHIL 170 series)
      2. philosophy of language, mind, metaphysics, and epistemology (PHIL 180 series)
      3. history of philosophy (above 100 level).
   d. two related courses in Classics or Philosophy. Students may double count a Classics course in Philosophy or ancient science for one of the two related courses provided that this course fulfills the Philosophy and Literature requirements and is approved by a member of the committee in Philosophy and Literature.
   e. *Philosophy and Literature capstone seminar*—This year's capstone seminars are COMPLIT 226/GERLIT 242: Narrative and Ethics (Winter), FRENGEN 284/ITALGEN 284: Poetry and Philosophy (Autumn), and RELIGST 271A: Dante's Spiritual Vision (Autumn). One of these courses must be taken in the student's senior year.

Note 1: University credit earned by placement tests or advanced placement work in secondary school is not counted towards any major program in the department; work done in other universities or colleges is subject to department evaluation.

HONORS PROGRAM

A minimum grade point average (GPA) of 3.6 within the major is required for students to enroll in the honors program. To be considered for honors in Classics, the student must select a professor who can supervise his or her honors thesis. A preliminary proposal, approved by the supervisor, is due April 15 of the junior year, and a final version is due at the beginning of the senior year. The proposal must outline the project in detail, list relevant courses that have been taken, and name the supervisor. The department gives approval only if a suitable faculty supervisor is available and if it is satisfied that the student has a sufficient basis of knowledge derived from department course work in the general areas the thesis covers, such as art, Greek, Latin, history, literature, or philosophy. If the proposal is approved, the student may sign up for CLASSGEN 199, Undergraduate Thesis: Senior Research, during the senior year for a maximum of 6 units per term, up to an overall total of 10 units. Honors are awarded only if the essay receives a grade of 'B+' or higher from the supervisor and a second reader, who is chosen by the department. In addition, students must graduate with a GPA of 3.6 or higher within the major to receive honors.

STUDY ABROAD

Funding—Undergraduates whose record in Classics indicates that they are qualified may apply for funding from the Department of Classics. Students must submit a proposal to the undergraduate director as part of the Undergraduate Summer Research Grant Application; see the undergraduate page at http://classics.stanford.edu for the application. The proposal should include an itemized list of expenses based on the fees charged by the program, including room, board, tuition, and other expenses. Food expenses are not normally reimbursed unless they are an integral part of the program package. Limited funding is available each year; preference is shown to students with strong records.

Programs—

1. *Rome:* Classics majors are encouraged to apply for the Intercollegiate Center for Classical Studies in Rome, which is managed by Duke University for about 50 constituent colleges and universities (http://studyabroad.duke.edu/home/Programs/Semester/ICCS_Rome). It is open to Stanford majors in Classics, History, and Art History. All courses receive full credit at Stanford and may be applied to the respective major. Students interested in this program should consult the undergraduate director and the ICCS representative in the Department of Classics as early as possible in their career at Stanford to plan their course preparation and application. Competition is strong, and applicants are expected to have taken one or more courses in Roman history and at least one year of Latin before they arrive in Rome. Brochures are available at the department office. ICCS now also offers a program in Sicily, http://studyabroad.duke.edu/home/Programs/Semester/ICCS_Sicily.
   Other programs offer a quarter, semester, or summer session in Rome. Interested students should consult with the Bing Overseas Studies Program (http://bosp.stanford.edu).
2. *Greece:* students are encouraged to apply for the summer session at the American School of Classical Studies in Athens (http://ascsa.edu.gr). The school is recommended principally for Classics majors with at least two years of ancient Greek. A student wishing to apply should prepare by taking courses in Greek history, archaeology, and art; beginning modern Greek is strongly recommended. Applicants should see the undergraduate director early in the academic year. Other programs such as College Year in Athens (http://cyathens.org) offer a quarter, semester, or summer session in Greece. Interested students should visit the Bing Overseas Studies Program in Sweet Hall.

MINOR IN CLASSICS

The undergraduate director meets with each student who opts for a minor to discuss curriculum choices and assigns the student an adviser in the relevant field. Students are required to work closely with their advisers to create a cohesive curriculum within each area. Students who minor in Classics are required to take CLASSGEN 176, Majors Seminar, which is writing intensive.

Students may choose among four minors in Classics:

1. *Classical Language*s: students are required to take a minimum of five courses in Greek or in Latin. In addition to the five re-

quired courses, students must take CLASSGEN 176, Majors Seminar. Students wishing to combine Greek and Latin may only do so if courses for one of the two languages are all above the 100 level; for example, CLASSGRK 1, 10, plus CLASSLAT 103, 111, 175.

2. *Ancient History:* students are required to take a minimum of five courses in history, art history, and archaeology. Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken. In addition to the five required courses, students must take CLASSGEN 176, Majors Seminar. Courses offered in Latin and Greek that focus on historical topics or authors may count toward this minor.
3. *Literature and Philosophy:* students are required to take a minimum of five courses in classical literature or philosophy, including classical science. Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken. In addition to the five required courses, students must take CLASSGEN 176, Majors Seminar. Courses offered in Latin and Greek that focus on philosophical or literary topics or authors may count toward the minor.
4. *Classical Studies*: students are required to take a minimum of five courses in Classics (CLASSART, CLASSGEN, CLASSGRK, CLASSHIS, CLASSLAT) plus the majors seminar (CLASSGEN 176).

MASTER OF ARTS IN CLASSICS

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

I and II. Language and Literature, and Philosophy Fields of Study—Students who have completed an undergraduate major in Classics (Greek, Latin, or Greek and Latin fields of study) or equivalent may be accepted as candidates for the M.A. degree in Classics and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students with an undergraduate major in Classics (Ancient History or Classical Studies fields of study) or without an undergraduate major in Classics may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 25 units of graduate courses and 20 additional units of work at the 100 level or higher.
2. Completion of one Greek course at the 100 level (if the undergraduate major field of study was Latin) or one Latin course at the 100 level (if the undergraduate major field of study was Greek). This requirement is waived for students with an undergraduate major in Classics (Greek and Latin field of study).
3. Passing an examination testing the candidate's ability to translate into English from a selected list of Greek and/or Latin authors.
4. Completion of the 275A,B sequence in at least one language (Latin or Greek).
5. Writing a thesis, or passing of an examination on a particular author or topic, or having written work accepted by the graduate committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
6. A reading examination in French or German; these examinations are administered every quarter.
7. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also, on the recommendation of the department, become candidates for the M.A. degree. In this case, requirement 5 above is waived provided that the student has completed some work beyond the course requirements listed under requirements 1 and 2 above.

III. Classical Archaeology—Students who have completed an undergraduate major in Classics with a Classical Archaeology field of study, or in a closely related field, may be accepted as candidates for the M.A. degree in Classics with a Classical Archaeology field of study, and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in Classics with a Classical Archaeology field of study may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 25 units of graduate courses and 20 additional units of work at the 100 level or higher.
2. Completion with a grade of 'B' or higher of at least 15 units of graduate-level courses in classical archaeology, not including CLASSART 302.
3. Passing an examination designed to test the candidate's ability to translate into English from either ancient Greek or Latin.
4. Completion with a grade of 'B' or higher of CLASSART 302, Classical Archaeology: Experiences of the Discipline, or an equivalent course on the history of thought in classical archaeology approved by the Classics department's graduate committee.
5. Writing a thesis, or passing an exam on a particular topic, or having written work accepted by the graduate committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
6. Passing a reading examination in French, German, or Italian. These examinations are administered every quarter.
7. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also, on the recommendation of the department, become candidates for the M.A. degree. In their case, requirement 5 above is waived provided that the student has completed some work beyond the course requirements listed under requirements 1 and 2 above.

IV. Ancient History—Students who have completed an undergraduate major in Classics with a Classical Archaeology field of study, or in a closely related field may be accepted as candidates for the M.A. degree in Classics with an Ancient History field of study, and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in Classics with a Classical Archaeology field of study may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing 30 units of graduate courses and 15 additional units of work at the 100 level or higher.
2. Satisfactory completion of 20 units of graduate-level courses in Classics and of 10 units of graduate-level courses in other programs.
3. Satisfactory completion of 15 additional units of courses in either ancient Greek or Latin.
4. Writing a thesis, or passing an exam on a particular topic, or having written work accepted by the Graduate Committee as

an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
5. Passing a reading examination in French, German, or Italian. These examinations are administered every quarter.
6. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also (on the recommendation of the department) become candidates for the M.A. degree. In their case, requirement 4 above is waived provided that they have completed some work beyond the course requirements listed under requirements 1 and 2 above.

COTERMINAL BACHELOR'S AND MASTER'S DEGREE IN CLASSICS

Stanford students in the undergraduate major who are interested in postgraduate work in Classics may apply for Stanford's coterminal master's program. Candidates for a coterminal master's degree must fulfill all requirements for the M.A. in Classics, as well as general and major requirements for the B.A. No courses used to satisfy the B.A. requirements (either as General Education Requirements or department requirements) may be applied toward the M.A. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree. Applicants must have a minimum GPA of 3.7 in the major, and no incompletes on record. Undergraduate course work in Greek and Latin is normally a prerequisite for graduate-level work. To apply, students should submit the Application for Admission to Coterminal Master's Program form, two letters of recommendation from Classics faculty, a sealed, official copy of their undergraduate transcript, a 1-3 page statement of purpose and a 10-15 page writing sample. GRE scores are not required. Applications are due in early January of your intended graduation year; please see the departmental website, http://classics.stanford.edu for the specific deadline.

For University coterminal degree program rules and University application forms, see the Undergraduate Academic Life web site. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin.

DOCTOR OF PHILOSOPHY IN CLASSICS

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. There are four specializations within the Classics Ph.D. program: language and literature; classical archaeology; ancient history; and ancient philosophy.

I. *Language and Literature*—Candidates for the Ph.D. degree in Classics with specialization in language and literature must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. These must include:
   a. Greek and Latin survey sequence (CLASSGEN 207-208).
   b. Greek and Latin syntax sequence (CLASSGRK 275A,B *and* CLASSLAT 275A,B).
   c. Semantics of grammar sequence (CLASSGEN 205A,B).
   d. Twelve graduate seminars, nine of which must be Classics seminars, and one of the remaining three of which must be outside the department. The other two seminars may be in Classics, from other departments (with the graduate director's approval), and/or directed readings. However, no more than two directed readings can be taken. Classics seminars are generally offered for 4-5 units. In some cases, instructors allow a student to complete a seminar for 4 units without requiring a written paper but with completion of all other requirements.
2. Examinations:
   a. Students must take Greek and Latin translation exams at the end of each survey sequence (the end of the first and second years). These exams are based on the Greek and Latin reading lists available on the Classics Department web site at: http://classics.stanford.edu. Greek and Latin survey courses cover less than half of the material on which the translation exams test, and students need to prepare much of the work on their own. It is possible to take both exams in the same year if the student chooses. However, students are obligated to take the exam in the language which the survey has covered that year. The exam consists of a choice of six of eight passages, and students are allowed three hours. A grade of 'B-' or higher, on every passage, is required to pass. If a student does not attain a 'B-', the exam must be retaken later in the summer before registering for the Autumn Quarter, in order to continue in the program. In order to retake an exam during Summer Quarter, a student must be registered at Stanford at his or her own expense; the department does not cover tuition in these instances. The exam can only be retaken once.
   b. Students must pass modern language translation exams in both German and French; Italian or modern Greek may be substituted in place of French, with consent of the graduate director. Students arrange with the student services officer to take the exam. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
   c. At the beginning of Autumn Quarter of the third year, students take general examinations in four of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, and Roman history. Students select the fields in consultation with the graduate director no later than June of the second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its equivalent); students need to confer with the professor overseeing the exam. General examinations must be taken by October of the third year.
   d. The University oral examination, which is a defense of the candidate's dissertation.
3. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
4. Students are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.
5. A typical program for a graduate student in Classics is as follows. First year: CLASSLAT 275A,B (6 units), CLASSGRK 275A,B (6 units), CLASSGEN 205A,B, Semantics (3 units), either CLASSGEN 207A-C or 208A-C, Literature Survey (offered alternate years; 15 units), and three elective seminars (12-15 units). Second year: either CLASSGEN 207A-C or 208A-C, Literature Survey (offered alternate years; 15 units),

five to nine elective seminars (20-45 units), and one to three teaching assistantships (9-27 units). Third year: three to eight elective seminars (12-40 units), one to three teaching assistantships (9-27 units). Fourth year: three quarters of predoctoral dissertation research assistantship (30 units).

II. *Classical Archaeology*—Candidates for the Ph.D. degree in Classics with a specialization in classical archaeology must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the candidate's fourth year.
   These must include:
   a. At least three graduate (200 or 300) level courses in Latin and/or Greek literature.
   b. History of Classical Archaeology (CLASSART 201), to be taken as early as possible in the candidate's Stanford career.
   c. The interdepartmental graduate core sequence in archaeology. The Archaeology Center announces the courses which fulfill this requirement. The core sequence currently comprises a seminar in archaeology theory and a course on archaeological methods.
   d. At least one further course outside the Classics department.
   e. At least five graduate seminars in classical archaeology.
   f. At least three graduate seminars in ancient history.
   g. Students may petition to count independent study courses in place of up to two required courses, but no more.
   h. Students who enter the program with only one ancient language at the level needed for graduate study are strongly encouraged to take additional course work to reach graduate (200 and above) level in another language.
   i. Students are urged to enroll in or audit other undergraduate courses that may fill gaps in their undergraduate training.
   j. All students are expected to take part in archaeological fieldwork in the classical world areas.
   k. At least three consecutive quarters of course work must be taken at Stanford.
2. Examinations:
   a. As soon as students arrive, they must take a diagnostic exam in either Greek or Latin. Depending on performance, students may be required to enroll in undergraduate language classes in that language to improve their skills to the level required for graduate work.
   b. Reading examinations in two of the following languages: French, German, Italian, and modern Greek. Candidates may petition to substitute a different modern language for one of these, if their area of specialization requires it. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
   c. A translation examination from Latin or Greek into English. This examination must be taken either at the end of the first year or at the end of the second year. A grade of 'B-' or higher on every passage is required to pass. If a student does not attain a 'B-,' the exam must be retaken later in the summer before registering for Autumn Quarter, in order to continue in the program. In order to retake an exam during Summer Quarter, a student must be registered at Stanford at his or her own expense; the department does not cover tuition in these instances. The exam can only be retaken once.
   d. General examinations in Greek archaeology and Roman archaeology, and two of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, Roman history. Candidates select the fields in consultation with the graduate director no later than the first week of Spring Quarter of the second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its equivalent). General examinations must be taken by October of the third year.
   e. The University oral examination, which is a defense of the candidate's dissertation.
3. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
4. Students are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

III. Ancient History—Candidates for the Ph.D. degree in Classics with specialization in ancient history must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. These must include:
   a. In the Autumn Quarter of the first year, Approaches to History (HISTORY 304), offered in the History department.
   b. Two proseminars. These introduce students to primary sources of evidence for ancient history that require special training: papyrology, epigraphy, paleography, numismatics, and archaeology. The department should offer one each year, but students may also fulfill this requirement by doing a directed reading, or (with the approval of the ancient history track adviser) by taking a course at another university with which Stanford has an exchange agreement.
   c. Three skills courses relevant to the individual student's chosen research approach. For example, a student could take classes in economics, demography, legal history, or anthropology. The skills courses can also be used to learn other ancient or modern languages, either by course work or directed reading. Students need to consult with their advisers and the graduate director to determine appropriate skills courses.
   d. Ten graduate seminars: These normally have course numbers in the 200s, 300s, or 400s. Most of these are taken in the department, but students may also take seminars outside the department or at another university with which Stanford has an exchange agreement. Approval from the ancient history adviser and the graduate director must be obtained prior to exercising this option. While only two of the ten seminars can be replaced by directed readings, up to three additional seminars may be taken outside the department. This leaves five ancient history seminars that must be chosen from those in the department. Other Classics graduate seminars may be substituted for these ancient history seminars, with approval of the ancient history track adviser.
   e. The range and sequence of other courses to be taken depend on which of the following two options the student selects within the Ancient History track.
      1. *Option 1*: Students focus more on one language. This requires students to take: the three quarter survey

course in either Greek or Latin (CLASSGEN 207A-C or CLASSGEN 208 A-C); the fifteen-week syntax course in the same language (CLASSGRK 275A,B or CLASSLAT 275A,B); one quarter of the survey course sequence in the other language; and the two quarter Semantics of Grammar sequence (CLASSGEN 205A,B).

1. *Option 2:* Students emphasize broader linguistic skills. This requires students to take the three quarter survey sequence in both Greek and Latin (CLASSGEN 207A-C and 208A-C).

2. Examinations:
   a. As soon as students arrive, they take diagnostic exams in two areas of ancient history. Choices are: Egyptian, Greek, and Roman history. The test is mainly on narrative history, especially important names, dates, and events. Depending on performance, students may be asked to sit in on the undergraduate history courses and take directed reading or a graduate survey if offered. Reading lists are available upon request.
   b. Students must take the final offered at the end of each quarter of Greek or Latin survey (for Option 1 above) or both Greek and Latin surveys (for Option 2 above). Students must earn a 'B-' or higher on each final to pass.
   c. Students must pass modern language translation exams in both German and French; Italian or modern Greek may be substituted in place of French with consent of the graduate director. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
   d. Students must pass general exams in two areas in history (Egyptian, Greek, or Roman) and two of the following fields: Greek literature, Latin literature, Greek archaeology, Roman archaeology, or ancient philosophy. Students select the fields in consultation with the graduate director no later than June of their second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its equivalent). General examinations must be taken by October of the third year. In preparing for the general examinations, candidates are expected to make full use of relevant secondary material in modern languages. They should therefore plan to satisfy the requirements in French and German as soon as possible, preferably before the translation examinations.
   e. The University oral examination which is a defense of the candidate's dissertation.
3. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
4. Candidates are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

IV. Joint Program in Ancient Philosophy—This specialization is jointly administered by the departments of Classics and Philosophy and is overseen by a joint committee composed of members of both departments. It provides students with the training, specialist skills, and knowledge needed for research and teaching in ancient philosophy while producing scholars who are fully trained as either philosophers or classicists.

Graduate students admitted by the Classics department receive their Ph.D. from the Classics department. This specialization includes training in ancient and modern philosophy. Each student in the program is advised by a committee consisting of one professor from each department.

Candidates for the Ph.D. degree in Classics with specialization in ancient philosophy must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. These must include:
   a. All the requirements listed for the language and literature specialization in the graduate program in Classics (see "I" above).
   b. Three courses in the Philosophy department (including 100/200 and two courses at the 200 level or higher). These include:
      1. one course in logic which can be fulfilled at the 100 level or higher
      1. one course in aesthetics, ethics, or political philosophy
      2. one course in metaphysics, epistemology, philosophy of mind, or philosophy of science.
   c. At least three courses in ancient philosophy at the 200 level or above, one of which must be in the Philosophy department.
   d. All courses taken in the Philosophy department count for seminar credit (i.e., as contributing to the 12 seminar requirement in the Language and Literature track in the Classics department).
2. *Examinations:* The requirements are the same as those listed in the language and literature specialization, except that one of the four areas of general examination must be taken in ancient philosophy.
3. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
4. Students are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

PH.D IN CLASSICS AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Classics and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being

accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact Denise Winters at 650-724-1333 for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the Stanford Bulletin's ExploreCourses web site.

CLASSICS AND A MINOR FIELD

The Ph.D. in Classics may be combined with a minor in another field, such as anthropology, history, humanities, or classical linguistics. Requirements for the minor field vary, but might be expected to involve about six graduate-level courses in the field and one written examination, plus a portion of the University oral exam (dissertation defense). Such a program is expected to take five years. The department encourages such programs for especially able and well prepared students. See the department *Graduate Handbook* for more information. The following timetable would be typical for a five-year program:

First Year: course work, almost entirely in Classics. One translation exam taken in June. One or both modern language exams taken.

Second Year: course work, both in Classics and the minor field. Second translation exam completed. French and German exams completed.

Third Year: course work, both in Classics and the minor field. General examinations in Classics.

Fourth Year: remaining course work, both in Classics and the minor field. General examination in the minor field. Preparation for dissertation.

Fifth Year: dissertation, University oral examination.

PH.D. MINOR IN CLASSICS

For a graduate minor, the department recommends at least 20 units in Latin or Greek at the 100 level or above, and at least one course at the graduate (200) level.

OVERSEAS STUDIES COURSES IN CLASSICS

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

WINTER QUARTER

FLORENCE

- OSPFLOR 43.The Invention of the Book. 3-5 units, Reviel Netz, GER:DB:Hum
- OSPFLOR 45. Harmony: Ancient Science in the Italian Renaissance. 3-5 units, Reviel Netz, GER:DB:Hum

COMMUNICATION

Emeriti: (Professors) Henry S. Breitrose, Donald F. Roberts; *(Professor, Teaching)* Marion Lewenstein
Chair: James S. Fishkin
Director, Institute for Communication Research: James S. Fishkin
Director, John S. Knight Fellowships for Professional Journalists: James R. Bettinger
Director, Media Studies: Byron Reeves
Director, Undergraduate Studies: Fred Turner
Deputy Director, John S. Knight Fellowships for Professional Journalists: Dawn E. Garcia
Director, Journalism: Ann Grimes
Professors: James S. Fishkin, Theodore L. Glasser, Shanto Iyengar, Jon Krosnick, Clifford Nass, Byron B. Reeves
Associate Professors: Jeremy Bailenson, Fred Turner
Courtesy Professors: Jan Krawitz, Walter W. Powell, Kristine M. Samuelson
Visiting Lorry I. Lokey Professorship in Professional Journalism: Ann Grimes
Visiting Hearst Professional in Residence: Joel Brinkley
Lecturers: Thomas Hayden, Geri Migielicz, Gary Pomerantz, Howard Rheingold, Alice Siu, David Voelker, James Wheaton
Department Offices: McClatchy Hall, Building 120, Room 110
Mail Code: 94305-2050
Phone: (650) 723-1941
Web Site: http://comm.stanford.edu

Courses offered by the Department of Communication are listed under the subject code COMM on the *Stanford Bulletin's* ExploreCourses web site.

Stanford's Department of Communication focuses on media in all its forms. The department studies the processes and effects of mass communication: the nature and social role of the various media; their structure, function, and ethics; and their impact on the political system, culture, and society. In this context, it considers not only traditional mass media, such as newspapers, magazines, radio, television, and film, but also information technology, online media, virtual reality, and the Internet. Students are trained as social scientists who can study the media and as potential practitioners in the use of the media in journalism, mass communications, and digital media. The department combines theory and practice and fosters individual research opportunities for its students, employing both quantitative and qualitative approaches.

The Department of Communication engages in research in communication and offers curricula leading to the B.A., M.A., and Ph.D. degrees. The M.A. degree prepares students for a career in journalism. The department also offers current Stanford University undergraduates a coterminal program with an M.A. emphasis in Media Studies. The Ph.D. degree leads to careers in university teaching and research-related specialties.

The Institute for Communication Research offers research experience primarily to advanced Ph.D. students.

The John S. Knight Fellowships Program brings outstanding journalists to the University to study and do research for an academic year. While here, they focus on issues, challenges and opportunities of journalism innovation, entrepreneurship and leadership. The John S. and James L. Knight Foundation sponsors twelve U.S. journalists. They are joined by eight International Fellows sponsored by the Lyle and Corrine Nelson International Fellowship Fund, the Knight Foundation, Yahoo! Inc., the Shinyoung Journalism Fund and others.

MISSION OF THE UNDERGRADUATE PROGRAM IN COMMUNICATION

The mission of the undergraduate program in Communication is to expose students to a broad-based understanding of communication theory and research. Students in this major are expected to become familiar with the fundamental concerns, theoretical approaches, and methods of the field, and to acquire advanced knowledge in one or more sub-areas of the discipline. This is accomplished by several levels of study: a core curriculum; intermediate-level electives; and internships. Majors also have the opportunity to do advanced research projects. The department is committed to providing students with analytical and critical skills needed for success in graduate programs, professional schools, or immediate career entry.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of communications.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of communications.

ADMISSION

Prospective Undergraduates—Applications are available online at http://admission.stanford.edu

Prospective Coterminal Students—Applications are available online at http://studentaffairs.stanford.edu/sites/default/files/registrar/files/CotermApplic.pdf

Prospective Graduate Students—Applications are available online at at http://gradadmissions.stanford.edu.

The department requires that applicants for graduate admission submit verbal and quantitative scores from the Graduate Record Examination (GRE). Admission to each graduate degree program is competitive, based on the pool of applicants each year rather than on standard criteria that can be stated in advance. The GRE should be taken no later than early November prior to the early December application deadline.

THE INSTITUTE FOR COMMUNICATION RESEARCH

The Institute is an office of project research for the faculty of the Department of Communication and operates under grants to faculty from government, industry, and non-profit organizations. Research assistantships are often available to qualified Ph.D. students in Communication.

BACHELOR OF ARTS IN COMMUNICATION

PREPARATION

Before declaring the major, students must have completed or be concurrently enrolled in one of the following:

COMM 1A. Media Technologies, People, and Society or COMM 1B. Media, Culture, and Society

COMM 106. Communication Research Methods

COMM 108. Media Processes and Effects

Students interested in declaring the major should apply via Axess and meet with the student services administrator in Building 120, Room 110A, during scheduled office hours. Students are required to take at least 60 units (approximately 12 courses), not counting statistics, to complete the major.

PROGRAM OF STUDY

The undergraduate curriculum is intended for liberal arts students who wish to develop an understanding of communication in society, drawing on the perspective of the social sciences. Undergraduates majoring in Communication are expected to become acquainted with the fundamental concerns, theoretical approaches and methods of the field, and to acquire advanced knowledge in one or more of the sub-areas of communication: institutions, processes, and effects.

While the department does not attempt to provide comprehensive practical training at the undergraduate level, the curriculum provides a diverse range of internship opportunities including professional print journalism, some of which are funded by the department's Rebele Internship Program.

The department is committed to providing students with analytical and critical skills for future success in graduate programs, professional schools, or immediate career entry.

The major is structured to provide several levels of study: a core curriculum, intended to expose students to a broad-based understanding of communication theory and research, and a number of intermediate-level options and electives. Majors also have the opportunity to do advanced research in the form of senior projects and honors theses.

All undergraduate majors are required to complete a set of core communication courses which include COMM 1A. Media Technologies, People, and Society (5 units) or COMM 1B. Media, Culture, and Society (5 units); COMM 106. Communication Research Methods (5 units); COMM 108. Media Processes and Effects (5 units), and COMM 120. Digital Media in Society (WIM, 5 units). Core courses are usually given only once each year.

The department also requires completion of or concurrent registration in an introductory statistics course (STATS 60 or PSYCH 10) prior to registration in COMM 106. Communication Research Methods, in preparation for courses in methodology and advanced courses in communication processes and effects. It is recommended that this be done as soon as possible so as not to prevent registration in a course requiring statistical understanding. The statistics course does not count toward the 60 units to complete the Communication major.

In addition to the core courses and the statistics requirement, undergraduate majors select courses from the areas described below. Many of the courses require core courses as prerequisites. Majors select a total of four area courses, taking at least one from each area.

Area I: Communication Processes and Effects—Area I emphasizes the ways in which communication scholars conduct research in, and consider the issues of, human communication. These studies aim to provide expert guidance for social policy makers and media professionals and include the following courses: COMM 137, 160, 162, 166, 168, 169, 172, 326.

Area II: Communication Systems and Institutions—Area II considers the roles and interaction of institutions such as broadcasting, journalism, constitutional law, and business within communication and mass communication contexts and includes the following courses: COMM 104, 116, 117, 120, 125, 131, 140, 147, 182, 212.

The remainder of the 60 required units may be fulfilled with any elective Communication courses or cross listed courses in other departments.

To be recommended for the B.A. degree in Communication, the student must complete at least 60 units (approximately 12 courses) in the department. No more than 10 units of course work outside of the department, transfer credit, or Summer Session credit may be applied to meet department requirements. Communication majors must receive a letter grade for all Communication courses unless they are offered only for satisfactory/no credit (S/NC), and must maintain a grade point average (GPA) of 2.0 (C) in courses towards the major. Only courses with a grade of C- or above count towards the major.

HONORS PROGRAM

The honors program provides undergraduates the opportunity to undertake a significant program of research in an individual professor/student mentoring relationship. The aim is to guide students through the process of research, analysis, drafting, rethinking, and redrafting, which is essential to excellence in scholarship. Working one-on-one with a faculty adviser, seniors earn 15 Communication units, culminating in an honors thesis. In order to be eligible for the honors program, interested majors must have: (1) successfully completed both a research methods and statistics course, (2) selected an adviser, and (3) submitted an application to the department by the end of their junior year. An application may be picked up outside Room 110, Building 120.

Students are expected to make steady progress on their honors thesis throughout the year.

A final copy of the honors thesis must be read and approved by the adviser and submitted to the department by the eighth week of Spring Quarter (exact date to be arranged). It becomes part of a permanent record held by the department. Honors work may be used to fulfill communication elective credit but must be completed and a letter grade submitted prior to graduation. A student

failing to fulfill all honors requirements may still receive independent study credit for work completed, which may be applied toward fulfilling major requirements.

The designation "with honors" is awarded by the Department of Communication to those graduating seniors who, in addition to having completed all requirements for the Communication major:

1. complete an honors thesis;
2. maintain a distinguished GPA in all Communication course work;
3. are recommended by the Communication faculty.

MINOR IN COMMUNICATION

PREPARATION

Before declaring the minor, students must have completed or be concurrently enrolled in one of the following:

- COMM 1A. Media Technologies, People, and Society or COMM 1B. Media, Culture, and Society
- COMM 106. Communication Research Methods
- COMM 108. Media Processes and Effects

Students interested in declaring the minor should do so no later than Spring Quarter of their junior year by applying via Axess and meeting with the student services administrator in Building 120, Room 110A, during scheduled office hours.

PROGRAM OF STUDY

The minor is structured to provide a foundation for advanced course work in communication through a broad-based understanding of communication theory and research.

Students are required to take 35 units (approximately 7 courses), not counting statistics, to complete the minor. The curriculum consists of three introductory communication core courses that include COMM 1A. Media Technologies, People, and Society (5 units), or COMM 1B. Media, Culture, and Society (5 units); COMM 106. Communication Research Methods (5 units); and COMM 108. Media Processes and Effects (5 units). The department also requires completion of or concurrent registration in an introductory statistics course (STATS 60 or PSYCH 10) prior to registration in COMM 106. Communication Research Methods, in preparation for courses in methodology and advanced courses in communication processes and effects. It is recommended that this be done as soon as possible so as not to prevent registration in a course requiring statistical understanding. The statistics course does not count toward the 35 units to complete the Communication minor.

The remainder of the 35 required units may be fulfilled with any intermediate-level elective Communication courses or cross-listed courses in other departments. No more than 5 units of course work outside of the department, transfer credit, or Summer Session credit may be applied to meet department requirements. Communication minors must receive a letter grade for all Communication courses unless they are offered only for satisfactory/no credit (S/NC), and must maintain a grade point average (GPA) of 2.0 (C) in courses towards the minor. Only courses with a grade of C- or above count towards the minor. Some courses are not given every year. Refer to ExploreCourses for details.

Core courses are usually offered only once annually:

Prerequisite—introductory statistics course (for example, PSYCH 10)

Core Courses—COMM 1A or 1B, 106, 108

Area I: Communication Processes and Effects—a minimum of one course from COMM 137, 160, 162, 166, 168, 169, 172, 326

Area II: Communication Systems/Institutions—a minimum of one course from COMM 104, 116, 117, 120, 125, 131, 140, 147, 182, 212

Elective courses—totaling 10 units.

MEDIA STUDIES COTERMINAL MASTER'S PROGRAM

The Department of Communication offers current Stanford University undergraduates a one-year coterminal program with an M.A. emphasis in Media Studies specializing in either social sciences or journalism. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

Admission—Applications for coterminal study must be submitted at least four quarters in advance of the expected master's degree conferral date. Applicants must have earned a minimum of 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. This includes allowable advanced placement (AP) and transfer credit. Applications must be submitted no later than November 17, 2010 for admission beginning in either Winter or Spring Quarter 2010-11 or Autumn Quarter 2011-12. Journalism track students may begin the program only in Spring Quarter of their senior year. Requirements include: Application for Admission to Coterminal Master's Program form, preliminary program proposal, statement of purpose, three letters of recommendation from Stanford professors, a written statement from a Communication professor agreeing to act as a graduate adviser (social sciences track only), three samples of writing (journalism track only), and a current unofficial Stanford transcript. GRE scores are not required. Coterminal applications are submitted directly to the department. Review procedures and the Graduate Admissions Committee determine criteria.

Requirements—The Media Studies coterminal master's program provides a broad introduction to scholarly literature in mass communication and offers a social sciences or journalism track. Journalism track students may begin the program only in Spring Quarter of their senior year during which time one elective course is taken towards the master's program and any remaining requirements for the undergraduate degree are completed. In the following academic year journalism track students follow the same curriculum as students in the Graduate Program in Journalism (see Master of Arts-Journalism section), less one elective course. Journalism track students may be required to complete more than 45 units. Social Science track students need to satisfy the following four basic requirements:

1. *Required Units and GPA:* students must complete a minimum of 45 units in Communication and related areas, including items 2 and 3 below. Courses must be taken for a letter grade if offered. Courses in related areas outside the department must be approved by the student's adviser. A minimum of 36 units must be in the Communication department. No more than two courses (not including the statistics prerequisite) may be below the 200 level. To remain in good academic standing students must maintain a grade point average (GPA) of 3.0 or better. Graduation requires a GPA of 3.0 or better.
2. *Core Requirements:* students must complete COMM 206, 208, and a statistics course. Typically, the statistics requirement is met with STATS 160. Other courses occasionally are approved as a substitute before the student is admitted to the program. The statistics course does not count toward the 45 units.
3. *Six Media Studies Courses:* students must complete a minimum of six additional Communication courses from the following list concerned with the study of media. Not all the listed courses are offered every year, and the list may be updated from one year to the next. In addition to the core requirements and a minimum of six courses listed below, students may choose additional courses from the list and any related course approved by the student's adviser.
   - COMM 211. Media Technologies, People, and Society
   - COMM 216. Journalism Law
   - COMM 217. Digital Journalism
   - COMM 220. Digital Media in Society

- COMM 225. Perspectives on American Journalism
- COMM 231. Media Ethics and Responsibility
- COMM 237. The Dialogue of Democracy
- COMM 240. Digital Media Entrepreneurship
- COMM 247. History and Future of Journalism
- COMM 260. The Press and the Political Process
- COMM 262. Analysis of Political Campaigns
- COMM 266. Virtual People
- COMM 268. Experimental Research in Advanced User Interfaces
- COMM 269. Computers and Interfaces: Psychology and Design
- COMM 272. Media Psychology
- COMM 277. Specialized Writing and Reporting
- COMM 326. Human Virtual Representation

4. *The Media Studies M.A. Project:* students following the social sciences track enroll in COMM 290 to complete a project over two consecutive quarters that must be pre-approved and supervised by the adviser. The completed M.A. project must be submitted to the adviser no later than the last day of classes of the second consecutive quarter.

Additional courses are chosen in consultation with an academic adviser.

MASTER OF ARTS IN COMMUNICATION

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

The department awards a terminal M.A. degree in Communication with a field of study in Journalism. Applicants for this program are evaluated for admission on different criteria. Work to fulfill graduate degree requirements must be in courses numbered 100 or above.

Stanford students who are completing an M.A. degree and who desire entry into the Ph.D. program must file a Graduate Program Authorization Petition on Axess. Such students are considered alongside all other doctoral applicants.

JOURNALISM

Stanford's graduate program in Journalism focuses on the knowledge and skills required to report, analyze, and write authoritatively about public issues and digital media. The curriculum combines a sequence of specialized reporting and writing courses with seminars and courses devoted to deepening the students' understanding of the roles and responsibilities of American news media in their coverage of public issues.

The program emphasizes preparation for the practice of journalism and a critical perspective from which to understand it. The program's objective is twofold: (1) to graduate talented reporters and writers to foster public understanding of the significance and consequences of public issues and the debates they engender; and (2) to graduate thoughtful journalists to respond openly and eloquently when called on to explain and defend the methods of their reporting and the quality of their writing.

CURRICULUM

The curriculum includes several required courses, examples of which are shown below, and a master's project:

- COMM 216. Journalism Law
- COMM 217. Digital Journalism
- COMM 225. Perspectives on American Journalism
- COMM 240. Digital Media Entrepreneurship
- COMM 273,274. Public Issues Reporting I,II
- COMM 275. Multimedia Storytelling
- COMM 289. Journalism M.A. Project
- COMM 291. Graduate Journalism Seminar

Additionally, students are usually required to take two specialized writing courses, chosen from a list of four or five, and two approved electives from among graduate-level courses in the Department of Communication, or from among courses on campus that deal substantively with issues of public importance. The M.A. degree in Communication (Journalism) requires a minimum of 45 units.

Except for the Graduate Journalism Seminar and the Journalism Project, all courses must be taken for a letter grade. To remain in good academic standing, students must maintain a grade point average (GPA) of 3.0 or better. Graduation requires a GPA of 3.0 or better.

JOURNALISM PROJECT

The Journalism master's project, a requirement for graduation, is intended as an opportunity for students to showcase their talents as writers and reporters. It is also an opportunity to undertake an in-depth critique of an area of journalism in which the author has a special interest. Work on the project usually begins during Winter Quarter and continues through Spring Quarter. Completed master's projects must be submitted to the project adviser no later than the last day of classes in the Spring Quarter. The project represents a major commitment of time, research, and writing. Although it is not a requirement that the project be published, it must be judged by a member of the faculty to be of a quality acceptable for publication. At a minimum, the project should demonstrate the rigor and discipline required of good scholarship and good journalism; it should offer ample evidence of students' ability to gather, analyze, and synthesize information in a manner that goes beyond what ordinarily appears in daily news media.

DOCTOR OF PHILOSOPHY IN COMMUNICATION

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. The minimum number of academic units required for the Ph.D. at Stanford is 135, up to 45 of which can be transferred either from a master's degree at the University or from another accredited institution.

The department offers a Ph.D. in Communication Theory and Research. First-year students are required to complete introductory courses in communication theory and research, research methods, and statistics. These core courses, grounded in the social science literature, emphasize how people respond to media and how media institutions function. In addition, Ph.D. students must complete a minimum of three literature survey courses and related advanced seminars in Communication. Students also take significant course work outside the department in their area of interest. Each student builds a research specialty relating communication to current faculty interests in such areas as ethics, human-computer interactions, information processing, information technology, law, online communities, politics and voting, virtual reality, and youth and media. Regardless of the area of specialization, the Ph.D. program is designed primarily for students interested in university research and teaching or other research or analyst positions.

The Ph.D. program encompasses four years of graduate study (subsequent to completion of the B.A. degree) during which, in addition to fulfilling University residency requirements, Ph.D. candidates are required to:

1. Complete all departmental course requirements with grades of 'B+'' or above. Currently these courses include COMM 206, 208, 301, 311, 314, 317, and 318. Students are also required to take STATS 160 and two advanced methods courses.
2. Pass the general qualifying examinations by the end of the second academic year of study and pass a specialized area examination by the end of the third academic year of study.
3. Demonstrate proficiency in tools required in the area of research specialization. Identified with the advice of the faculty, such tools may include detailed theoretical knowledge, advanced statistical methods, a foreign language, computer programming, or other technical skills.
4. Complete at least two pre-dissertation research projects (the Major Project and the Complementary Project).
5. Teach or assist in teaching at least two courses, preferably two different courses, at least one of which is ideally a core undergraduate course (COMM 1A, 1B, 106, and 108).

6. Complete a dissertation proposal and proposal meeting approved by the dissertation committee.
7. Apply for candidacy by the end of the second year of graduate study.
8. Complete a dissertation satisfactory to a reading committee of three or more faculty members in the Department of Communication and one faculty member outside of the Department of Communication.
9. Pass the University oral examination, which is a defense of the dissertation.

Because the multifaceted nature of the department makes it possible for the Ph.D. student to specialize in areas that draw on different related disciplines, the plan of study is individualized and developed between the faculty adviser and the student.

Ph.D. candidacy is valid for five years.

Other requirements and details of the requirements can be found in the document, *Official Rules and Procedures for the Ph.D. in the Department of Communication*, available from the student services administrator of the department.

PH.D. MINOR IN COMMUNICATION

Candidates for the Ph.D. degree in other departments who elect a minor in Communication are required to complete a minimum of 20 units of graduate courses in the Department of Communication, including a total of three theory or research methods courses, and are examined by a representative of the department. A department adviser in consultation with the individual student determines the particular communication theory and methods courses.

OVERSEAS STUDIES COURSES IN COMMUNICATION

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

OSPBEIJ 42. Chinese Media Studies. 4 units, Kun Li, GER:DB:SocSci

WINTER QUARTER

FLORENCE

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II As Represented in Italian and European Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

COMPARATIVE LITERATURE

Emeriti: (Professors) Joseph Frank, John Freccero, René Girard, Herbert Lindenberger, Mary Pratt; *(Courtesy Professors)* W. B. Carnochan, Gerald Gillespie, David G. Halliburton, Marjorie G. Perloff

Director: David Palumbo-Liu

Chair of Graduate Admissions: Monika Greenleaf

Chair of Graduate Studies: Hans U. Gumbrecht

Chair of Undergraduate Studies: Margaret Cohen

Professors: John Bender (English, Comparative Literature, on leave Spring), Russell Berman (German Studies, Comparative Literature), Margaret Cohen (Comparative Literature), Amir Eshel (German Studies, Comparative Literature), Roland Greene (English, Comparative Literature), Hans U. Gumbrecht (French and Italian, Iberian and Latin American Cultures, Comparative Literature), Franco Moretti (English, Comparative Literature), Elisabeth Mudimbe-Boyi (French and Italian, Comparative Literature), Andrea Nightingale (Classics, Comparative Literature, on leave Winter), David Palumbo-Liu (Comparative Literature), Patricia Parker (English, Comparative Literature, on leave Autumn), José David Saldívar (Comparative Literature), Ramón Saldívar (English, Comparative Literature), Jeffrey T. Schnapp (French and Italian, Comparative Literature, on leave), Ban Wang (Asian Languages, Comparative Literature)

Associate Professor: Monika Greenleaf (Slavic Languages and Literatures, Comparative Literature)

Courtesy Professors: Nancy Ruttenberg

Lecturers: Petra Dierkes-Thrun

Visiting Professors: Sibylle Baumbach (Winter), Anne Marie Guglielmo (Winter), Kurt Mueller-Vollmer (Winter)

Department Offices: Building 260, Room 108

Mail Code: 94305-2031

Phone: (650) 723-3566

Email: comparativelit@stanford.edu

Web Site: http://complit.stanford.edu

Courses offered by the Department of Comparative Literature are listed under the subject code COMPLIT on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Comparative Literature offers courses in the history and theory of literature through comparative approaches. The department accepts candidates for the degrees of Bachelor of Arts and Doctor of Philosophy.

The field of Comparative Literature provides students the opportunity to study imaginative literature in all its forms. While other literary disciplines focus on works of literature as parts of specific national or linguistic traditions, Comparative Literature draws on literature from all contexts in order to examine the nature of literary phenomena from around the globe and from different historical moments, while exploring how literary writing interacts with other elements of culture and society. The field studies literary expression through examinations of genres such as novels, epics, drama, and poetry, and new aesthetic forms such as cinema and electronic media. Although Comparative Literature does not restrict its focus to single traditions or periods, it does investigate the complex interplay of the literary imagination and historical experience. Attention is also paid to questions of literary theory, aesthetic philosophy, and cultural interpretation.

Along with the traditional model of comparative literature that juxtaposes two or more national literary cultures, the department supports teaching and research that examine literary phenomena with additional tools of inquiry such as literary theory, the relationship between literature and philosophy, and the enrichment of literary study with other disciplinary methodologies. Comparative Literature also encourages the study of aspects of literature that surpass national boundaries, such as transnational literary movements or the dissemination of particular genres. In each case, students emerge from the program with enhanced verbal and writing skills, a command of literary studies, the ability to read analytically and critically, and a more global knowledge of literature.

MISSION OF THE UNDERGRADUATE PROGRAM IN COMPARATIVE LITERATURE

The mission of the undergraduate program in Comparative Literature is to enhance students' verbal and written communication skills, their ability to read analytically and critically as well as to develop their global knowledge of literature. The program provides students with the opportunity to study imaginative literature in all of its forms, investigating the complex interplay of the literary imagination and the historical experience. Courses in the program focus on literary theory, aesthetic philosophy, as well as cultural interpretation. The program prepares students for a variety of career paths as well as for further study in graduate or professional schools as students learn to think, adapt, and communicate effectively.

The department's undergraduate programs are designed to enhance students' appreciation of literature in all its diversity, particularly through introductory courses that include treatments of

the primary literary genres. The course of study at intermediate and advanced levels is flexible in order to accommodate student interest in areas such as specific geographical regions, historical periods, and interdisciplinary connections between literature and other fields such as philosophy, music, the visual arts, and the social sciences. A Comparative Literature major prepares a student to become a better reader and interpreter of literature, through enhanced examination of texts and the development of a critical vocabulary to discuss them. Attention to verbal expression and interpretive argument serves students who plan to proceed into careers requiring strong language skills. In addition, the major in Comparative Literature provides preparation for students who intend to pursue an advanced degree as a gateway to an academic career.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to interpret a literary text in a non-native language or to compare literary texts from different linguistic traditions, which may be read in translation.
2. a self-reflective understanding of the critical process necessary to read and understand texts.
3. skills in writing effectively about literature.
4. skills in oral communication and public speaking about literature.

GRADUATE PROGRAMS IN COMPARATIVE LITERATURE

The department offers a Doctor of Philosophy and a Ph.D. minor in Comparative Literature.

COMPARATIVE LITERATURE COURSE CATALOG NUMBERING SYSTEM

Course numbering system:

Course Topic	*Number*
Authors	10–19
Genre	20–29
Periods and Movements	30–39
Cultures	40–49
Philosophy and Theory	50–59
Required courses:	101, 121, 122, 123, 199, 369, 396L

BACHELOR OF ARTS IN COMPARATIVE LITERATURE

The major in Comparative Literature requires students to enroll in a set of core courses offered by the department, to complete electives in the department, and to enroll in additional literature courses, or other courses approved by the Chair of Undergraduate Studies, offered by other departments. This flexibility to combine literature courses from several departments and to address literature from multiple traditions is the hallmark of the Comparative Literature major. Students may count courses which read literature in translation; however, students, and especially those planning to pursue graduate study in Comparative Literature, are encouraged to develop a command of non-native languages.

Declaring the Major—Students declare the major in Comparative Literature through Axess. Students should meet with the Chair of Undergraduate Studies to discuss appropriate courses and options within the major, and to plan the course of study. Majors are also urged to attend department events such as public talks and conferences.

Advising—Students majoring in Comparative Literature should consult with the Chair of Undergraduate Studies at least once a year. The chair monitors progress to completion of the degree. Students are also encouraged to develop relationships with other faculty members who may act as mentors.

Overseas Campuses and Abroad Programs—The Department of Comparative Literature encourages time abroad, both for increased proficiency in language and the opportunity for advanced course work. Course work done at campuses other than Stanford is counted toward the major at the discretion of the Chair of Undergraduate Studies and is contingent upon the Office of the University Registrar's approval of transfer credit. To that end, students abroad are advised to save syllabi, notes, papers, and correspondence.

Honors College—The Department of Comparative Literature encourages honors students to enroll in the honors college scheduled during the weeks preceding the beginning of every academic year. Applications to the college are available from the DLCL student affairs officer. The honors college is coordinated by the Division of Literatures, Cultures, and Languages (DLCL).

REQUIREMENTS

All majors in Comparative Literature (including honors) are required to complete the following courses:

1. COMPLIT 101, What is Literature? (5 units). This gateway to the major is normally taken by the end of sophomore year. It provides an introduction to literature and its distinctions from other modes of linguistic expression, and a fundamental set of interpretive skills. This course fulfills the Writing in the Major requirement.
2. *The genre core—*
   a. COMPLIT 121, Poems, Poetry, Worlds: An Introductory Course
   b. COMPLIT 122, Literature as Performance
   c. COMPLIT 123, The Novel, the World (5 units each)
   Students should complete these courses as soon as possible. Each course draws on examples from multiple traditions to ask questions about the logic of the individual genres.
3. COMPLIT 199 (5 units). This senior seminar is designed as a culmination to the course of study while providing reflection on the nature of the discipline. Topics vary.
4. *Electives*—Majors must complete at least 40 units of electives. Three of these electives must be Comparative Literature courses. The remaining courses may be drawn from Comparative Literature offerings, from other literature departments, or from other fields of interdisciplinary relevance to the student's interest. Up to 10 units of IHUM or SLE courses may be counted towards the elective requirement. Electives are subject to adviser consultation and approval.
   Examples of possible Comparative Literature electives include:
   - COMPLIT 61Q. Culture and Conflict in Contemporary Europe
   - COMPLIT 125A. The Gothic Novel
   - COMPLIT 127A. Short Stories from the Arab World
   - COMPLIT 151. Theories of Poetic Life
   - COMPLIT 211. Albert Camus and Jean-Paul Sartre: French Existentialism in the Post-World War II Period
   - COMPLIT 223. Courtly Love in Classical Persian Poetry
   - COMPLIT 242A. China and the World: Aesthetics, Ethics and Literature
   - COMPLIT 246A. Literature and Film of Modern Iran
   - COMPLIT 248A. CSI Vienna: American Culture in Austria since 1980
5. *Total unit load*—Students must complete course work for a total of at least 65 units.

PHILOSOPHICAL AND LITERARY THOUGHT

Undergraduates may major in Comparative Literature with a special track in interdisciplinary studies at the intersection of literature and philosophy. Students in this option take courses alongside students from other departments that also have specialized options associated with the program for the study of Philosophical and

Literary Thought. Each student in this option is assigned an adviser in Comparative Literature, and student schedules and course of study must be approved in writing by the adviser, the Chair of Undergraduate Studies of Comparative Literature, and the Chair of Undergraduate Studies of the program. See http://philit.stanford.edu.

A total of 65 units must be completed for this option, including the following requirements:

1. Seven courses taught by Comparative Literature faculty. Of the seven, the following five are required courses:
   - COMPLIT 101, What is Literature?
   - COMPLIT 121, Poems, Poetry, Worlds: An Introductory Course
   - COMPLIT 122, Literature as Performance
   - COMPLIT 123, The Novel, the World
   - COMPLIT 199, Senior Seminar. (5 units each)
   - The remaining two courses must be instructed by Comparative Literature faculty and approved by the Chair of Undergraduate Studies.
2. *Philosophy and Literature Gateway Course* (4 units)—COMPLIT 181 (same as PHIL 81, CLASSGEN 81, ENGLISH 81, FRENGEN 181 and ITALGEN 181). This course should be taken as early as possible in the student's career, normally in the sophomore year.
3. *Philosophy Writing in the Major* (5 units)—PHIL 80. Prerequisite: introductory philosophy class.
4. *Aesthetics, Ethics, Political Philosophy* (ca. 4 units)—One course from the PHIL 170 series.
5. *Language, Mind, Metaphysics, and Epistemology* (ca. 4 units)—One course from the PHIL 180 series.
6. *History of Philosophy* (ca. 8 units)—Two courses in the history of philosophy, numbered above PHIL 100.
7. *Related Courses* (ca. 8 units)—Two upper division courses relevant to the study of philosophy and literature as identified by the committee in charge of the program. A list of approved courses is available from the undergraduate adviser of the program in philosophical and literary thought.
8. One course, typically in translation, in a literature distant from that of the student's concentration and offering an outside perspective on that literary tradition.
9. *Capstone Seminar* (ca. 4 units)—In addition to COMPLIT 199, students take a capstone seminar of relevance to philosophy and literature approved by the undergraduate adviser of the program in philosophical and literary thought. The student's choice of a capstone seminar must be approved in writing by the Chair of Undergraduate Studies of Comparative Literature and by the Chair of Undergraduate Studies of the program. For a list of current capstone courses, see http://philit.stanford.edu/programs/capstone.html.
10. *Seminar Paper Requirement—S*tudents must write at least one seminar paper that is interdisciplinary in nature. This paper brings together material from courses taken in philosophy and literature, and may be an honors paper (see below), an individual research paper (developed through independent work with a faculty member), or a paper integrating materials developed for two separate courses (by arrangement with the two instructors). Though it may draw on previous course work, the paper must be an original composition, 18-20 pages in length. It must be submitted to the Chair of Undergraduate Studies and receive approval no later than the end of Winter Quarter in the fourth year of study.

At least two of the courses counted toward requirements 1, 2, 7, 8, and 9 must be taught by Comparative Literature faculty. Transfer units may not normally be used to satisfy requirements 2, 3, 4, 5, 6 and 9. Units devoted to acquiring language proficiency are not counted toward the 65-unit requirement.

HONORS PROGRAM

The honors option offers motivated Comparative Literature majors the opportunity to write a senior honors paper. During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies and submit a thesis proposal (2-5 pages), an outline of planned course work for the senior year, and proof of a 3.5 GPA or higher within the student's Comparative Literature course work to date. During this quarter, the student may enroll for 2 units of credit for independent research in COMPLIT 189B to prepare this statement and undertake initial planning for the honors paper. The proposal is reviewed by the honors committee, including the Chair of Undergraduate Studies and the chair of the department.

The Chair of Undergraduate Studies designates a faculty tutor appropriate to the topic and a second reader for approved honors papers.

Students in the honors program enroll in DLCL 189 (5 units) in Autumn Quarter of the senior year to refine the project description and begin research in preparation for composing the honors paper. During Winter Quarter of the senior year, the student enrolls in COMPLIT 189A (5 units), independent study with the faculty tutor, to draft the honors paper.

At the end of the quarter, the student submits a completed draft to the tutor. If approved, two copies are forwarded to the honors committee, which ultimately awards honors. If revisions are advised, the student has until the fifth week of Spring Quarter to submit the final paper. Students who did not enroll in a 189B course in the junior year may enroll in COMPLIT 189B in Spring Quarter of the senior year while revising the thesis, if approved by the thesis adviser. 10-12 units of course work associated with the honors paper (DLCL 189 and COMPLIT 189A and 189B) may be counted toward the 65 units required for the major.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Typically, however, honors papers are 40-70 pages.

Honors Awards—The two readers of any honors thesis in Comparative Literature may elect to nominate the thesis in question for University-wide awards. In addition, the department honors committee evaluates on a competitive basis the honors theses completed in a given year and nominates one for University-wide awards competitions.

MINORS IN COMPARATIVE LITERATURE

The undergraduate minor in Comparative Literature represents an abbreviated version of the major. It is designed for students who are unable to pursue the major but who nonetheless seek an opportunity to gain a deeper understanding of literature. Plans for the minor should be discussed with the Chair of Undergraduate Studies. The minimum number of units required for a minor at Stanford is 20. Requirements for the minor in Comparative Literature include:

1. COMPLIT 101. What is Literature?
2. One course from the genre core: COMPLIT 121, 122, or 123
3. At least two other Comparative Literature courses.

MINOR IN LITERATURE AND MINOR IN MODERN LANGUAGES

The Division of Literatures, Cultures, and Languages offers two undergraduate minor programs, the minor in Literature and the minor in Modern Languages. These minors draw on literature and language courses offered in this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about these minors and their requirements.

DOCTOR OF PHILOSOPHY IN COMPARATIVE LITERATURE

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The Ph.D. program is designed for students whose linguistic background, breadth of interest in literature, and curiosity about

the problems of literary scholarship and theory (including the relation of literature to other disciplines) make this program more appropriate to their needs than the Ph.D. in one of the individual literatures. Students take courses in at least three literatures (one may be that of the native language), to be studied in the original. The program is designed to encourage familiarity with the major approaches to literary study prevailing today.

Before starting graduate work at Stanford, students should have completed an undergraduate program with a strong background in one literature and some work in a second literature studied in the original language. Since the program demands an advanced knowledge of two non-native languages and a reading knowledge of a third non-native language, students should at the time of application have an advanced enough knowledge of one of the three to take graduate-level courses in that language when they enter the program. They should be making enough progress in the study of a second language to enable them take graduate courses in that language not later than the beginning of the second year, and earlier if possible. Language courses at the 100- or 200- level may be taken with approval from the Chair of the department or the Chair of Graduate Studies. Applicants are expected to take an intensive course in the third language before entrance.

Students are admitted under a fellowship plan which attempts to integrate financial support and completion of residence requirements with their training as prospective university teachers. Tenure as a fellow, assuming satisfactory academic progress, is for a maximum of four or five years. The minimum teaching requirement is the same regardless of financial support. (For specific teaching requirements, see below.) Five years of support are normally available, from a combination of fellowships and teaching assistantships, to Ph.D. candidates admitted to the Comparative Literature Department who are making satisfactory progress toward the degree.

APPLICATION PROCEDURES

Competition for entrance into the program is keen. The program is kept small so that students have as much opportunity as possible to work closely with faculty throughout the period of study. Because of the special nature of comparative literature studies, the statement of purpose included in the application for admission should contain the following information besides the general plan for graduate work called for on the application:

1. A detailed description of the applicant's present degree of proficiency in each of the languages studied, indicating the languages in which the applicant is prepared to do graduate work at present and outlining plans to meet additional language requirements of the program.
2. A description of the applicant's area of interest (for instance, theoretical problems, genres, periods) within literary study and the reasons for finding comparative literature more suitable to his or her needs than the study of a single literature. Applicants should also indicate their most likely prospective primary field, including the literatures on which they intend to concentrate.
3. All applicants should arrange to have the results of the general section of the Graduate Record Examination sent to the Department of Comparative Literature.
4. Recommendations should, if possible, come from faculty in at least two of the literatures in which the student proposes to work.
5. Applicants must submit a copy of an undergraduate term paper which they consider representative of their best work.
6. Completed applications are due on December 7, 2010.

For further information see the Graduate Admissions web site.

DEGREE REQUIREMENTS

Residence—A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the B.A. degree. The student must take 135 units of graduate work, in addition to the doctoral dissertation. At least three consecutive quarters of course work must be taken at Stanford.

Languages—Students must know three non-native languages, two of them sufficiently to qualify for graduate courses in these languages and the third sufficiently to demonstrate the ability to read a major author in this language. Only the third language may be certified by examination. The other two are certified by graduate-level course work specified below. Language preparation must be sufficient to support graduate-level course work in at least one language during the first year and in the second language during the second year. Students must demonstrate a reading knowledge of the third non-native language no later than the beginning of the third year.

Literatures made up of works written in the same language (such as Spanish and Latin American) are counted as one. One of the student's three literatures usually is designated as the primary field, the other two as secondary fields, although some students may offer two literatures at the primary level (six or more graduate courses).

Teaching—Fellows, whatever their sources of financial support, are ordinarily required to undertake a total of five quarters of supervised apprenticeships and teaching at half time. Fellows must complete whatever pedagogy courses are required by the departments in which they teach. The department's minimum teaching requirement is a total of three quarters.

Minimum Course Requirements—Students are advised that the range and depth of preparation necessary to support quality work on the dissertation, as well as demands in the present professional marketplace for coverage of both traditional and interdisciplinary areas of knowledge, render these requirements as bare minimums. The following are required:

1. COMPLIT 369
2. COMPLIT 396L
3. A sufficient number of courses (six or more) in the student's primary field to assure knowledge of the basic works in one national literature from its beginnings until the present.
4. At least two additional complementary courses, with most of the reading in the original, in each of two different national literatures. Students whose primary field is a non-native language are required to take two courses in one additional literature not their own.

Minimum course requirements must be completed before the student is scheduled to take the University oral examination. These requirements are kept to a minimum so that students have sufficient opportunity to seek out new areas of interest. A course is an offering of 3-5 units. Independent study may take the place of up to two of the required courses, but no more; classroom work with faculty and other students is central to the program. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.

Examinations—Three examinations are required. The first two are one-hour exams, taken at the end of the first and second year of study. The first of these is on literary genre, designed to demonstrate the student's knowledge of a substantial number of literary works in a single genre, ranged over several centuries and over at least three national literatures. This exam is also designed to demonstrate the student's grasp of the theoretical problems involved in his or her choice of genre and in the matter of genre in general. The second of these examinations is on literary theory and criticism, designed to demonstrate the student's knowledge of a particular problem in the history of literary theory and criticism, or the student's ability to develop a particular theoretical position. In either case, this exam should demonstrate wide reading in theoretical and critical texts from a variety of periods. The third and last is the University oral examination.

1. *First One-Hour Examination*: The genre exam is generally administered the second week of April of the student's first year. All first-year students take the exam during the same period, with an examination committee established by the department. Exam lists should be approved by the Chair of Graduate Studies well in advance of the exam. Students are urged to focus on poetry, drama, or the novel or narrative, combining core recommendations from the department with selections from their individual areas of concentration. Any student who does not pass the exam has the opportunity to retake the exam the second week of May of the same quarter. Students who do not pass this exam a second time may be dismissed from the program.
2. *Second One-Hour Examination*: The theory exam is generally administered the second week of April of the student's second year. All second-year students take the exam during the same period, with an examination committee established by the department. Exam lists should be approved by the Chair of Graduate Studies well in advance of the exam. Any student who does not pass the exam has the opportunity to retake the exam the second week of May of the same quarter. Students who do not pass this exam a second time may be dismissed from the program.
3. *University Oral Examination*: Students are urged to complete this exam by the end of their third year. The oral exam is individually scheduled, with a committee established by the student in consultation with the Chair of Graduate Studies. The exam covers a literary period, to consist of in-depth knowledge of a period of approximately a century in three or more literatures with primary emphasis on a single national literature or, in occasional cases, two national literatures. The reading list covers chiefly the major literary texts of this period but may also include some studies of intellectual backgrounds and modern critical discussions of the period. Students must demonstrate a grasp of how to discuss and define this period as well as the concept of periods in general. This examination is not to be on the dissertation topic, on a single genre, or on current criticism, but rather on a multiplicity of texts from the period. Students whose course work combines an ancient with a modern literature have the option of dividing the period sections into two wholly separate periods.

Qualifying Procedures—The department meets at the end of each year to review student progress. Performance on the first one-hour examination, together with class performance and general progress, are taken into consideration. Students are admitted to candidacy upon completion of the first one-hour examination and departmental review. As soon as the student has completed the qualifying procedures, the chair recommends the student for admission to candidacy for the Ph.D.

Colloquium—The colloquium normally takes place in the quarter following the University oral examination. The colloquium lasts one hour, begins with a brief introduction to the dissertation prospectus by the student lasting no more than five minutes, and consists of a discussion of the prospectus by the student and the three readers of the dissertation. At the end of the hour, the faculty readers vote on the outcome of the colloquium. If the outcome is favorable (by majority vote), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory (by majority vote), the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second colloquium.

The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. It must be submitted in its final form to the readers no later than one week before the colloquium. A prospectus should not exceed ten double spaced pages, in addition to which it should include a working bibliography of primary and secondary sources. It should offer a synthetic overview of the dissertation, describe its methodology and the project's relation to prior scholarship on the topic, and lay out a complete chapter by chapter plan.

It is the student's responsibility to schedule the colloquium no later than the first half of the quarter after that quarter in which the student passed the University Oral Examination. The student should arrange the date and time in consultation with the department administrator and with the three examiners. The department administrator schedules an appropriate room for the colloquium.

Members of the dissertation reading committee are ordinarily drawn from the University oral examination committee.

PH.D. IN COMPARATIVE LITERATURE AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to a Ph.D. degree in Comparative Literature and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the Stanford Bulletin's ExploreCourses web site.

PH.D. MINOR IN COMPARATIVE LITERATURE

This minor is designed for students working toward the Ph.D. in the various foreign language departments. Students working toward the Ph.D. in English are directed to the program in English and Comparative Literature described among the Department of English offerings. Students must have:

1. A knowledge of at least two foreign languages, one of them sufficient to qualify for graduate-level courses in that language, the second sufficient to read a major author in the original language.
2. A minimum of six graduate courses, of which three must be in the department of the second literature and three in the Department of Comparative Literature, the latter to include a seminar in literary theory or criticism. At least two of the three courses in comparative literature should originate in a department other than the one in which the student is completing the degree. Except for students in the Asian languages, students must choose a second literature outside the department of their major literature.

COMPARATIVE STUDIES IN RACE AND ETHNICITY (CSRE)

Director: José David Saldívar
Associate Director: Tania D. Mitchell
Curriculum Committee: Arnetha Ball, Cheryl Brown, Charlotte Fonrobert, Teresa LaFromboise, Tania Mitchell, David Palumbo-Liu, Gary Segura, Vered Shemtov
Affiliated Faculty and Teaching Staff: Arnetha Ball (Education), David Abernethy (Political Science, emeritus), Anthony Antonio (Education), Rick Banks (Law), Lucius Barker (Political Science, emeritus), Donald Barr (Sociology), Karen Biestman (Native American Studies), Albert Camarillo (History), James T. Campbell (History), Martin Carnoy (Education), Clayborne Carson (History), Prudence Carter (Education), Gordon Chang (History), Kathleen Coll (Chicana/o Studies), Karen Cook (Sociology), Michele Dauber (Law), Linda Darling-Hammond (Education), Sergio De La Mora (Chicana/o Studies), Carolyn Duffey (Comparative Studies in Race and Ethnicity), Jennifer Eberhardt (Psychology), Paulla Ebron (Anthropology), Penny Eckert (Linguistics), Harry Elam (Drama), Michele Elam (English), James Ferguson (Anthropology), Shelley Fisher-Fishkin (English), James Fishkin (Communication), Charlotte Fonrobert

(Religious Studies), Estelle Freedman (History), Susana Gallardo (Chicana/o Studies), Gabriel Garcia (Medicine), Leah Gordon (Education), David Grusky (Sociology), Sean Hanretta (History), Georgina Hernandez (Comparative Studies in Race and Ethnicity), Allyson Hobbs (History), Miyako Inoue (Anthropology), Shanto Iyengar (Communication), Tomás Jiménez (Sociology), Gavin Jones (English), Terry Karl (Political Science), Pamela Karlan (Law), Ju Yon Kim (Comparative Studies in Race and Ethnicity), Matthew Kohrman (Anthropology), Jan Krawitz (Art and Art History), Jon Krosnick (Communication), Teresa LaFromboise (Education), David Laitin (Political Science), Sandra Lee (Asian American Studies), Julie Lythcott-Haims (Associate VPUE, Dean of Freshmen and Undergraduate Advising), Liisa Malkki (Anthropology), Hazel Markus (Psychology), Barbaro Martinez-Ruiz (Art and Art History), Douglas McAdam (Sociology), Monica McDermott (Sociology), Melissa Michelson (Chicana/o Studies), Tania Mitchell (Comparative Studies in Race and Ethnicity, Education), Cherríe Moraga (Drama), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Italian), Thomas S. Mullaney (History), Stephen Murphy-Shigematsu (Asian American Studies), Hilton Obenzinger (Undergraduate Advising and Research), Susan Olzak (Sociology), Amado Padilla (Education), David Palumbo-Liu (Comparative Literature), Celine Parreñas Shimizu (Asian American Studies), Arnold Rampersad (English), Delphine Red Shirt (Native American Studies), Robert Reich (Political Science), John Rickford (Linguistics), Cecilia Ridgeway (Sociology), Richard Roberts (History), Aron Rodrigue (History), Michael Rosenfeld (Sociology), José David Saldívar (Comparative Literature), Ramón Saldívar (English), Joel Samoff (History), Stephen Sano (Music), Debra Satz (Philosophy), Gary Segura (Political Science), Vered Shemtov (Division of Literatures, Cultures and Languages), JoEllen Shively (Native American Studies), C. Matthew Snipp (Sociology), Paul Sniderman (Political Science), Stephen Sohn (English), Jayashiri Srikantiah (Law), James Steyer (Comparative Studies in Race and Ethnicity), Ewart Thomas (Psychology), Jeanne L. Tsai (Psychology), Linda Uyechi (Music), Guadalupe Valdés (Education), Gregory Walton (Psychology), Richard White (History), Jeremy Weinstein (Political Science), Michael Wilcox (Anthropology), Bryan Wolf (Art and Art History), Sylvia Yanagisako (Anthropology), Yvonne Yarbro-Bejarano (Iberian and Latin American Cultures), Steven Zipperstein (History)

Teaching Fellows: Regina Arnold, Shantal Marshall, Manwai Ku
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Phone: (650) 724-2088
Web Site: http://csre.stanford.edu

The Undergraduate Program in Comparative Studies in Race and Ethnicity is home to four areas of study: Asian American Studies, Chicano/a Studies, Comparative Studies, and Native American Studies. Students can pursue a major or minor in any of these four areas, and are encouraged to build their interdisciplinary study around a focus or theme. Students can then select from more than 150 course options from across departments and schools to customize a curriculum. The major requires 60 units of study and a culminating research project (either a senior paper or thesis).

Courses offered by the Program in Comparative Studies in Race and Ethnicity are listed under the subject code CSRE on the Stanford Bulletin's ExploreCourses web site.

Courses offered by Asian American Studies are listed under the subject code ASNAMST on the Stanford Bulletin's ExploreCourses web site.

Courses offered by Chicana/o Studies are listed under the subject code CHICANST on the Stanford Bulletin's ExploreCourses web site.

Courses offered by Native American Studies are listed under the subject code NATIVEAM on the Stanford Bulletin's ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

The Interdepartmental Program in Comparative Studies in Race and Ethnicity (CSRE) is an interdisciplinary program offering students the opportunity to investigate the significance of race and ethnicity in all areas of human life.

Devoted to a rigorous analysis of race and ethnicity and using a comparative and interdisciplinary approach, CSRE is committed to promoting and deepening student's understanding of the multiple meanings of racial diversity in the United States and abroad in ways that prepare students for living and working effectively in a multicultural society.

The interdisciplinary and integrated nature of our academic programs means that students take courses from across the university including: anthropology, art, communication, drama, economics, education, history, languages, linguistics, literature, music, philosophy, political science, psychology, sociology, and religion, among others.

LEARNING OUTCOMES

The IDP in CSRE expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the undergraduate program. Students will:

1. Demonstrate an understanding of interdisciplinary approaches to the knowledge of experiences related to race and ethnicity in the United States.
2. Demonstrate the ability to employ diverse analytical resources and comparative modes of study as tools to frame and address research questions.
3. Be critical readers of both primary and secondary sources, who can use and properly cite both types of evidence in their written work.
4. Actively and critically engage in verbal and/or written discussion of issues.
5. Demonstrate analytical writing skills that convey their understanding of the topic.
6. Expand their ability to think critically about issues in political, social, scientific, economic and cultural life stemming from the diversity of experiences related to race an ethnicity.

UNDERGRADUATE PROGRAM IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

MAJORS: CORE CURRICULUM

The Interdepartmental Program in Comparative Studies in Race and Ethnicity (CSRE) provides students the opportunity to structure a major or minor in comparative ethnic studies or to focus their course work in a single ethnic studies area. Four majors and minors (Asian American Studies, Chicana/o Studies, Comparative Studies, and Native American Studies) are offered as part of the the IDP in CSRE. All courses taken for the major must be taken for a letter grade. The directors of the program and of each major constitute the CSRE curriculum committee, the policy making body for the interdisciplinary program.

Students who declare any of the four majors participate in a common curriculum consisting of at least two core courses and a senior seminar. Individually designed majors in Jewish Studies may also enroll in the core curriculum. African and African American Studies majors take one CSRE core course as part of their program of study.

There are two types of introductory courses taught by senior CSRE-affiliated faculty: core courses that are interdisciplinary and compare across racial and ethnic groups; and foundational courses that focus on a specific racial or ethnic group. The core requirements illustrate how different disciplines approach the study and

interpretation of race and ethnicity and provide a foundation for the student's program of study.

MINORS

Students who wish to minor in the study areas must complete six courses (a minimum of 30 units) from the approved course list, two of which must be core courses. Proposals for the minor must be approved by the director of each study area.

DIRECTED READING AND RESEARCH

Directed reading and research allows students to focus on a special topic of interest. In organizing a reading or research plan, the student consults with the director of the major and one or more faculty members specializing in the area or discipline.

Courses that fulfill directed reading and research requirements:
ASNAMST 200R. Directed Research (1-5 units)
ASNAMST 200W. Directed Reading (1-5 units)
CHICANST 200R. Directed Research (1-5 units)
CHICANST 200W. Directed Reading (1-5 units)
CSRE 200R. Directed Research (1-5 units)
CSRE 200W. Directed Reading (1-5 units)
NATIVEAM 200R. Directed Research (1-5 units)
NATIVEAM 200W. Directed Reading (1-5 units)

SENIOR SEMINAR

Research and writing of the senior honors thesis or senior paper is under the supervision of a faculty project adviser. All CSRE-related students, even those who opt to write honors theses in other departments and programs, must enroll in CSRE 200X, Senior Seminar, offered in Autumn Quarter. The course takes students through the process of research including conceptualization, development of prospectus, development of theses, research, analysis, and writing. This course meets the Writing in the Major requirement (WIM). Those who opt to write senior papers are organized into tutorial groups in Autumn Quarter.

SPECIAL PROGRAMS

CSRE majors have several unique opportunities available to them. The program supports full-time paid summer research internships for those who apply to complete a self-designed research project in collaboration with a community agency. The Public Policy Institute is a two week, pre-Autumn Quarter seminar that provides exposure to critical public policy issues. The residence-based institute provides room and board and all seminar materials for participants, including a visit to Sacramento to meet with policy makers. CSRE also sponsors quarterly luncheons and community programs for all majors and minors.

MURRAY HOUSE

Murray House, 566 Governor's Avenue, is an undergraduate residence with a CSRE focus that is devoted to developing an intellectual community amongst students interested in the study of race and ethnicity. Programs, including an in-house seminar, are developed with the guidance of CSRE faculty to increase the understanding of issues of race and ethnicity amongst its residents through social events and discussions. Students may apply for pre-assignment to Murray House to participate in the CSRE Focus. Contact Residential Education for more information.

HONORS

Majors in each of the study areas who meet academic qualifications (a grade point average of at least 3.5 in courses for their major) may apply for honors. Majors are expected to participate in a Pre-Honors Seminar in Autumn Quarter of Junior year to prepare for honors thesis research. Honors students take CSRE 200X, Senior Seminar (which fulfills the program's WIM requirement), and also enroll in CSRE 200Y and 200Z in Winter and Spring quarters to continue to get peer and faculty support as they write their thesis. An honors colloquium held near the end of Spring Quarter affords students an opportunity to present their research formally. Prizes for best undergraduate honors thesis are awarded annually by the CSRE curriculum committee.

Courses that fulfill honors requirements:
CSRE 199. Pre-Honors Seminar (1-2 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
CSRE 200Y. CSRE Senior Honors Research (1-10 units)
CSRE 200Z. CSRE Senior Honors Research (1-10 units)

AFRICAN AND AFRICAN AMERICAN STUDIES (AAAS)

Director: Arnetha Ball

Since 1997-98, AAAS has been a CSRE-related major. For major and minor descriptions and requirements, see the "African and African American Studies" section of this bulletin.

ASIAN AMERICAN STUDIES

Director: David Palumbo-Liu

Asian American Studies (AAS) provides an interdisciplinary approach to understanding the historical and current experiences of persons of Asian ancestry in the United States. In using the term "Asian American," the AAS faculty recognize that the term seeks to name a rapidly developing, complex, and heterogeneous population and that there is neither a single Asian American identity nor one community that comprises all Asian Americans. Asian Americans include those with ancestral ties to countries or regions in East Asia, South Asia, Southeast Asia, or the Philippines, among others.

AAS brings together courses that address the artistic, historical, humanistic, political, and social dimensions of Asian Americans and is an appropriate course of study for students interested in a variety of concerns related to Asian Americans, including: artistic and cultural contributions; current social significance; historical experiences; immigration, intellectual, and policy issues; relationships with other social groups; and the construction of the notion of Asian American as it addresses important theoretical and practical issues.

BACHELOR OF ARTS IN ASIAN AMERICAN STUDIES

A total of 60 units of course work is required for the major.

1. *Core Curriculum*—Asian American majors must take the 15-unit CSRE core curriculum including two introductory core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Asian ethnic group may be counted toward the 15-unit core requirement.
2. *Foundational Course*—Majors are required to take one foundational course in Asian American Studies. This may be either HISTORY 59, Introduction to Asian American History, or COMPLIT 148, Introduction to Asian American Cultures.
3. *Area Study*—Majors must complete an additional 40 units of course work from an approved list. One course must have an international dimension, preferably a focus on Asia. Five other courses must have an Asian American focus and must be selected from social science and humanities departments. Majors must take two courses offering a comparative perspective on race and ethnicity.
4. *Language Study (optional)*—Students may obtain credit for their study of a related Asian language towards their degree. If students take 15 or more units of an Asian language relevant to Asian American Studies, they may apply 5 of those units toward their Asian American Studies degree.
5. *Senior Paper or Honors Thesis*—All CSRE-related majors complete a culminating research paper under the supervision of a faculty adviser.

ASIAN AMERICAN STUDIES MINOR

A total of 30 units of approved course work is required for the minor. Two CSRE core courses and at least one foundational

course are needed to fulfill the requirements for the minor. Proposals must be approved by the director.

COURSES

Students in Asian American Studies may find the following courses useful in fulfilling course requirements in the major or minor.

CORE COURSES

ANTHRO 88. Theories of Race and Ethnicity (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
HISTORY 64. Introduction to Race and Ethnicity in 20th Century America (5 units)
HISTORY 255D. Racial Identity in the American Imagination (4-5 units)
PSYCH 75. Introduction to Cultural Psychology (5 units)
SOC 147A/247A. Comparative Ethnic Conflict (5 units)
SOC 148. Racial Identity (5 units)

FOUNDATIONAL COURSES

COMPLIT 148. Introduction to Asian American Cultures (3-5 units)
HISTORY 59. Introduction to Asian American History (5 units)

THEMATIC COURSES

ASNAMST 146S/CSRE 146S/COMPLIT 146. Asian American Culture and Community (5 units)
ASNAMST 173S/CSRE 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges (5 units)
ASNAMST 161/CSRE 161. Asian American Immigration and Health (3-5 units)

COGNATE COURSES

COMPLIT 41Q. Ethnicity and Literature (3-5 units)
EDUC 193F. Psychological Well-Being on Campus: Asian American Perspectives (1 unit)
ENGLISH 261B. Bright Lights, Global Cities: Reading Transnational Asia/Pacific Spatial Geographies (5 units)
ENGLISH 362S. Phantoms That Follow: Trauma and Disillusionment in Asian American Literature (5 units)
HISTORY 265. Writing Asian American History (5 units)
MUSIC 17Q. Perspectives in North American Taiko (4 units)

CHICANA/O STUDIES

Director: Gary Segura

Chicana/o Studies is an interdisciplinary major focusing on the Mexican-origin population of the U.S., the second largest ethnic group in the nation. Students who major or minor in Chicana/o Studies have an opportunity to select from courses in the humanities, social sciences, and courses offered by affiliated faculty in the School of Education. Established in 1997, the Chicana/o Studies program affords students an opportunity to explore the culture, society, economy, and politics of this important and growing segment of our national population.

BACHELOR OF ARTS IN CHICANA/O STUDIES

A total of 60 units of course work are required for the major.

1. *Core Curriculum*—Chicana/o Studies majors must take the 15-unit CSRE core curriculum including two introductory core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Mexican origin group may be counted toward the 15-unit core requirement.
2. *Foundational Courses*—Majors are required to take one foundational course in Chicana/o Studies. This may be either CHICANST 180E, Introduction to Chicana/o Studies or SOC 166, Mexicans, Mexican Americans, and Chicanos in American Society.
3. *Thematic Concentration*—Chicana/o Studies majors select a thematic concentration which allows students to customize their curriculum and to synthesize course work taken across various departments into a coherent focus. Majors complete an additional 40 units of courses relevant to the thematic concentration and approved by the adviser.
4. *Senior Paper or Honors Thesis*—All CSRE-related majors complete a culminating research paper under the supervision of a faculty adviser.

CHICANA/O STUDIES MINOR

Students who wish to minor in Chicana/o Studies must complete one core introductory course and one foundational course, either CHICANST 180E or SOC 166. Minors will also select a thematic concentration and choose four additional courses relevant to that theme to customize their curriculum. A total of 30 units of approved course work is required for each minor.

COURSES

Students in Chicana/o Studies may find the following courses useful in fulfilling course requirements in the major or minor.

CORE COURSES

ANTHRO 88. Theories of Race and Ethnicity (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
HISTORY 64. Introduction to Race and Ethnicity in 20th Century America (5 units)
HISTORY 255D. Racial Identity in the American Imagination (4-5 units)
PSYCH 75. Introduction to Cultural Psychology (5 units)
SOC 147A/247A. Comparative Ethnic Conflict (5 units)
SOC 148. Racial Identity (5 units)

FOUNDATIONAL COURSES

CHICANST 180E/CSRE 180E. Introduction to Chicana/o Studies (5 units)
SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society (5 units)

THEMATIC COURSES

CHICANST 160N/CSRE 160N/DRAMA 17N. Salt of the Earth: Docudrama in (Latino) America (3-5 unis)
CHICANST 189W/CSRE 189W. Language and Minority Rights (3-5 units)
CHICANST 197/CSRE 197/NATIVEAM 197/DRAMA 355. The Rite to Remember: Performance and Chicana Indigenous Thought (3-5 units)
CHICANST 201B/CSRE 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post-Civil Rights Era (5 units)

COGNATE COURSES

EDUC 149. Theory and Issues in the Study of Bilingualism (3-5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 178X. Latino Families, Languages, and Schools (3-5 units)
EDUC 193B. Peer Counseling in the Chicano/Latino Community (1 unit)
ENGLISH 45/145. Another Way to be: Writing by Women of Color (3-5 units)
ENGLISH 64N. Growing Up in America (3 units)
HISTORY 165. Mexican American History through Film (4-5 units)
ILAC 117N. Film, Nation, *Latinidad* (3-4 units)

ILAC 389E. Race, Gender, and Sexuality in Cultural Representations (3-5 units)
ILAC 280. Latina/o Literature (3-5 units)
POLISCI 125S. Chicano/Latino Politics (5 units)
POLISCI 327. Minority Behavior and Representation (5 units)
SOC 164. Immigration and the Changing United States (5 units)
SPANLIT 193. The Cinema of Pedro Almodóvar (3-5 units)

COMPARATIVE STUDIES IN RACE AND ETHNICITY

Director: José David Saldívar

Comparative Studies in Race and Ethnicity does not focus on a particular ethnic group. Rather, a student in consultation with the adviser designs a curriculum in relation to a thematic concentration that compares various ethnic groups or explores topics that cut across group experiences in the United States and elsewhere in the world. For example, students may compare groups within the U.S., or compare groups in the U.S. to ethnic groups elsewhere, or study the diaspora of a single group or the sovereignty of indigenous peoples within and across different national contexts. Students in this major are able to take advantage of courses in over 22 fields offered by the affiliated faculty of CSRE.

BACHELOR OF ARTS IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

A total of 60 units of course work are required for the major.

1. *Core Curriculum*—All CSRE-related majors enroll in the 15-unit CSRE core curriculum, which consists of two introductory core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course may be counted toward the 15-unit core requirement.
2. *Thematic Concentration*—Comparative Studies majors complete another 45 units of course work relevant to the thematic concentration they have chosen in consultation with the adviser.
3. *Senior Paper or Honors Thesis*—All CSRE-related majors complete a culminating research paper under the supervision of a faculty adviser.

COMPARATIVE STUDIES MINOR

Students who wish to minor in Comparative Studies must complete six courses (a minimum of 30 units) from the approved course list. Two core courses (or one core and one foundational course) are needed to fulfill the minor requirements.

COURSES

Students in Comparative Studies may find the following courses useful in fulfilling course requirements in the major or minor.

CORE COURSES

ANTHRO 88. Theories of Race and Ethnicity (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
HISTORY 64. Introduction to Race and Ethnicity in 20th Century America (5 units)
HISTORY 255D. Racial Identity in the American Imagination (4-5 units)
PSYCH 75. Introduction to Cultural Psychology (5 units)
SOC 147A/247A. Comparative Ethnic Conflict (5 units)
SOC 148. Racial Identity (5 units)

FOUNDATIONAL COURSES

ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America (5 units)
CHICANST 180E/CSRE 180E. Introduction to Chicana/o Studies (5 units)
COMPLIT 148. Introduction to Asian American Cultures (3-5 units)
HISTORY 59. Introduction to Asian American History (5 units)
SOC 138. American Indians in Comparative Historical Perspective (5 units)
SOC 139. American Indians in Contemporary Society (5 units)
SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society (5 units)

THEMATIC COURSES

CSRE 183/AMSTUD 183. Border Crossings and American Identities (5 units)
CSRE 145A/AFRICAAM 145A. Poetics and Politics of Caribbean Women's Literature (5 units)
CSRE 146. Community Matters: Research and Service with Community Organizations (2 units)
CSRE 146S. Asian American Culture and Community (5 units)
CSRE 173S/ASNAMST 173S. Transcultural and Multiethnic Lives: Contexts, Controversies and Challenges (5 units)
CSRE 160N/CHICANST 160N/DRAMA 17N. Salt of the Earth: Docudrama in America (3-5 units)
CSRE 177/DRAMA 177. Writing for Performance: The Fundamentals (5 units)
CSRE 189W/ CHICANST 189W. Language and Minority Rights (3-5 units)
CSRE 197/CHICANST 197/NATIVEAM197/DRAMA 255. The Rite to Remember: Performance and Chicana Indigenous Thought (3-5 units)
CSRE 198. Internship for Public Service (1-5 units)
CSRE 199. Pre-Honors Seminar (1-2 units)
CSRE 201B/CHICANST 201B. From Racial Justice to Multicultural Movement-based Arts Organizing in the Post Civil Rights Era (5 units)
CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century (5 units)

COGNATE COURSES

AFRICAAM 152/ENGLISH 152D/ PHIL 194L. W. E. B. DuBois as Writer and Philosopher (5 units)
AFRICAST 111. Education for All? The Global and Local in Public Policy Making in Africa (5 units)
AFRICAST 112. AIDS, Literacy, and Land: International Aid and the Problems of Development in Africa (5 units)
AMSTUD 183. Border Crossings and American Identities (5 units)
AMSTUD 184. Cityscapes of the Imaginary: The Urban World in Literature and Film (5 units)
ANTHRO 82. Medical Anthropology (4-5 units)
ANTHRO 88. Theories in Race and Ethnicity (5 units)
ANTHRO 126. Cities in Comparative Perspective (5 units)
ARTHIST 160A. Twentieth Century African American Art (4 units)
ARTHIST 256A. Critical Race Art History (5 units)
COMM 160/POLISCI 323R. The Press and the Political Process (5 units)
COMM 162/POLISCI 323S. Analysis of Political Campaigns (5 units)
COMPLIT 41Q. Ethnicity and Literature (3-5 units)
COMPLIT 142/ENGLISH 172E. The Literature of the Americas (5 units)
COMPLIT 148. Introduction to Asian American Cultures (3-5 units)
DRAMA 17N. Salt of the Earth: The Docudrama in America (3 units)
DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts (5 units)
DRAMA 177. Writing for Performance: The Fundamentals (5 units)
EDUC 112X/212X. Urban Education (3-4 units)
EDUC 116X. Service Learning as an Approach to Teaching (3 units)

EDUC 149. Theory and Issues in the Study of Bilingualism (3-5 units)
EDUC 165. History of Higher Education in the U.S. (3-4 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 178X. Latino Families, Languages, and Schools (3-5 units)
EDUC 193B. Peer Counseling in the Chicano/Latino Community (1 unit)
EDUC 193C. Peer Counseling in the African American Community (1 unit)
EDUC 193F. Psychological Well-Being on Campus: Asian American Perspectives (1 unit)
EDUC 193N. Peer Counseling in the Native American Community (1 unit)
EDUC 201. History of Education in the United States (3-4 units)
EDUC 233A. Adolescent Development and Mentoring in the Urban Context (3 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
ENGLISH 140A. Creative Resistance and the Holocaust (5 units)
ENGLISH 152D/AFRICAAM 152/PHIL 194L. W. E. B. Du Bois as Writer and Philosopher (5 units)
ENGLISH 172E/COMPLIT 142. The Literature of the Americas (5 units)
ENGLISH 261B. Bright Lights, Global Cities: Reading Transnational Asia/Pacific Spatial Geographies (5 units)
ENGLISH 362S. Phantoms That Follow: Trauma and Disillusionment in Asian American Literature (5 units)
FEMST 120. Introduction to Queer Studies (4-5 units)
HISTORY 48Q. South Africa: Contested Transitions (3 units)
HISTORY 52N. The Harlem Renaissance (5 units)
HISTORY 54N. African American Women's Lives (4-5 units)
HISTORY 64C. From Freedom to Freedom Now! African American History (3 units)
HISTORY 137. The Holocaust (4-5 units)
HISTORY 150C. The United States in the Twentieth Century (5 units)
HISTORY 151. Slavery and Freedom in American History (5 units)
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle (4-5 units)
HISTORY 255B/AFRICAAM 105/ENGLISH 143E. Introduction to African and African American Studies (5 units)
HISTORY 255D. Racial Identity in the American Imagination (4-5 units)
HISTORY 258. History of Sexuality in the U.S. (4-5 units)
HISTORY 259. Poverty and Homelessness in America (5 units)
HISTORY 260. California's Minority-Majority Cities (5 units)
HISTORY 261. Race, Gender, and Class in Jim Crow America (5 units)
HISTORY 295F. Race and Ethnicity in East Asia (4-5 units)
HUMBIO 122S/SOC 141A. Social Class, Race, Ethnicity, Health (5 units)
HUMBIO 129. Critical Issues in International Women's Health (4 units)
LINGUIST 150. Language in Society (4 units)
LINGUIST 156. Language and Gender (4 units)
MUSIC 17Q. Perspectives in North American Taiko (4 units)
MUSIC 37N. Ki ho'alu: The New Renaissance of a Hawaiian Musical Tradition (3 units)
PHIL 194L/AFRICAAM 152/ENGLISH 152D. W.E.B. DuBois as Writer and Philosopher (5 units)
POLISCI 120B. Parties, Voting, the Media, and Elections (5 units)
POLISCI 125S. Chicano/Latino Politics (5 units)
POLISCI 137R/EDUC 261X/ETHICSOC 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
POLISCI 141. The Global Politics of Human Rights (5 units)
POLISCI 323R/COMM 160. The Press and the Political Process (4-5 units)
POLISCI 323S/COMM 162. Analysis of Political Campaigns (4-5 units)
POLISCI 327. Minority Behavior and Representation (5 units)
POLISCI 337R/EDUC 261X/POLISCI 137R/ETHICSOC 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
PSYCH 25N. Psychology, Inequality, and the American Dream (3 units)
PSYCH 180/245. Social Psychological Perspectives on Stereotyping and Prejudice (3 units)
PSYCH 236. The Social Self (3 units)
SOC 45Q. Understanding Race and Ethnicity in American Society (5 units)
SOC 46N. Race, Ethnic, and National Identities: Imagined Communities (3 units)
SOC 118. Social Movements and Collective Action (5 units)
SOC 119. Understanding Large-Scale Societal Change: The Case of the 1960s (5 units)
SOC 120. Interpersonal Relations (5 units)
SOC 133. Law and Wikinomics: The Economic and Social Organization of the Legal Profession (1-5 units)
SOC 140. Introduction to Social Stratification (5 units)
SOC 141A/HUMBIO 122S. Social Class, Race, Ethnicity, Health (5 units)
SOC 142. Sociology of Gender (5 units)
SOC 149/URBANST 112. The Urban Underclass (5 units)
SOC 155.The Changing American Family (5 units)
SOC 164. Immigration and the Changing United States (5 units)
SOC 180B. Evaluation of Evidence (5 units)
SPANLIT 193. The Cinema of Pedro Almodóvar (3-5 units)
URBANST 112/SOC 149. The Urban Underclass (5 units)

TAUBE CENTER FOR JEWISH STUDIES

Directors: Charlotte Fonrobert, Vered Shemtov

Jewish Studies is an affiliated program of CSRE. For program and course descriptions, see the "Jewish Studies" section of this bulletin.

NATIVE AMERICAN STUDIES

Director: Teresa LaFromboise

Native American Studies provides an intensive approach to understanding the historical and contemporary experiences of Native American people. Attention is paid not only to the special relationship between tribes and the federal government, but to issues across national boundaries, including tribal nations within Canada, and North, Central, and South America. In using the term Native American, the NAS faculty recognize the heterogeneous nature of this population. Native Americans include the Alaska Native population, which comprises Aleuts, Eskimo, and other Native American people residing in Alaska, as well as Native Hawaiian communities.

The purpose of the Native American Studies major and minor is to introduce students to approaches in the academic study of Native American people, history, and culture. Students who major in Native American Studies have the opportunity of doing advanced work in related fields, including literature, sociology, education, and law. In addition to specialized course work on Native American issues, students also are expected to concentrate in a traditional discipline such as anthropology, history, or psychology to ensure a well rounded educational experience. The area of concentration and related course work should be chosen in consultation with a faculty adviser in Native American Studies. All courses in the program promote the discussion of how academic knowledge about Native Americans relates to the historical and contemporary experiences of Native American people and communities.

BACHELOR OF ARTS IN NATIVE AMERICAN STUDIES

A total of 60 units of course work are required for the major.

1. *Core Curriculum*—Native American Studies majors must take the 15-unit CSRE core curriculum, including two introductory core courses and a senior seminar taken in Autumn Quarter of

the senior year. One foundational course that focuses on a non-Native American group may be counted toward the 15-unit core requirement.

2. *Foundational Courses*—Majors are required to take one foundational course in Native American Studies. This may be either SOC 138, American Indians in Comparative Historical Perspective; SOC 139, American Indians in Contemporary Society; or ANTHRO 16, Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America.
3. *Area Study*—Majors complete an additional 40 units of course work that satisfy three categories in their area of study: Native American focus, comparative focus, and a methodology/research course.
4. *Language Study (optional)*—Students may obtain credit for their study of a related native language towards their degree. If students take 15 or more units of a native language relevant to Native American Studies, they may apply 5 of those units toward their Native American Studies degree.
5. *Senior Paper or Honors Thesis*—All CSRE-related majors complete a culminating research paper under the supervision of a faculty adviser.

NATIVE AMERICAN STUDIES MINOR

Students who wish to minor in Native American Studies must complete two core courses and four additional courses relevant to the area of concentration selected by the student in consultation with a faculty adviser. A total of 30 units of approved course work is required for the minor. Proposals must be approved by the director.

COURSES

Students in Native American Studies may find the following courses useful in fulfilling course requirements in the major or minor.

CORE COURSES

ANTHRO 88. Theories of Race and Ethnicity (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
HISTORY 64. Introduction to Race and Ethnicity in 20th Century America (5 units)
HISTORY 255D. Racial Identity in the American Imagination (4-5 units)
PSYCH 75. Introduction to Cultural Psychology (5 units)
SOC 147A/247A. Comparative Ethnic Conflict (5 units)
SOC 148. Racial Identity (5 units)

FOUNDATIONAL COURSES

ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America (5 units)
SOC 138. American Indians in Comparative Historical Perspective (5 units)
SOC 139. American Indians in Contemporary Society (5 units)

THEMATIC COURSES

NATIVEAM 109A/CSRE 109A. Federal Indian Law (5 units)
NATIVEAM 109B/CSRE 109B. Indian Country Economic Development (5 units)
NATIVEAM 116/CSRE 116. Language, Culture, and Education in Native North America (5 units)
NATIVEAM 117S/CSRE 117S. History of California Indians (5 units)
NATIVEAM 123/CSRE 123. American Indians and the Cinema (5 units)
NATIVEAM 197/CHICANST 197/CSRE 197/DRAMA 355M. The Rite to Remember: Performance and Chicana Indigenous Thought (3-5 units)

COGNATE COURSES

EDUC 193N. Peer Counseling in the Native American Community (1 unit)
MUSIC 37N. Ki ho'alu: The New Renaissance of a Hawaiian Musical Tradition (3 units)
SOC 45Q. Understanding Race and Ethnicity in American Society (5 units)

THEMATIC CONCENTRATION IN THE INSTITUTE FOR DIVERSITY IN THE ARTS (IDA)

Students in any major in the Comparative Studies in Race and Ethnicity undergraduate program can choose a concentration in the Institute for Diversity in the Arts. The concentration is not declared on Axess; it does not appear on the transcript or diploma. Students interested in IDA should contact the CSRE undergraduate program office.

A minimum of 60 units is required for the thematic concentration in IDA. Students take two of the CSRE core courses (10 units), one of which must focus on the arts; in addition, CSRE 200X is required of students in the IDA concentration and is taken in Autumn Quarter of the senior year (5 units, WIM). As a capstone experience, majors must write an honors thesis or senior paper.

IDA concentration students must also complete a senior project. Possible senior projects include a stage production, CD, or arts workshop curriculum in a community setting. Students who elect to write an honors thesis may incorporate their project as the basis for their thesis.

In addition to the core curriculum, students complete 45 units drawing from new and existing courses in departments and programs such as Art and Art History, Music, Drama, and Comparative Literature, African and African American Studies; Asian American Studies; Chicana/o Studies; Comparative Studies; and Native American Studies. Thematic courses may focus on performance, visual aesthetics, writing for performance, critical studies in art and performance, and critical arts theory.

Students may find the following courses useful in fulfilling requirements in the Institute for Diversity in the Arts (IDA) thematic concentration.

ARTHIST 160A. Twentieth Century African American Art (4 units)
ARTHIST 256A. Critical Race Art History (5 units)
CHICANST 160N/CSRE 160N/DRAMA 17N. Salt of the Earth: Docudrama in (Latino) América (3-5 units)
DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts (5 units)
COMPLIT 142/ ENGLISH 172E. Literature of the Americas (5 units)
CSRE 179G/DRAMA 179G. Indigenous Identity in Diaspora People of Color Art Practice in North America (5 units)
CSRE 177/DRAMA 177. Writing for Performance: The Fundamentals (5 units)
CSRE 197/CHICANST 197/NATIVEAM 197/DRAMA 355. The Rite to Remember: Performance and Chicana Indigenous Thought (3-5 units)
CSRE 201B/CHICANST 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era (5 units)

THEMATIC CONCENTRATION IN PUBLIC SERVICE

The Public Service thematic concentration is open to students in any major in the Comparative Studies in Race and Ethnicity Undergraduate Program. The concentration allows a student to develop an area of study focused on community development, public service, and social change. Studying how issues of race and ethnicity impact and are impacted by community and social problems, this concentration is designed to ensure that students inter-

ested in service and community have access to a structured curriculum that provides a solid grounding in the theory and practice of community and civic engagement in order to provide the skills and experiences that enable students to become leaders and actors in the sphere of public life.

Students who wish to pursue a thematic concentration in public service must organize their studies to include 15 units, including two approved CSRE core courses and the CSRE 200X, Senior Seminar taken Autumn Quarter of the senior year. Public Service concentration students should also prepare to complete 25 units (at least 5 courses) relevant to the theme of public service. Three of these courses must include a service learning component (i.e., require the student to participate in service in the local community as a central component to the course).

Students who select a thematic concentration in public service must complete an internship as part of their program of study. This internship can be completed during the academic year for credit or during the summer, but must be at least 300 hours.

Finally, students who pursue the concentration in public service should select a topic for their senior paper or honors thesis that reflects their interest in community work (i.e., service or organizing) or a community issue or concern that is addressed through public service.

This concentration is not declared on Axess; it does not appear on the transcript or diploma. Students interested in this thematic concentration should contact the CSRE Undergraduate Program Office for details about its requirements.

Students may find the following courses useful in fulfilling requirements for the Public Service thematic concentration:

ASNAMST 146S/CSRE 146S/COMPLIT 146. Asian American Culture and Community (5 units)
CHICANST/CSRE 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post-Civil Rights Era (5 units)
CSRE 146. Community Matters: Research and Service with Community Organizations (2 units)
CSRE 198. Internship for Public Service (1-5 units)
CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century (5 units)
DANCE 197. Art and Community: Dance in Prisons (4 units)
EDUC 116X. Service Learning as an Approach to Teaching (3 units)
EDUC 270A. Learning to Lead in Public Service Organizations (3-5 units)
HISTORY 260. California's Majority Minority Cities (5 units)
HISTORY 251A. Poverty and Homelessness in America (5 units)
POLISCI 133. The Ethics and Politics of Public Service (5 units)
POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
SOC 118. Social Movements and Collective Action (5 units)
SOC 135. Poverty, Inequality, and Social Policy in the United States (5 units)
SOC 141. Controversies about Inequality (5 units)
URBANST 112. The Urban Underclass (5 units)

THEMATIC CONCENTRATION IN AMERICAN DIVERSITY

The American Diversity concentration is designed for students who wish to explore how the United States was and is constituted with relation to issues of race and ethnicity. The concentration investigates how American domestic and foreign policy, law, history, culture, and society are formed within conversations, debates, policies and studies regarding race and ethnicity. Issues of immigration, citizenship, empire and expansion, defense, diplomacy, human rights, public welfare, social justice and law, educational rights and other topics are explored from the angle of how racial and ethnic difference impacts debate and policy.

The concentration is not declared on Axess; it does not appear on the transcript or diploma. Students interested in the American Diversity thematic concentration should contact the CSRE undergraduate program office.

The American Diversity concentration requires 15 units including two approved CSRE core courses and CSRE 200X, Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete 45 units of course work relevant to the thematic concentration.

Students may find the following courses useful in fulfilling requirements in the American Diversity thematic concentration.

CSRE 201B/CHICANST 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era (5 units)
CSRE 203A. Changing Face of America: Strategies for Civil Rights and Education in the 21st Century (5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 201. History of Education in the U.S. (5 units)
POLISCI 141. Global Politics of Human Rights (5 units)
POLISCI 327. Minority Politics (5 units)
SOC 164. Immigration and the Changing United States (5 units)

THEMATIC CONCENTRATION IN RACE AND THE AMERICAN CITY

The Race and the American City concentration is designed for students who wish to develop methodologies, data, and theoretical and conceptual materials concerning how urban life, infrastructure, and policies are influenced by race and ethnicity. As virtual laboratories of social interaction, cities embody negotiations around resources, residences, financial districting, economic flow, health and educational resources, environmental policies, and city planning. A primary goal is for students to learn how they might contribute to the social and political discourse on race and ethnicity in the U.S. Participation in a public service internship and/or Stanford in Washington is encouraged.

The concentration is not declared on Axess; it does not appear on the transcript or diploma. Students interested in the Race and the American City concentration should contact the CSRE undergraduate program office.

The Race and the American City concentration requires 15 units including two approved CSRE core courses and CSRE 200X, Senior Seminar (WIM), taken Autumn Quarter of the senior year. One single-group core course may be counted toward the 15 unit core requirement. In addition to the core requirements, students must take an additional 45 units of course work relevant to the thematic concentration which may include courses such as:

HISTORY 260. California's Minority-Majority Cities (5 units)
SOC 148. The Urban Underclass (5 units)
URBANST 114. Cities in Comparative Perspective (5 units)
URBANST 173. Suburbs and Sprawl (5 units)
URBANST 162. Managing Local Governments (5 units)

DRAMA

Emeriti: (Professors) Helen W. Schrader, Carl Weber; *(Associate Professor)* William S. Eddelman; *(Senior Lecturers)* Susan Cashion, Patricia Ryan
Chair: Peggy Phelan
Drama Division
Professors: Jean-Marie Apostolidès (French and Italian; Drama), Harry J. Elam, Jr. (Humanities; Vice Provost for Undergraduate Education), Peggy Phelan (Drama; English), Alice Rayner (Drama; Graduate Studies Committee Chair), Rush Rehm (Drama; Classics; Stanford Summer Theater)
Assistant Professors: Branislav Jakovljevic (Undergraduate Faculty Adviser), Jisha Menon
Professors (Teaching): Michael F. Ramsaur, Janice Ross
Associate Professors (Teaching): Helen Paris, Leslie Hill
Senior Lecturer: Connie Strayer
Lecturers: Jeffrey Bihr, Erik Flatmo Gambatese, Daniel Klein, Kathryn Kostopoulos
Visiting Artists: Ann Carlson, Robert Perillo, Joanna Settle, Mary Ellen Strom
Guest Lecturers: Linda Apperson, Nadine George-Graves
Artists in Residence: Amy Freed, Cherríe Moraga
Institute for Diversity in the Arts and Black Performing Arts Division
IDA Faculty Director: Harry J. Elam, Jr.
Executive Director (IDA): Georgina Hernandez
Director (CBPA): Robert Moses
Dance Division
Director: Janice Ross
Lecturers: Kristine Elliott, Diane Frank, Aleta Hayes, Richard Powers, Ronnie Reddick
Visiting Artist: Muriel Maffre
Artist in Residence: Robert Moses
Mail Code: Drama, 94305-5010; Dance, 94305-8125
Drama Department Office: 551 Serra Mall, Memorial Auditorium, Room 144
Dance Division Office: 375 Santa Teresa Street, Roble Gym, Room *2*
Phone: Drama (650) 723-2576; Dance (650) 723-1234
Student Services Email: sdbaker@stanford.edu
Web Site: Drama, http://drama.stanford.edu
Web Site: Dance, http://dance.stanford.edu

Courses offered by the Department of Drama are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes DRAMA and DANCE.

MISSION OF THE DEPARTMENT OF DRAMA

The Drama Department integrates theory, criticism, and performance. Convinced that scholarship is strengthened by direct engagement in performance, and that performance is enhanced by practitioners whose analytic skills have been honed in scholarship, the department produces more than a dozen productions each academic school year, including canonical plays, commissioned dance works, experimental projects, and the works of visiting artists.

MISSION OF THE UNDERGRADUATE PROGRAMS IN DRAMA AND DANCE

The mission of the undergraduate program in Drama is to provide a strong non-conservatory program for students studying Drama and Dance in a liberal arts context. Joining academic research with performance and technical practice, department majors pursue areas of interest in acting, directing, playwriting, dance, design, stage management, performance theory, and cultural studies. Students explore these fields in a collaborative environment with close faculty contact. One of the requirements of the major is to fulfill a stage management course, generally in the junior year, which allows students practical exposure to managing and/or crewing a production. It is essential that students understand the concrete workings of theater in order to appreciate its history and literature. With faculty collaboration, students of Drama and Dance integrate research, theory, intellectual engagement, and performance. During the senior year, students have the option of completing a senior project in addition to completing the 60 units required for the major.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to find organic and meaningful ways of integrating theory and practice.
2. the ability to perform critical and theoretical analysis within the discipline.
3. effective research and writing skills that complement practical work.

MISSION OF THE GRADUATE PROGRAM IN DRAMA

The mission of the graduate program in Drama is to produce students who work on the leading edge of both scholarly and performance practice. The Ph.D. program in Drama emphasizes the combination of theory and practice. Graduate students complete a program with a study of critical theory and textual history and an understanding that such theory is informed by practical elements in directing, acting, writing, and design.

BACHELOR OF ARTS IN DRAMA

The requirements for the B.A. degree in Drama are designed to integrate the critical and historical study of drama with the study and experience of performance. A total of 60 units are required to obtain a B.A. degree in Drama. The major provides aesthetic and critical opportunities for students to develop special aptitudes. Students are encouraged to declare a major in their sophomore year.

SUGGESTED PREPARATION FOR THE MAJOR

Prospective majors in the first two years of study at Stanford are encouraged to take part in casting opportunities in department productions or independent undergraduate performing arts groups.

Recommended Preparatory Courses—Two years of a college-level foreign language.

DEGREE REQUIREMENTS

Required Courses—60 units total for the major

A course may be listed in more than one area; however, each course can only satisfy one major requirement. There is no double credit for a course. Additionally, you can petition to the department undergraduate advisor to have additional courses offered by the department count towards requirements in areas 2, 3, and 4. All introductory courses are required with no exceptions.

1. *Introductory Core Courses*—14 units
   DRAMA 30. How Theater is Designed (4 units)
   DRAMA 34. Stage Management Techniques (2 units)
   DRAMA 101H. How Theater Thinks (4 units)
   DRAMA 101P. How Practice Practices (4 units)
2. *Theatrical Literature/History*—14 units
   Any course between DRAMA 150-169. The following courses are offered in 2010-11:
   DRAMA 150T. Racial Erotics
   DRAMA 151T. Great Books
   DRAMA 151. Greek Tragedy
   DRAMA 1552. Beckett
   DRAMA 156H. Dance and Theater

DRAMA 160. Performance, Dance, and History: From Postwar to Postmodernism
DRAMA 166H. Historiography of Theater
DRAMA 167. Avant Garde Theater
DRAMA 169A. Cultural Traffic

3. *Theatrical Performance Courses: Acting, Directing, and Playwriting*—8 units
Any course with the subject code DANCE
Acting courses between DRAMA 20-29, 120-129, 210. The following courses are offered in 2010-11:
DRAMA 20. Acting for Non-Majors
DRAMA 120A,B. Fundamentals of Acting
DRAMA 120V. Vocal Production and Audition
DRAMA 121C: Physical Characterization
DRAMA 121S. Acting Shakespeare
DRAMA 122. Contemporary Vernacular Dance in New Musical Theater
DRAMA 122P. Undergraduate Acting Project
DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts (IDA)
Playwriting and Dramaturgy courses between DRAMA 70-79. The department is not offering any courses in the 70 series in 2010-11.
Directing, Playwriting and Dramaturgy courses between DRAMA 170-179. The following courses are offered in 2010-11:
DRAMA 170A. Concepts of Directing
DRAMA 170B. Advanced Directing
DRAMA 177. Writing for Performance
DRAMA 178. Playwriting
4. *Theatrical Production*—12 units
DRAMA 134. Stage Management Project (4 units)
DRAMA 39. Theater Crew (3 units)
Design, Stage Management, and Production courses between DRAMA 31-38, 131-133, 135-139. The following courses are offered in 2010-11:
DRAMA 28. Makeup for the Stage
DRAMA 31. Introduction to Lighting and Production
DRAMA 42. Costume Construction
DRAMA 131. Lighting Design
DRAMA 132. Costume Design
DRAMA 133. Stage Scenery Design
DRAMA 137. Hand Drafting for Designers
5. *Senior Project*—2 units
DRAMA 200. Senior Project
Work for this project normally begins in Spring Quarter of the junior year and is completed by the end of the senior year. The student has the option of writing an essay associated with the project. Students receive credit for senior projects through DRAMA 200 or DRAMA 205. Students pursuing senior projects should consult with both the undergraduate adviser and a faculty adviser in the project's specialty area early in the junior year. Students must petition for approval of senior projects through the department's undergraduate adviser. Projects are typically approved by department faculty at the end of Spring Quarter of the junior year or the end of Autumn Quarter of the senior year. The proposal should include an outline of the courses the student has taken and grades received in the area requirements, and should describe the courses in which the student plans to enroll as part of the project. It should describe in detail the purpose and methods involved in the project; a bibliography, if appropriate; and a 1-2 page abstract of the associated essay if an essay is part of the project.
6. *Electives*—10 units
Any courses with the subject code DRAMA or DANCE.
7. *WIM*—Writing in the Major. The following courses are offered in 2010-11:
DRAMA 101H. How Theater Thinks
DRAMA 160. Performance, Dance, and History: From Postwar to Postmodernism

HONORS PROGRAM

For a limited number of students, the department confers the degree of Bachelor of Arts with Departmental Honors in Drama. To be considered for departmental honors, students must meet the following requirements in addition to the other requirements of the Drama major:

1. Application involves a written submission (including transcript) establishing the student's work to date in the department and outlining the area of research that the student wishes to pursue. No students are admitted to the honors program with a grade below 'B-' in any course that constitutes part of their Drama major.
2. Student must have a Stanford cumulative grade point average above a 'B-' to be admitted into the Honors Program. For transfer students, at the time of transfer the same GPA requirement applies.
3. Students must complete the Drama core requirements by the end of their junior year, earlier if possible. Only in exceptional circumstances can this requirement be waived. Transfer from another university, extended overseas study, or temporary withdrawal from the major due to illness might constitute extenuating circumstances.
4. Students must have completed half of the courses in their specialization by the end of their junior year.
5. Students must complete 4 units in the honors colloquia (described below), beginning Spring Quarter of their junior year and continuing the following three regular quarters. Each quarter's colloquium is offered for 1 unit, S/NC. In extenuating circumstances (overseas study, for example), an honors program student may substitute other equivalent work for one quarter of the colloquium, with the approval of the honors adviser.
6. GPA in courses counting towards the major must be 3.5 by the time of graduation.
7. By the end of the seventh week of the quarter in which they plan to graduate, students in the honors program must submit an honors thesis (described below), to be read and evaluated by their thesis committee.
8. On the basis of a student's work in the Drama core, in the area of specialization, on the senior project, in the honors colloquia, and on the honors thesis, the faculty determines and confers honors on graduating students who have successfully completed the honors program.
9. Failure to meet any of these requirements, or to make satisfactory progress on the honors thesis, leads to dismissal from the honors program.
10. Entry into the Honors program does not guarantee an Honors degree. The final decision to confer an Honors degree will be made by the student's thesis committee, upon evaluating the quality of the Senior Project and the thesis.

Honors Colloquia and Thesis—The honors colloquia aim to engage honors program students in important issues in the field focusing on the students' areas of specialization and research. The honors program adviser convenes the colloquia three times per quarter and sets the agenda for meetings and discussion. Students discuss their work in the department and present and discuss their research for their honors thesis. Students must enroll in DRAMA 202, Honors Thesis.

The honors thesis typically consists of a long essay (40-60 pages) presenting the student's research on an important issue or subject, determined by the student. The honors program adviser, the senior project adviser, and another faculty member constitute the student's honors thesis committee. They read and evaluate the thesis, and make recommendations to the faculty at large regarding its strengths and weaknesses. Additionally, students have the option of using their own senior project as a case study. In these situations, the honors thesis will critically analyze the strengths and weaknesses of the creative work. Generally, these essays tend to be shorter (about 20-25 pages) because the creative work constitutes one-half of the honors project.

Honors in Humanities—An honors program in Humanities is

available for Drama majors who wish to supplement their major with related, guided studies. See the "Interdisciplinary Studies in Humanities" section of this bulletin for a description of the honors program. Students who enroll in this program may take HUMNTIES 160 and two seminars from 190-198 in fulfillment of the departmental elective requirement.

MINOR IN DRAMA

The requirements for the Minor in Drama are designed to integrate the critical and historical study of drama with the study and experience of performance. A total of 30 units are required to obtain a Minor in Drama. The minor provides aesthetic and critical opportunities for students to develop special aptitudes. Students are encouraged to declare a minor in their sophomore year.

MINOR REQUIREMENTS

Required Courses—30 units total for the minor

A course may be listed in more than one area; however, each course can only satisfy one minor requirement. There is no double credit for a course. A student may petition to the department Undergraduate Adviser to have additional courses offered by the department count towards requirements in areas 2 and 3. All introductory courses are required with no exceptions.

Introductory Core Courses—14 units

DRAMA 30. How Theater is Designed (4 units)
DRAMA 34. Stage Management Techniques (2 units)
DRAMA 101H. How Theater Thinks (4 units)
DRAMA 101P. How Practice Practices (4 units)

1. *Theatrical Literature/History*—3 units
   Any course between DRAMA 150-169. The following courses are offered in 2010-2011:
   DRAMA 150T. Racial Erotics
   DRAMA 151T. Great Books
   DRAMA 151. Greek Tragedy
   DRAMA 1552. Beckett
   DRAMA 156H. Dance and Theater
   DRAMA 160. Performance, Dance, and History: From Postwar to Postmodernism
   DRAMA 166H. Historiography of Theater
   DRAMA 167. Avant Garde Theater
   DRAMA 169A. Cultural Traffic
2. *Theatrical Performance Courses: Acting, Directing, and Playwriting*—3 units
   Any course with the subject code DANCE
   Acting courses between DRAMA 20-29, 120-129, 210. The following courses are offered in 2010-11:
   DRAMA 20. Acting for Non-Majors
   DRAMA 120A,B. Fundamentals of Acting
   DRAMA 120V. Vocal Production and Audition
   DRAMA 121C. Physical Characterization
   DRAMA 121S. Acting Shakespeare
   DRAMA 122. Contemporary Vernacular Dance in New Musical Theater
   DRAMA 122P. Undergraduate Acting Project
   DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts (IDA)
   Playwriting and Dramaturgy courses between DRAMA 70-79. The department is not offering any courses in the 70 series in 2010-11.
   Directing, Playwriting and Dramaturgy courses between DRAMA 170-179. The following courses are offered in 2010-11:
   DRAMA 170A. Concepts of Directing
   DRAMA 170B. Advanced Directing
   DRAMA 177. Writing for Performance
   DRAMA 178. Playwriting
3. *Theatrical Production*—4 units
   DRAMA 39. Theater Crew (4 units)
4. *Electives*—6 units
   Any courses in Drama or Dance.

DOCTOR OF PHILOSOPHY IN DRAMA

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. All graduate study in the Department of Drama leads to the Ph.D. degree. The doctoral program in Drama aims to integrate practical theater work with the critical and historical study of dramatic literature and theory. Candidates are expected to function both as scholars and as theater directors. The curriculum offers a two-year practical concentration in directing along with the study of critical and performance theory, aesthetics, history, and literature. The goal of the program is to give students a thorough knowledge of the field that leads to original and significant scholarly work grounded in practice as well as an inventive directorial practice that is based on solid scholarly analysis.

Admission—Applicants for the Ph.D. program can visit our web site at http://drama.stanford.edu or write directly to the Department of Drama, Attention: Graduate Admissions, for information. Online graduate applications are available at http://gradadmissions.stanford.edu. In addition to the required statement of purpose, applicants must submit a statement detailing their practical theater experience, a sample of their written critical work, and a statement on directing. An invitation to interview may be extended by the end of January. Graduate students in the Department of Drama begin study in Autumn Quarter of each academic year; there are no mid-year admissions. Graduate students must be degree candidates.

The Department of Drama awards a number of fellowships to students in the Ph.D. program.

DEGREE REQUIREMENTS

Department requirements 2 through 9 following are in addition to the University's basic requirements for the doctorate.

1. *Units and Course Requirements*—
   a. A minimum of 135 units of graduate courses and seminars in support of the degree. These units are in addition to units for the doctoral dissertation.
   b. Core seminars: DRAMA 300A, 300B, 301, 302 or 303, and 304.
   c. Three additional graduate seminars within the Department of Drama to be worked out with the adviser.
   d. Four workshops in directing: DRAMA 370, 372, 373, 374. In the first two years, students take: DRAMA 370, Concepts of Directing; DRAMA 372, Actor and Director Dialogue; and DRAMA 373, Directing and Dramaturgy. Students take DRAMA 374, Projects in Directing, to stage a more fully developed production chosen in consultation with the faculty. DRAMA 374, Projects in Directing is advanced creative work approved by the GSC and supervised by a faculty member.
   e. Students are allowed to take up to 6 units of DRAMA 390, Drama Tutorial/Directed Reading, to count towards their degree program and towards the 135 units requirement.
2. *Language Requirement*—The candidate must demonstrate reading knowledge of one foreign language in which there is a major body of dramatic literature. The language requirement must be met before the student can be advanced to candidacy. The language requirement may be fulfilled in any of the following ways:
   a. achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). Latin and Greek are not tested by ETS.
   b. a reading examination given each quarter by the various language departments, except for Latin and Greek.
   c. pass with a grade of 'B' or higher courses in Literature/History numbered 100 or higher in a foreign language department at Stanford.
3. *Examinations*—Candidates must complete three examinations (comprehensive, qualifying, and department oral) by the end of the first three years of study at Stanford.

a. *First-Year Comprehensive*—The comprehensive examination is taken over the first weekend in December of the first year. The exam is based on texts given to the student by the department before the start of the first year. Students study these texts independently. For the exam, they should be able to identify and compare plays and playwrights from the list of texts in terms of dramatic genres, styles, and periods, and to address comparatively and analytically critical issues of texts and performance.
b. *Second-Year Qualifying*—The qualifying examination, which must be completed before advancement to candidacy at the end of the second year, consists of two 25-35-page essays. Each of these essays should demonstrate a broad knowledge of two different historical periods (pre-20th century), with emphasis on particular dramatic texts and/or performance practices. Essay topics should be designed and written up in consultation with a faculty adviser. The reading list for each period should be approved by the end of the first quarter. These essays should not duplicate any written work from seminars. After approval by the adviser, the Graduate Studies Committee reads and evaluates these essays. For the first qualifying examination, candidates must choose from the following historical periods:
   1. Classical
   2. Medieval and Renaissance
   3. 17th, 18th, or early 19th century
c. *Third-Year Department Oral*—The department oral examination requires three faculty members, at least two from the Department of Drama, who most likely form the dissertation reading committee. This exam is based on a 2-3 page summary of the project and a 40-page review of the literature for the dissertation that the student creates in conjunction with the committee. This exam should be taken by the end of Spring Quarter in the third year.

4. *Dissertation Prospectus*—The dissertation prospectus must be approved by the candidate's adviser and by the departmental Graduate Studies Committee two quarters after taking the department oral. This should be done in the Autumn Quarter of the fourth year. Within 30 days of approval, a student should schedule a prospectus colloquium with the proposed reading committee (the dissertation director and two other faculty members). The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. The prospectus should be approximately 15-20 pages and minimally cover three things:
   a. the research question and context
   b. the methodology for research
   c. a lay-out of a complete chapter by chapter plan
5. *University Oral Examination*—The University oral examination is a defense of the dissertation based on a full draft submitted at least 75 days before the proposed degree conferral. The examining committee consists of four faculty members, at least two of whom must be from the Department of Drama, as well as one faculty chair from outside the department who does not share an appointment with the department of any of the examiners.
6. *Assistantships*
   a. *Research Assistantship*—Three quarters of research assistantship with faculty members are required. Generally, this requirement is fulfilled in the third year.
   b. *Teaching Assistantship*—Four quarters of supervised teaching at half time are a required part of the Ph.D. program. The requirement is normally met by teaching three courses during the fourth year and one course during the fifth year.
7. *Application for Candidacy*—By the end of the second year of residence, the following requirements or appropriate equivalents must be completed:
   a. the core seminars: DRAMA 300A, 300B, 301, 302 or 303, and 304
   b. the directing workshop series (DRAMA 370-374), including the successful production of at least one work in public performance
   c. a foreign language
   d. successful completion of the comprehensive and qualifying exams

   Based on its evaluation of the student's progress, the Graduate Studies Committee certifies the student's qualifications for candidacy. Upon favorable action, the student files a formal application for candidacy, as prescribed by the University, by the end of Summer Quarter of the second year. By University policy, candidacy is valid for five years unless terminated by the department.
8. *Dissertation*—Normally, the Ph.D. program in Drama is completed in five years. The first two years should be devoted to full-time graduate study, and the third, fourth, and fifth years to research, teaching, and writing the dissertation. A candidate taking more than five years is required to reinstate candidacy by repassing the written examinations on dramatic literature.
9. *Satisfactory Progress, Annual Review*—The program and progress of each student must be evaluated by the Graduate Studies Committee at the end of each academic year. At the end of the first year, the Graduate Studies Committee evaluates the work of each student in classes, seminars, examinations, and performance. Production planning in the Spring of each year for the following season is contingent upon students making satisfactory progress. Continuation in the program depends upon the recommendation of this faculty group. At the end of the second year, the committee reviews the student's work in consideration of advancement to candidacy. At the end of the third year, students are expected to have developed an approved dissertation prospectus. Funding is contingent upon satisfactory progress. Failure to make satisfactory progress may result in dismissal from the program. University policy states that all requirements including dissertation must be completed before candidacy expires.

PH.D. IN DRAMA AND HUMANITIES

The Drama department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Drama and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact Denise Winters at 650-724-1333 for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

INSTITUTE FOR DIVERSITY IN THE ARTS AND BLACK PERFORMING ARTS DIVISION

The Institute for Diversity in the Arts (IDA) is an interdisciplinary program in the humanities that involves students in the study of culture, identity and diversity through artistic expression. The Committee on Black Performing Arts (CBPA) and the Institute for Diversity in the Arts (IDA) merged in Autumn 2005. The mission of IDA/CBPA is to engage artists, students, and the local community collaboratively to create performance and visual art that examines the intersections among race, diversity, and social action through programming that includes artist residencies, classes, workshops, public performances, a lecture series, and symposia. The division produces annual student productions and is a resource for student organizations promoting artistic expression through the exploration of the impact of ethnic representation in the arts, literature, media, and pop culture. The programs prepare students for work in areas including the arts and community development. Students have gone on to graduate-level critical studies, M.F.A.

programs, public service, government and politics, arts administration, and teaching. Students can pursue an IDA concentration through the Comparative Studies in Race and Ethnicity major; students can also emphasize Black performance through the African and African American Studies major.

DANCE DIVISION

The Stanford Dance Division offers a range of broadly diverse approaches to dance as a performing art, cultural practice, political act and embodiment of ideology and beliefs. All of the dimensions through which one comes to experience dance, from studying a range of dance techniques, choreographing and performing, to viewing and critically and historically assessing dance, are represented in the course offerings of the Dance Division.

MINOR IN DRAMA WITH DANCE CONCENTRATION

A student declaring a minor in Drama with a Dance Concentration must complete 30 units of course work in Dance/Drama. Upon declaring the minor, a proposed course of study must be submitted by each student in consultation with the Dance Director, Janice Ross, jross@stanford.edu, and approved by her no later than one quarter following the declaration. Declaration of the Drama/Dance Minor should also be made on-line at http://axess.stanford.edu.

The minor includes the following core requirements, and an individual program of study shaped in consultation with the minor adviser in Dance, Janice Ross. Please note that the special elective dance classes are offered every year; the list below includes some, but not all of the classes that fulfill the requirements. Other classes may be substituted with adviser's consent.

Requirements—30 total units

1. *Technique Classes*: Studio Classes: Minimum of six studio dance classes (10 units)
   a. A concentration of at least three classes chosen from a specific dance form (e.g., Contemporary, Modern, Jazz, Hip-Hop, Ballet, Social), and the attainment of intermediate or advanced level (at least two classes) in a style other than the concentration
2. *Dance Studies Classes:* Minimum of two courses (8 units) of the following
   a. DANCE 156H. Dance and Theatre: Twentieth Century German Encounters (4 units)
   b. DANCE 160. Dance and History: From Postwar to Postmodernism (4 units)
   c. DANCE 197. Dance in Prison: The Arts, Juvenile Justice, and Rehabilitation (4 units)
   d. DANCE 191 or 290. Special Project (3-5 units)
3. *Choreography/Repertory/Performance Classes* (4 units)
   a. DANCE 27. Faculty Choreography (1 unit)
   b. DANCE 30. Chocolate Heads (1 unit)
   c. DANCE 52. The Dance Jam: Process and Performance (1 unit)
   d. DANCE 56. Ballet Repertory (1 unit)
   e. DANCE 57. Dance Repertory (1 unit)
   f. DANCE 100. Student Choreography (1 unit)
   g. DANCE 105. Contemporary Afro Styles and Dance Making (1 unit)
   h. DANCE 106. Essence of Contemporary Dance Performance (1 unit)
4. *Drama Core Courses*: Minimum of 2 courses (8 units)
   a. DRAMA 30. How Theater is Designed (4 units)
   b. DRAMA 34. Stage Management Techniques (2 units)
   c. DRAMA 101H. How Theater Thinks (4 units)
   d. Drama 101P. How Practice Practices (4units)

OVERSEAS STUDIES COURSES IN DRAMA

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

- OSPBER 101A. Contemporary Theater. 5 units, Karen Kramer, GER:DB:Hum

SPRING QUARTER

BERLIN

- OSPBER 101A. Contemporary Theater. 5 units, Karen Kramer, GER:DB:Hum

EAST ASIAN LANGUAGES AND CULTURES

Emeriti: (Professors) Albert E. Dien, David S. Nivison, Makoto Ueda, John Wang*; *(Associate Professor)* Susan Matisoff; *(Senior Lecturer)* Yin Chuang*

Chair: Chao Fen Sun

Directors of Graduate Studies: James Reichert (Japanese), Ban Wang (Chinese)

Directors of Undergraduate Studies: Melinda Takeuchi (Japanese), Yiqun Zhou (Chinese)

Professors: Steven D. Carter, Mark E. Lewis (East Asian Languages and Cultures, History), Li Liu, Chao Fen Sun, Melinda Takeuchi (East Asian Languages and Cultures, Art and Art History), Ban Wang (East Asian Languages and Cultures, Comparative Literature)

Associate Professors: Yoshiko Matsumoto, James Reichert

Assistant Professors: Haiyan Lee, Indra Levy, Yiqun Zhou

Consulting Professor: Richard Dasher

Visiting Professor: Stuart Sargent

Postdoctoral Fellows: Paul Festa, Minku Kim

Chinese-Japanese Area Studies Faculty:

Professors: Carl W. Bielefeldt (Religious Studies, on leave), Gordon Chang (History, on leave), Richard Dasher (Center for Integrated Systems), Paul Harrison (Religious Studies), Jean Oi (Political Science), David Palumbo-Liu (Comparative Literature), Gi-Wook Shin (Sociology), Richard Vinograd (Art and Art History), Andrew Walder (Sociology), Kären Wigen (History), Arthur P. Wolf (Anthropology), Lee H. Yearley (Religious Studies), Xueguang Zhou (Sociology)

Associate Professors: Jindong Cai (Music), Matthew Sommer (History), Miyako Inoue (Anthropology), Matthew Kohrman (Anthropology)

Assistant Professors: Jennifer Adams (Education), Melissa Brown (Anthropology), Phillip Lipscy (Political Science), Jean Ma (Art and Art History), Yumi Moon (History), Thomas Mullaney (History, on leave), Jun Uchida (History)

* Recalled to active duty.

Department Office: Building 250, Room 106

Mail Code: 94305-2000

Phone: (650) 725-2742

Email: asianlanguages@stanford.edu

Web Site: http://asianlanguages.stanford.edu

Courses offered by the Department of East Asian Languages and Cultures are listed on the *Stanford Bulletin's* Explore Courses web site under the subject codes CHINGEN (Chinese General), CHINLIT (Chinese Literature), JAPANGEN (Japanese General), JAPANLIT (Japanese Literature), and KORGEN (Korean General). Courses with the suffix -GEN do not require reading knowledge of an Asian language. Language courses are listed on the *Stanford Bulletin's* Explore Courses web site under CHINLANG (Chinese Language), JAPANLNG (Japanese Language), and KORLANG (Korean Language).

The Department of East Asian Languages and Cultures offers programs for students who wish to engage with the cultures of China, Japan, and Korea as articulated in language, linguistics, literature, film, cultural studies, and visual arts. Students emerge with a sophisticated understanding of culture as a dynamic process embodied in language and other representational media, especially the verbal and visual forms that are central to humanistic study. Department faculty represent a broad range of research interests and specialties, and visiting scholars and postdoctoral fellows from the Stanford Humanities Center, the Andrew W. Mellon Fellowship of Scholars in the Humanities, the Freeman Spogli Institute for International Studies, and the Center for East Asian Studies add to the intellectual vitality of the department.

East Asian Languages and Cultures offers a full range of courses at the undergraduate and graduate levels. Undergraduate courses concentrate on language, literature, and other cultural forms from the earliest times to the present, covering traditional and contemporary topics from Confucian conceptions of self and society to inflections of gender in the twentieth century. Emphasis in classes is on developing powers of critical thinking and expression that will serve students well no matter what their ultimate career goals. Graduate programs offer courses of study involving advanced language training, engagement with primary texts and other materials, literary history, and training in research methodologies and critical approaches.

East Asian language skills provide a foundation for advanced academic training and professional careers in fields such as business, diplomacy, education, and law. The department also offers opportunities for students who choose to double-major or minor in other academic disciplines, including anthropology, art history, economics, education, history, linguistics, philosophy, political science, religious studies, and sociology.

The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Chinese and Japanese, and Bachelor of Arts in East Asian Studies. It also offers undergraduate minors and the Ph.D. minor in Chinese or Japanese language and literature.

For information concerning other opportunities for study about Asian history, societies, and cultures, see the following departments and programs: Anthropology, Art and Art History, Business, Comparative Literature, East Asian Studies, Economics, History, Law, Linguistics, Philosophy, Political Science, Religious Studies, and Sociology.

UNDERGRADUATE MISSION STATEMENTS FOR EAST ASIAN LANGUAGES AND CULTURES

CHINESE MAJOR

The mission of the undergraduate program in Chinese is to expose students to a variety of perspectives in Chinese language, culture, and history by providing them with training in writing and communication, literature, and civilization. Emphasis in courses is on developing powers of critical thinking and expression that serve students well no matter what their ultimate career goals are. The program prepares students for diverse professions and enterprises, including business, government service, and academia.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in the studies of Chinese.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

JAPANESE MAJOR

The mission of the undergraduate program in Japanese is to expose students to a variety of perspectives in Japanese language, culture, and history by providing students with training in writing and communication, literature, and civilization. Emphasis in classes is on developing powers of critical thinking and expression that will serve students well no matter what their ultimate career goals are. The program prepares students for diverse professions and enterprises, including business, government service, and academia.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in the studies of Japanese.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

EAST ASIAN STUDIES MAJOR

The mission of the program in East Asian Studies is to enable students to obtain a comprehensive understanding of East Asia broadly conceived, which is the area stretching from Japan through Korea and China to the contiguous areas of the Central Asian land mass. Majors are expected to have a good mastery of an East Asian language, and focus on a particular sub-region or a substantive issue involving the region as a whole. Emphasis in classes is on developing powers of critical thinking and expression to serve students well no matter what their ultimate career goals in business, government service, academia, or the professions.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in East Asian studies.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

OVERSEAS STUDIES

Courses approved for the East Asian Languages and Cultures majors which are taught overseas can be found in the "Overseas Studies" section of this Bulletin, or in the Overseas Studies office, Sweet Hall. To find course offerings in Explore Courses, click on OSPKYOTO or OSPBEIJ.

STUDY ABROAD

Students interested in Japanese language, history, culture, and social organization are encouraged to apply to the Kyoto Center for Japanese Studies (KCJS), a two-semester academic program primarily for undergraduates wishing to do advanced work in the Japanese language and in Japanese studies.

In Spring Quarter, the Stanford Center for Technology and Innovation (SCTI), also in Kyoto, focuses on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries, followed by an optional two-to-three month internship in an agency, firm, or laboratory in Japan. For information about either program in Kyoto, students should contact the Bing Overseas Studies Program office in Sweet Hall.

Undergraduates interested in studying Chinese language, history, culture, and society are encouraged to apply to the Stanford Program in Beijing, also offered through the Bing Overseas Studies Program. This program is located at Peking University and is open Autumn and Spring Quarters.

Students should take note of the Inter-University Program for Chinese Language Studies (IUP) at Tsinghua University (http://ieas.berkeley.edu/iup; iub@socrates.berkeley.edu; 510-642-3873) and the Inter-University Center (IUC) for Japanese Language Studies in Yokohama (http://stanford.edu/dept/IUC; stacey.campbell@stanford.edu; 650-725-1490). Stanford is a member of these consortia.

Students interested in the graduate exchange program with the Department of Chinese at Peking University in Beijing should consult the chair of the department early in the academic year.

EAST ASIAN STUDIES THEME HOUSE

EAST House, located at Governor's Corner, is an undergraduate residence that houses 60 students and offers them opportunities to expand their knowledge, understanding, and appreciation of East Asia. Assignment is made through the regular undergraduate housing draw.

SUMMER PROGRAM

A nine-week summer program of intensive instruction is offered in both Chinese and Japanese. The intensive courses provide the equivalent in instruction to regular academic-year courses. (See courses CHINLANG 5, 25, 105, and JAPANLNG 10, 20, 130, as described in the "Language Center" section of this bulletin.) For detailed information about these and other aspects of the summer program, inquire at the Language Center.

GRADUATE PROGRAMS IN EAST ASIAN LANGUAGES AND CULTURES

ADMISSION

All students contemplating application for admission to graduate study must have a creditable undergraduate record. The applicant need not have majored in Chinese or Japanese as an undergraduate, but must have had the equivalent of at least three years of training in the language in which he or she intends to specialize, and must also demonstrate a command of English adequate for the pursuit of graduate study. Applicants should not wish merely to acquire or improve language skills, but to pursue study in one of the following fields: Chinese history (pre-modern), Chinese linguistics, Chinese literature, Chinese philosophy, Japanese cultural history, Japanese literature, Japanese linguistics, and Japanese visual culture.

BACHELOR OF ARTS PROGRAMS IN EAST ASIAN LANGUAGES AND CULTURES

BACHELOR OF ARTS IN CHINESE OR JAPANESE

The B.A. degree is granted both in Chinese and in Japanese. The following courses and their prerequisites must be completed with a grade point average (GPA) of 2.0 or better:

1. Concentration in Chinese:
   a. CHINGEN 91 and JAPANGEN 92
   b. Chinese language requirement:
      1. first-year modern Chinese (one of the following series: CHINLANG 1, 2, 3, or CHINLANG 1B, 2B, 3B, or CHINLANG 5)
      1. second-year modern Chinese (one of the following series: CHINLANG 21, 22, 23, or CHINLANG 21B, 22B, 23B, or CHINLANG 25)
      2. beginning classical Chinese (CHINLIT 125, 126, 127)
   c. three CHINGEN or CHINLIT courses at the 100 level with one in each of the following areas: pre-modern China, modern China, and Chinese linguistics
   d. four other content courses dealing with China, primarily at the 100 level, as approved by the undergraduate adviser
   e. CHINGEN 133 is the required Writing in the Major (WIM) course
   f. CHINGEN 198, Senior Colloquium: completion of a capstone essay of approximately 7,500 words, written either in a directed reading course or for one of the courses above.
2. Concentration in Japanese:
   a. CHINGEN 91 and JAPANGEN 92
   b. Japanese language requirement:
      1. first-year modern Japanese (one of the following series: JAPANLNG 1, 2, 3, or JAPANLNG 7, 8, 9, or JAPANLNG 5)
      2. second-year modern Japanese (JAPANLNG 17, 18, 19, or JAPANLNG 20)
      3. third-year modern Japanese (JAPANLNG 117, 118, 119)
   c. three JAPANGEN or JAPANLIT courses at the 100 level with one in each of the following areas: pre-modern Japan, modern Japan, and Japanese linguistics
   d. four other content courses dealing with Japan primarily at the 100 level, as approved by the undergraduate adviser
   e. JAPANGEN 138 is the required Writing in the Major (WIM) course
   f. JAPANGEN 198, Senior Colloquium: completion of a capstone essay of approximately 7,500 words, written either in a directed reading course or for one of the courses above.

   JAPANGEN 71N can be used to satisfy the Japanese linguistics requirement. JAPANGEN 51/251 is not counted toward the major. Students who complete third-year Japanese at KCJS satisfy the language requirement but are required to take a placement test if they wish to enroll in JAPANLNG 211, 212, 213.

Students who want to concentrate in Chinese or Japanese linguistics can substitute the four other content courses primarily at the 100 level with LINGUIST 1 and three other linguistics courses at the 100 level, as approved by the undergraduate adviser in consultation with the student's academic adviser.

These requirements are in addition to the University's basic requirements for the bachelor's degree. Letter grades are mandatory for required courses.

HONORS PROGRAM

Majors with an overall grade point average (GPA) of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include a thesis outline, a list of all relevant courses the student has taken or plans to take, a preliminary reading list including a work or works in Chinese or Japanese, and the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved, research begins in Spring Quarter of the junior year, or by Autumn Quarter at the latest, when the student enrolls in CHINLIT 189A or JAPANLIT 189A for 2-5 units of credit for independent study. In Winter Quarter, students enroll for five units in independent study (CHINLIT 199 or JAPANLIT 199) with the thesis supervisor while writing the thesis, and the finished essay (normally about 15,000 words) is submitted to the committee no later than the end of the Winter Quarter in the senior year. Students enroll in CHINGEN 198 or JAPANGEN 198 in Spring Quarter of the senior year to polish and present their theses (instead of writing a capstone essay). Eight to eleven units of credit are granted for honors course work and the finished thesis.

BACHELOR OF ARTS IN EAST ASIAN STUDIES

Majors in East Asian Studies begin or continue the mastery of Chinese, Japanese, or Korean. Within the humanities or social sciences, they may focus on a particular sub-region, for example, Japan; South China, Hong Kong, and Taiwan; or western China and Central Asia; or a substantive issue involving the region as a whole, such as environmental protection, public health, rural development, historiography, cultural expression, or religious beliefs. The major seeks to reduce the complexity of a region to intellectually manageable proportions and illuminate the interrelationships among the various facets of a society.

Potential majors must submit a Student Proposal for a Major in East Asian Studies form not later than the end of the first quarter of the junior year. Majors must complete at least 75 units of course work on China, Japan, and/or Korea in addition to a one unit Senior Colloquium. Courses to be credited toward major requirements must be completed with a grade of 'C' or better. Requirements are:

1. *Language:* proficiency in Chinese, Japanese, or Korean language at the second-year level or above, to be met either by course work or examination. Students who meet the requirement through examination are still expected to take an additional 15 units of language at a higher level, or literature courses taught in the language, or the first year in an additional Asian language. No more than 30 units of language courses are counted toward the major.
2. *Area Courses:* a minimum of three area courses, one in each category below (courses listed are examples and by no means exhaustive--if uncertain whether a particular course fits into one of these categories, please contact the department to check).
   a. Art, Literature and Religion
      ARTHIST 2. Asian Art and Culture [Same as JAPANGEN 60]
      CHINGEN 91. Traditional East Asian Civilization: China
      JAPANGEN 92. Traditional East Asian Civilization: Japan
      RELIGST 14. Introduction to Buddhism
   b. History
      HISTORY 93. Late Imperial China
      HISTORY 94B. Japan in the Age of the Samurai
      HISTORY 95. Modern Korean History
      HISTORY 98. The History of Modern China
   c. Contemporary Social Sciences
      ANTHRO 148. Health, Politics and Culture of Modern China
      POLISCI 140L. China in World Politics
      POLISCI 148. Chinese Politics: The Transformation and the Era of Reform
      OSPKYOTO 215X. The Political Economy of Japan
3. *Substantive Concentration:* additional courses on East Asia, one of which must be a seminar above the 100 level. Majors are encouraged to distribute their course work among at least three disciplines and two subregions in Asia. The subregions need not be traditionally defined. Examples include China, Japan, or Korea; or, in recognition of the new subregions which are emerging, South China and Taiwan, or Central Asia. At least four courses must have a thematic coherence built around a topic. Examples include:
      East Asian religions and philosophies
      Culture and society of modern Japan
      Ethnic identities in East Asia
      Arts and literature in late imperial China
      Foreign policy in East Asia
      Social transformation of modern Korea
      China's political economy

   These courses are listed at the East Asian Studies website, and under CHINGEN, CHINLIT, JAPANGEN, and JAPANLIT.
4. *Capstone Essay:* completion of a paper of approximately 7,500 words, written either in a directed reading course or for one of the courses in item 3 above, which should be built upon the student's thematic interest. CHINGEN or JAPANGEN 198, Senior Colloquium (1 unit), is required of majors during Winter Quarter of their senior year to develop and present the capstone essay or honors paper.
5. At least one quarter overseas in the country of focus.
6. An East Asian Studies course that satisfies the University Writing in the Major requirement (WIM) should be completed before beginning the senior essay. This year, CHINGEN 133 and JAPANGEN 138 satisfy the WIM requirement.
7. The courses for the major must add up to at least 76 units, comprised of the one-unit Senior Colloquium (taken satisfactory/no credit) and at least 75 additional units, all taken for a letter grade. Courses must be at least three units to be counted towards the degree.

These requirements are in addition to the University's basic requirements for the bachelor's degree. Letter grades are mandatory for required courses.

HONORS PROGRAM

Majors with an overall grade point average (GPA) of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include a thesis outline, a list of all relevant courses the student has taken or plans to take, a preliminary reading list including a work or works in Chinese or Japanese, and the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved, research begins in Spring Quarter of the junior year, or by Autumn Quarter at the latest, when the student enrolls in 2-5 units of credit for independent study. In Winter Quarter, students enroll for five units in independent study with the thesis supervisor while writing the thesis, and the finished essay (normally about 15,000 words) is submitted to the committee no later than the end of the Winter Quarter in the senior year. Students enroll in CHINGEN 198 or JAPANGEN 198 in Spring Quarter of the senior year to polish and present their theses (instead of writing a capstone essay). Eight to eleven units of credit are granted for honors course work and the finished thesis. One advanced level colloquium or seminar dealing with China, Japan, or Korea is required as well.

MINORS IN EAST ASIAN LANGUAGES AND CULTURES

MINOR IN CHINESE OR JAPANESE

The undergraduate minors in Chinese and Japanese have been designed to give students majoring in other departments an opportunity to gain a substantial introduction to Chinese or Japanese language, as well as an introduction to the culture and civilization of East Asia. The minors consist of:

1. Completion of language study through the second-year level (that is, the one year sequence of CHINLANG 21, 22, 23 or 21B, 22B, 23B; or JAPANLNG 17, 18, 19) for students with no previous training in Chinese or Japanese. Students who already have first-year competence in Chinese or Japanese must complete the third-year course (CHINLANG 101, 102, 103 or 101B, 102B, 103B; or JAPANLNG 117, 118, 119). Students who already have a competence at the second-year level may fulfill the language component of the minor by taking three courses in the department using materials in either Chinese or Japanese. These courses may be language courses such as the third-year sequence mentioned above, the fourth-year language sequence, or they may be advanced literature and linguistics courses, depending on the capabilities and interests of the student.
2. The core courses, CHINGEN 91, Traditional East Asian Civilization: China, and JAPANGEN 92, Traditional East Asian Civilization: Japan.

3. Two courses selected from among the department's other offerings in the literature, linguistics, and civilization of a given minor area (CHINGEN, CHINLIT, JAPANGEN, JAPANLIT). All courses for the minor must be taken for a letter grade and completed with a GPA of 2.0 or better.

MINOR IN EAST ASIAN STUDIES

The goal of the minor in East Asian Studies is to provide the student with a broad background in East Asian culture as a whole, while allowing the student to focus on a geographical or temporal aspect of East Asia. The minor may be designed from the following, for a total of six courses. All courses should be taken for a letter grade.

1. Three area courses, one in each category (see major for listing of area courses).
2. One undergraduate seminar above the 100 level and two other courses from among those listed as approved for East Asian Studies majors, including literature courses but excluding language courses. These courses are listed under East Asian Studies (EASTASN) in this bulletin, and under CHINGEN, CHINLIT, JAPANGEN, and JAPANLIT.

Applications for the minor should be submitted online through Axess and are due no later than the second quarter of the junior year.

COTERMINAL B.A. AND M.A. PROGRAMS IN EAST ASIAN LANGUAGES AND CULTURES

With department approval, students may be able to combine programs for the B.A. and M.A. degrees in Chinese or Japanese. Prospective applicants must consult with the graduate adviser. For details, see the "Graduate Degrees" section of this bulletin or http://registrar.stanford.edu/shared/publications.htm#Coterm.

For those interested in a coterminal program with an M.A. in East Asian Studies, please contact the Center for East Asian Studies for application procedures and deadlines, or visit the center's web site at http://ceas.stanford.edu.

MASTER OF ARTS PROGRAMS IN EAST ASIAN LANGUAGES AND CULTURES

The M.A. is granted in Chinese and in Japanese. The normal length of study for the degree is two years.

No financial aid is available for those applicants who wish to obtain the M.A. only.

Students who wish to spend the first year of graduate study at the Beijing or Yokohama centers must obtain department approval first.

Candidates for the degree must be in residence at Stanford in California during the final quarter of registration.

A thesis or an annotated translation of a text of suitable literary or historical worth is required for the M.A. degree. Under special circumstances, a paper approved by the graduate adviser may be substituted.

The University's basic requirements for the master's degree, including a 45-unit minimum requirement, are given in the "Graduate Degrees" section of this bulletin. Department requirements are set forth below.

REQUIREMENTS FOR THE M.A. IN CHINESE

The M.A. program in Chinese is designed for students with strong academic records and an interest in pursuing postgraduate research in Chinese literature, history (pre-modern), philosophy, or linguistics, but who have not yet acquired the language skills or disciplinary foundation necessary to enter a Ph.D. program. (*Note:* Students who wish to pursue advanced language training in preparation for post-graduate research in other fields of Chinese studies are referred to the interdisciplinary M.A. program in the Center for East Asian Studies.)

The candidate must:

1. Demonstrate proficiency in both modern and classical Chinese through:
   a. completion with a letter grade of 'B' or higher of third-year Chinese through CHINLANG 103 and
   b. one of three advanced classical Chinese courses in the series CHINLIT 221-223.

(*Note:* qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations.)

2. Complete the following for a letter grade of 'B' or higher:
   a. four courses in Chinese literature or linguistics numbered between CHINLIT 230 and 292
   b. CHINLIT 201. Proseminar: Bibliographic and Research Methods in Chinese Studies
   c. two upper-division or graduate-level courses in fields such as Chinese anthropology, art history, history, philosophy, politics, and religion, as approved by the graduate adviser in consultation with the student's individual adviser
   d. a master's thesis; CHINLIT 299. Master's Thesis or Translation.

REQUIREMENTS FOR THE M.A. IN JAPANESE

The M.A. program in Japanese is designed for students with strong academic records and an interest in pursuing postgraduate research in Japanese literature, cultural history, or linguistics, but who have not yet acquired the language skills or disciplinary foundation necessary to enter a Ph.D. program. (*Note:* Students who wish to pursue advanced language training in preparation for post-graduate research in other fields of Japanese studies are referred to the interdisciplinary M.A. program in the Center for East Asian Studies.)

The candidate must:

1. Complete third-year Japanese (JAPANLANG 117, 118, 119) plus one of the following for a letter grade of 'B' or higher:
   a. fourth-year Japanese through JAPANLANG 213, or
   b. classical Japanese through JAPANLIT 246 and 247.

(*Note:* qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations.)

2. Complete the following with a letter grade of 'B' or higher:
   a. four adviser-approved courses in Japanese literature, culture, or linguistics from among the offerings of the Department of East Asian Languages and Cultures, not including courses taken to fulfill the language requirement
   b. JAPANLIT 201. Proseminar: Introduction to Graduate Study in Japanese
   c. two upper-division or graduate-level courses in fields such as Japanese anthropology, art history, history, philosophy, politics, and religion, as approved by the graduate adviser in consultation with the student's individual adviser
   d. a master's thesis; JAPANLIT 299. Master's Thesis or Translation.

DOCTOR OF PHILOSOPHY PROGRAMS IN EAST ASIAN LANGUAGES AND CULTURES

The Ph.D. degree is granted in Chinese and Japanese. Candidates for the degree are expected to acquire a thorough familiarity with Chinese or Japanese literature and linguistics, an adequate command of relevant languages, and a comprehensive knowledge of East Asian history, social institutions, and thought. The University's basic requirements for the Ph.D. are given in the "Graduate Degrees" section of this bulletin. Department requirements are set forth below.

ADMISSION TO CANDIDACY

Students admitted with a B.A. only are evaluated by the graduate faculty during the Autumn Quarter of their second year at Stanford. The evaluation is based on written work and at least a portion of the M.A. thesis or translation. If the faculty have serious doubts about a student's ability to work for the Ph.D., they convey this to

the student. During the subsequent Spring Quarter, the faculty formally decides whether a student should be admitted to candidacy for the Ph.D. or be terminated. In the case of a student who already has an M.A. in Chinese or Japanese when admitted to the department, the evaluation takes place in the Spring Quarter of the student's first year. If a student goes to the Inter-University Program for Chinese Language Studies (IUP) at Tsinghua University or the Inter-University Center (IUC) for Japanese Language Studies in Yokohama during the first two years of study, the department may consider an extension for admission to candidacy. The timing of the evaluation of a student admitted with an M.A. in East Asian Studies is decided on an individual basis.

Admission to candidacy does not mean that the student has fulfilled all requirements for the degree except the dissertation, but that the department faculty consider the student qualified to pursue a program of study leading to the Ph.D. and that, subject to continued satisfactory progress, the student's status in this department is secure.

REQUIREMENTS FOR DOCTOR OF PHILOSOPHY IN CHINESE

The Ph.D. program in Chinese is designed to prepare students for a doctoral degree in Chinese literature, history (pre-modern), philosophy, or linguistics. Applicants must have a minimum of three years of Chinese language study at Stanford or the equivalent to be considered for admission. Students on the Ph.D. track will complete the M.A. as described above on the way to advancing to Ph.D. candidacy (see department guidelines for admission to candidacy above). The majority of required course work for Ph.D. students demands the ability to read primary and secondary materials in Chinese. Advanced standing may be considered for students entering the Ph.D. program who have already completed an M.A. in Chinese literature or linguistics elsewhere only in cases when the level of prior course work and research is deemed equivalent to departmental requirements for the Ph.D. track. All courses must be taken for a letter grade.

A candidate must fulfill the following requirements:

1. Complete advanced classical Chinese through CHINLIT 223 and the department's requirements for the M.A. in Chinese.
2. Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.
3. Complete both CHINLIT 201 and CHINGEN 201.
4. Complete two relevant seminars at the 300 level. These seminars must be in different subjects.
5. Pass a set of three comprehensive written examinations, one of which tests the candidate's methodological competence in the relevant discipline. The remaining two fields are chosen, with the approval of the graduate adviser in consultation with the student's individual adviser, from the following: archaeology, anthropology, art, Chinese literature, history, Japanese literature, linguistics, philosophy, and religion. With the adviser's approval, a Ph.D. minor in a supporting field may be deemed equivalent to the completion of one of these three examinations.
6. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter, and taking DLCL 201. The Learning and Teaching of Second Languages.
7. Pass the University Oral Examination—General regulations governing the oral examination are found in the "Graduate Degrees" section of this Bulletin. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.
8. Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Chinese.

REQUIREMENTS FOR DOCTOR OF PHILOSOPHY IN JAPANESE

The Ph.D. program in Japanese is designed to prepare students for a doctoral degree in Japanese literature, cultural history, or linguistics. Applicants must have a minimum of three years of Japanese language study at Stanford or the equivalent to be considered for admission. Students on the Ph.D. track will complete an M.A. thesis on the way to advancing to Ph.D. candidacy (see department guidelines for admission to candidacy above). The majority of required course work for Ph.D. students demands the ability to read primary and secondary materials in Japanese. Advanced standing may be considered for students entering the Ph.D. program who have already completed an M.A. in Japanese literature or linguistics elsewhere only in cases when the level of prior course work and research is deemed equivalent to departmental requirements for the Ph.D. track. All courses must be taken for a letter grade.

A candidate must fulfill the following requirements:

1. Demonstrate proficiency in both modern and classical Japanese language by completing the following courses, or by demonstrating an equivalent level of linguistic attainment by passing the appropriate certifying examinations.
   a. fourth-year Japanese through JAPANLANG 213
   b. classical Japanese through JAPANLIT 246 and 247.
2. Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.
   Students concentrating in classical Japanese literature are normally expected to fulfill this requirement by completing
   a. kanbun (JAPANLIT 248 and/or 249), and
   b. first-year classical Chinese (CHINLIT 205, 206, 207).
3. Complete eight adviser-approved courses numbered above 200 from among the offerings of the Department of East Asian Languages and Cultures. At least four of these eight courses must be advanced seminars numbered above 300. At least one of these eight courses must deal with Japanese linguistics. For students focusing on modern literature, at least two of these eight courses must deal with premodern material, and for students focusing on premodern literature, at least two of the eight courses must deal with modern material.
4. Complete two upper-division or graduate-level courses in two supporting fields, for a total of four courses outside of Japanese literature or linguistics. Supporting fields, to be determined in consultation with the student's primary adviser, may include Japanese anthropology, art, history, philosophy, politics, and religion, Chinese literature, comparative literature, etc.
5. Complete JAPANLIT 201. Introduction to Graduate Study in Japanese.
6. Pass a comprehensive qualifying examination that tests the candidate's breadth and depth in the primary field of research and methodological competence in the relevant discipline.
7. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter and taking DLCL 201. The Learning and Teaching of Second Languages.
8. Pass the University Oral Examination. General regulations governing the oral examination are found in the "Graduate Degrees" section of this Bulletin. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.
9. Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Japanese.

A candidate specializing in Japanese linguistics must fulfill the following requirements.

1. Demonstrate proficiency in both modern and classical Japanese language by completing the following courses, or by demonstrating an equivalent level of linguistic attainment by passing the appropriate certifying examinations.
   a. fourth-year Japanese through JAPANLANG 213
   b. classical Japanese through JAPANLIT 246 and 247
2. Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.
3. Complete six adviser-approved courses numbered above 200 from among the offerings of the Department of East Asian Languages and Cultures. At least one of these six courses must be advanced seminars numbered above 300. At least one of these six courses must deal with Japanese literature.
4. Complete five upper-division or graduate-level courses in linguistics and other supporting fields. Supporting fields, to be determined in consultation with the student's primary adviser, may include applied linguistics, Chinese linguistics, psychology, education, anthropology, sociology, etc.
5. Complete JAPANLIT 279. Research in Japanese Linguistics.
6. Submit two qualifying papers presenting substantial research in two different subfields of Japanese linguistics to be approved by a committee of the specific qualifying paper.
7. Submit an annotated bibliography pertaining to the topic of dissertation to the primary adviser.
8. Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter and taking DLCL 201. The Learning and Teaching of Second Languages.
9. Pass the University Oral Examination. General regulations governing the oral examination are found in the "Graduate Degrees" section of this Bulletin. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.
10. Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Japanese.

PH.D. MINOR IN EAST ASIAN LANGUAGES AND CULTURES

A student taking a Ph.D. minor in Chinese or Japanese must complete at least 30 units of work within the department at the 200 and 300 level, chosen in consultation with a department adviser. The student must take either CHINLIT 201 or JAPANLIT 201 unless the department is satisfied that work done elsewhere has provided similar training. The student must also pass a written examination in the Chinese or Japanese language.

EAST ASIAN STUDIES

Director: Kären Wigen
Affiliated Faculty and Staff:
Anthropology: Harumi Befu (emeritus), Melissa Brown, Lisa M. Curran, Miyako Inoue, Matthew Kohrman, Sylvia Yanagisako
Art and Art History: Jean Ma (on leave), Melinda Takeuchi, Richard Vinograd, Xiaoze Xie
Biology: Marcus W. Feldman
Business: Hau Lee, Bruce R. McKern, William F. Miller (emeritus), John Roberts, Kenneth Singleton
Center for International Security and Cooperation: Undraa Agvaanluvsan, Chaim Braun
Civil and Environmental Engineering: David Freyberg, Renate Fruchter, Leonard Ortolano
Communications: James Fishkin
Comparative Literature: David Palumbo-Liu
Earth Sciences: Stephan Graham, Rosamond L. Naylor
East Asian Languages and Cultures: Steven Carter, Richard Dasher, Albert E. Dien (emeritus), Paul Festa (postdoctoral fellow), Haiyan Lee, Indra Levy, Mark E. Lewis, Li Liu, Yoshiko Matsumoto, James Reichert, Stuart Sargent, Chao Fen Sun, Melinda Takeuchi, Ban Wang, John C. Y. Wang (emeritus), Yiqun Zhou
East Asian Studies: Karen Eggleston, Scott Rozelle (on leave), Suyoung Son (postdoctoral fellow)
Economics: Ronald McKinnon (emeritus)
Education: Jennifer Adams, Anthony L. Antonio, Martin Carnoy, Francisco Ramirez, Christine M. Wotipka
Electrical Engineering: Richard Dasher
Freeman Spogli Institute for International Studies: Thomas Fingar
History: Gordon Chang (on leave), Mark E. Lewis, Mark Mancall, Yumi Moon, Thomas Mullaney (on leave), Matthew Sommer, Jun Uchida, Lyman P. Van Slyke (emeritus), Kären Wigen
Ho Center for Buddhist Studies: Tenzin Tethong
Hoover Institution: Richard Allen, Larry Diamond, Thomas Henriksen, Alex Inkeles (emeritus), Tai-Chun Kuo, Hsiao-ting Lin, Alice L. Miller, Ramon Myers (emeritus), Toshio Nishi, Mark Peattie, William Perry, Alvin Rabushka, William Ratliff, Henry Rowen, Charles Wolf Jr.
Human Biology: Arthur P. Wolf
Law: Eric Feldman, Thomas Heller, Erik Jenson
Linguistics: Dan Jurafsky
Management Science and Engineering: Siegfried S. Hecker, Edison Tse, Yinyu Ye
Materials Science and Engineering: Pamela Hinds, Robert Sinclair
Medicine: Scott W. Atlas, Joseph Helms, David Katzenstein, Samuel LeBaron
Music: Jingdong Cai, Jaroslaw Kapuscinski, Stephen Sano, Linda Uyechi, Daisy You
Political Science: Masahiko Aoki (emeritus), Phillip Lipscy, Jean C. Oi
Religious Studies: Carl Bielefeldt (on leave), Megan Bryson, Robert Gimello, Paul Harrison, Irene Lin, Christian Luczanits
Shorenstein APARC: Michael Armacost, Rafiq Dossani, Karen N. Eggleston, Donald K. Emmerson, Scott Rozelle (on leave)
Sociology: Gi-Wook Shin, Andrew Walder, Xueguang Zhou
Stanford Language Center: Kazuko M. Busbin, Yin Chuang, Marina Chung, Robert Clark, Sik Lee Dennig, Michelle DiBello, Hee-sun Kim, Nina Lin, Hisayo O. Lipton, Momoyo Kubo Lowdermilk, Emiko Yasumoto Magnani, Kiyomi Nakamura, Hua Qian, Yu-hwa Liao Rozelle, Yoshiko Tomiyama, Huazhi Wang, Hong Zeng, Youping Zhang, Qi Zhu
Center Offices: 615 Crothers Way, 100 Encina Commons
Mail Code: 6023
Phone: (650) 736-1759, 723-3362; *fax:* (650) 725-3350
Web Site: http://ceas.stanford.edu

The Center for East Asian Studies (CEAS) coordinates University instructional, research, and special activities related to China, Japan, and Korea. Faculty and students who share a common interest in the study of East Asia are brought together by the center from a broad range of academic concerns covering nearly every discipline and historical period. CEAS is part of the Division of International Comparative and Area Studies in the School of Humanities and Sciences.

Courses offered by the Center for East Asian Studies are listed under the subject code EASTASN on the *Stanford Bulletin's* ExploreCourses web site.

The EASTASN courses listed on ExploreCourses deal primarily with China, Japan, and/or Korea. Literature courses are listed with the subject codes of CHINGEN, CHINLIT, JAPANGEN, and JAPANLIT on ExploreCourses. Many other theoretical and methodological courses within departments at Stanford are taught by faculty who are East Asian specialists; these courses often have a substantial East Asian component and a list of current applicable courses from outside departments may be found in the "Master of Arts in East Asian Studies" section of this bulletin. For courses in

Chinese, Japanese, and Korean language instruction use the subject codes CHINLANG, JAPANLNG, and KORLANG. For courses in Classical Chinese, search under the subject code CHINLIT.

UNDERGRADUATE PROGRAMS IN EAST ASIAN STUDIES

Undergraduates interested in East Asia can become involved by attending CEAS events, taking courses in the subject codes listed above, or earning a Minor or Bachelor of Arts degree in East Asian Studies. These undergraduate degrees in East Asian Studies are now administered by the Department of East Asian Languages and Cultures. The Bing Overseas Study Program also offers study abroad opportunities and internships in East Asia.

For language study, CEAS provides undergraduate fellowships for language study in China, Japan, or Korea; students must simultaneously apply to a pre-approved language program abroad. Applications are due in February each year. Deadlines and application information can be found on the CEAS web site. In addition, undergraduates can obtain a coterminal M.A. degree in East Asian Studies while concurrently working on their undergraduate major by applying during the regular admissions cycle no later than their senior year.

GRADUATE PROGRAMS IN EAST ASIAN STUDIES

MASTER'S PROGRAMS

The M.A. program in East Asian Studies is designed both for students who plan to complete a Ph.D. but who have not yet decided on the particular discipline in which they prefer to work, and for students who wish to gain a background in East Asian Studies in connection with a career in nonacademic fields such as business, law, education, journalism, or government service. Students interested in pursuing professional careers are encouraged to plan for additional training through internships or graduate professional programs, in conjunction with obtaining an M.A. in East Asian Studies.

DOCTORAL PROGRAMS

Stanford does not offer a Ph.D. in East Asian Studies. However, there are more than 100 doctoral students with a specialization on China, Korea, or Japan within various departments and schools of the University. The departments that offer an East Asian concentration are Anthropology, Art and Art History, Comparative Literature, Earth Sciences, East Asian Languages and Cultures, Economics, Education, History, Human Biology, Linguistics, Music, Political Science, Religious Studies, and Sociology. It is also possible to specialize in East Asia within some of the doctoral programs of the professional schools of Business, Education, and Law. Inquiries should be directed to the individual department or school concerned.

POSTDOCTORAL PROGRAMS

The Center for East Asian Studies offers postdoctoral fellowships in Chinese Studies each year. Postdoctoral fellowships in other areas are also available from the Freeman-Spogli Institute of International Studies and the Walter H. Shorenstein Asia-Pacific Research Center.

FINANCIAL AID

Students in graduate programs who plan to do work in Chinese, Japanese, or Korean language and area studies courses, may be eligible for Foreign Language and Area Studies (FLAS) fellowships and are encouraged to apply for them at the time of application to Stanford. Recipients of FLAS fellowships must be American citizens or permanent residents. For further information, see http://ceas.stanford.edu/students/fellowships.php.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN EAST ASIAN STUDIES

The center admits a limited number of Stanford undergraduates to work for a coterminal M.A. degree in East Asian Studies. Applications are accepted once a year during the regular CEAS M.A. application cycle. The deadline for the 2011-12 academic year is January 11, 2011. Students may apply after completing 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. Applicants are expected to meet the same standards as those seeking admission to the M.A. program, and they must submit the following directly to the Center's office in 100 Encina Commons:

- a written statement of purpose
- an unofficial Stanford transcript
- three letters of recommendation, at least two of which should be from members of the department of concentration
- copy of scores from the General Test of the Graduate Record Exam (official score should be sent to Stanford's school code 4704)
- a list of courses the applicant intends to take to fulfill degree requirements.

Coterm applications are reviewed along with peer applications by the M.A. Admissions Committee of the Center for East Asian Studies (CEAS). See also http://ceas.stanford.edu/admissions/apply.php.

Students must meet all requirements for both B.A. and M.A. degrees. They must complete a total of 15 full-time quarters or the equivalent, or three full quarters after completing 180 units for a total of 225 units. Coterms are not eligible for University financial aid, but are eligible to apply for Foreign Language and Area Studies (FLAS) Fellowships administered by CEAS.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN EAST ASIAN STUDIES

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

The master's degree program allows a great deal of flexibility in combining language training, interdisciplinary area studies, and a disciplinary concentration. The director of the center assigns preliminary faculty advisers to all students. Members of the staff and faculty are available for academic and career planning. The M.A. program is normally completed in two academic years, but students can shorten this time by receiving credit for prior language work or by attending summer sessions. Students are urged to complete the degree requirements within one year if their background makes it possible.

Applicants must submit scores for the General Test of the Graduate Record Examination. Foreign applicants are also required to take the Test of English as a Foreign Language (TOEFL). Applications for admission and financial aid should be made online; see http://gradadmissions.stanford.edu. The deadline for submitting applications for the 2011-2012 academic year is January 11, 2011.

The requirements for the M.A. in East Asian Studies are as follows:

Language Requirement—Students must complete the equivalent of Stanford's first three years of language training in Chinese, Japanese, or Korean. Students entering the program without any language preparation should complete first- and second-year Chinese, Japanese, or Korean within the first year of residence at Stanford. This necessitates completing a summer language program. Language courses taken at Stanford must be for letter grades.

The language requirement may be satisfied in part or in full by placing into an appropriate Stanford language class through the language proficiency exam given by the Language Center. Students who fulfill this minimum three-year language requirement before completing other requirements are encouraged to continue language study, or take courses in which Chinese, Japanese, or Korean are used, for as long as they are in the program. Language courses above the third-year level may be applied to the Area Studies requirement discussed below. Please note that the language used to meet the three year language proficiency requirement should match the student's country of focus. Students in the M.A. program are also eligible to apply for the Inter-University language programs in Beijing and Yokohama. Work completed in one of these programs may be counted toward the M.A. degree's language requirement. Language courses are listed in the bulletin under the following subject codes on the *Stanford Bulletin's* ExploreCourses web site: CHINLANG, JAPANLNG, and KORLANG.

Area Studies Requirement—Students must complete the 1-unit core course, EASTASN 330, and at least nine additional courses related to East Asia numbered 100 or above for a minimum total of 45 units. These nine courses must be 3 or more units each, and taken for a letter grade. At least 23 units must be designated primarily for graduate students, typically at the 200-300 levels. As training in research methodologies and demonstrated research ability in a specific discipline are integral parts of the program, three of the nine courses must be taken within a single department, and at least one of these must be a seminar, colloquium, or advanced course which requires a research paper on East Asia. The six additional area studies courses may be taken in departments of the student's choosing so long as the courses are focused on East Asia. Some theory-oriented or methodological courses may be used to meet part of these requirements provided they are demonstrably useful for understanding East Asian problems. Language courses numbered 100-199 do not count toward the nine courses required for the degree. Credit toward the area studies requirement is not given for courses taken before entering the M.A. program, however students may take courses for exchange credit at the University of California, Berkeley, with the approval of their adviser and the Office of the University Registrar.

M.A. Thesis Requirement—A master's thesis, representing a substantial piece of original research, should be filed with the center's program office as part of the graduation requirements. With the adviser's approval, the master's thesis requirement may be satisfied by expanding a research paper written for an advanced course.

Because East Asian Studies is an interdisciplinary major, the majority of the courses that apply towards the degree are listed under other departments. In addition to courses listed under the EASTASN subject code, students should check the list below, as well as on the *Stanford Bulletin's* ExploreCourses site for courses in other departments that will meet the degree requirements for East Asian Studies; such departments include Anthropology, East Asian Languages and Cultures, History, Political Science, Religious Studies, and Sociology.

To meet requirements for the master's degree, students must take courses at the 100 level or above, and at least 23 units at the 200 level or above. In general, M.A. students should register for classes with the higher course number (for example, graduate students should register for ANTHRO 282 and undergraduates should register for ANTHRO 82 if the class is open to both graduate students and undergraduates). Please note that some of the courses listed are intended for undergraduates only (courses below 100, and courses with "OSP" catalog numbers) and are meant to be applied to the East Asian Studies minor or B.A. degrees, not the East Asian Studies M.A. degree. Not all courses offered by other departments that have East Asia content may be listed below or on the CEAS web site. If there is a course not listed here that has East Asia content, check with the Center for East Asian Studies to verify whether or not it can be used to fulfill the degree requirements.

The following course list represents courses that may, with the adviser's approval be used to fulfill degree requirements:

- ANTHRO 25N. Contemporary Japanese Popular Culture
- ANTHRO 147A. Folklore, Mythology, and Islam in Central Asia
- ANTHRO 148A/248A. Nomads of Eurasia: Culture in Transition
- ANTHRO 153A/253A. Japan's Postwar Cultural History
- ANTHRO 355. Cities in Global Perspective
- ANTHRO 380A. Topics in the Anthropology of China and Taiwan
- ANTHRO 380B. Gender Bias in the Past and Future of Asia: Kinship & Society
- ANTHRO 380C. Gender Bias in the Past and Future of Asia: Governance
- ARCHLGY 111. Emergence of Chinese Civilization from Caves to Palaces (Same as CHINGEN 141, CHINGEN 241)
- ARCHLGY 201. Art and Archaeology of Korea (Same as KORGEN 170)
- ARCHLGY 302. Constructing National History in East Asian Archaeology (Same as CHINLIT 218)
- ARTHIST 185/385. Art in China's Modern Era
- ARTHIST 187/387. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868 (Same as JAPANGEN 185)
- ARTHIST 481. Colloquium on Song and Yuan Dynasty Painting Studies
- ARTHIST 482. Chinese Art of the 1970's and 1980's
- CHINGEN 51. Chinese Calligraphy
- CHINGEN 70N. Marvelous Creatures: Animals and Humans in Chinese Literature
- CHINGEN 91. Traditional East Asian Culture: China
- CHINGEN 117/217. Worship of Buddhist Images in Medieval China
- CHINGEN 131/231. Chinese Poetry in Translation
- CHINGEN 133/233. Literature in 20th-Century China
- CHINGEN 136/236. The Chinese Family
- CHINGEN 140/240. Chinese Justice: Law, Morality, and Literature
- CHINGEN 141/241. Emergence of Chinese Civilization from Caves to Palaces (Same as ARCHLGY 111)
- CHINGEN 142. Early Chinese Thought
- CHINLIT 125/205. Beginning Classical Chinese, First Quarter
- CHINLIT 126/206. Beginning Classical Chinese, Second Quarter
- CHINLIT 127/207. Beginning Classical Chinese, Third Quarter
- CHINLIT 161/261A. Passion in Late Imperial Literature
- CHINLIT 174/274. Modern Chinese Novel: Theory, Aesthetics, History
- CHINLIT 190/290. Chinese Cultural Revolution: Performance, Politics, and Aesthetics
- CHINLIT 191/291. The Structure of Modern Chinese
- CHINLIT 218. Constructing National History in East Asian Archaeology (Same as ARCHLGY 302)
- CHINLIT 223. Advanced Classical Chinese: Literary Essays
- CHINLIT 265. Major Figures in Classical Chinese Shi Poetry
- CHINLIT 273. Chinese Drama
- CHINLIT 279. For Love of Country: National Narratives in Chinese Literature and Film
- CHINLIT 369. Late Imperial Chinese Fiction
- EASTASN 113/213. Comparative Southeast Asian Politics: Democratic Governance, Corruption and Development
- EASTASN 114/214. Chinese Imagination of Death
- EASTASN 117/217. Health and Healthcare Systems in East Asia
- ECON 168/268. International Finance and Exchange Rates
- EDUC 109X/309X. Educational Issues in Contemporary China

- EDUC 202. Introduction to Comparative and International Education
- EDUC 306B. Politics, Policy Making, and Schooling Around the World
- EE 402A. Topics in International Technology Management
- EE 402T. Entrepreneurship in Asian High Tech Industries
- FILMSTUD 116/316. International Documentary
- HISTORY 62N. The Atomic Bomb in Policy and History
- HISTORY 91C/191C/391C. Early Imperial China
- HISTORY 92S. What is China; Who are Chinese?: Cultural Identity in Ancient and Medieval China
- HISTORY 93/193/393C. Late Imperial China
- HISTORY 94B/194B. Japan in the Age of the Samurai
- HISTORY 95/195. Modern Korean History
- HISTORY 95C/195C. Modern Japanese History
- HISTORY 98/198. The History of Modern China
- HISTORY 106A. Global Human Geography: Asia and Africa (Same as INTNLREL 161A)
- HISTORY 197. Southeast Asia: From Antiquity to the Modern Era
- HISTORY 198B. The Construction of Modern China through Space and Time
- HISTORY 291D/391D. Colonialism and Collaboration in East Asia
- HISTORY 292/392. The Two Koreas
- HISTORY 292D/392D. Japan in Asia, Asia in Japan
- HISTORY 292F/392F. Traditional Korea: History and Culture
- HISTORY 396D. Modern Japan
- HISTORY 495A. Qing Legal Documents
- HISTORY 495B. Qing Legal Documents
- HUMBIO 148. Kinship and Marriage
- JAPANGEN 51/251. Japanese Business Culture
- JAPANGEN 92. Traditional East Asian Culture: Japan
- JAPANGEN 121/221. Translating Japan, Translating the West
- JAPANGEN 137/237. Classical Japanese Literature in Translation
- JAPANGEN 138/238. Survey of Modern Japanese Literature in Translation
- JAPANGEN 141/241. Japanese Performance Traditions
- JAPANGEN 185. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868 (Same as ARTHIST 187/387)
- JAPANLIT 157/257. Points in Japanese Grammar
- JAPANLIT 235. Academic Readings in Japanese I
- JAPANLIT 260. Japanese Poetry and Poetics
- JAPANLIT 266. Introduction to Sino-Japanese
- JAPANLIT 279. Research in Japanese Linguistics
- JAPANLIT 287. Pictures of the Floating World: Images from Japanese Popular Culture (Same as ARTHIST 287)
- JAPANLIT 296. Readings in Modern Japanese Literature - 20th Century Comics
- JAPANLIT 298. The Theory and Practice of Japanese Literary Translation
- JAPANLIT 377. Seminar: Structure of Japanese
- JAPANLIT 396. Modern Japanese Literature
- LAW 245. Chinese Law and Business
- MUSIC 13Q. Classical Music and Politics: Western Music in Modern China
- OSPBEIJ 10. Beijing Past and Present
- OSPBEIJ 19. Population and Society in East Asia
- OSPBEIJ 24. China's Economic Development
- OSPBEIJ 27. Topics in China's Development
- OSPBEIJ 39. China and the World
- OSPBEIJ 41. Chinese Society and Business Culture
- OSPBEIJ 42. Chinese Media Studies
- OSPBEIJ 46. Introduction to Chinese Economy
- OSPBEIJ 48. Chinese LIterature: Tradition in Transformation
- OSPBEIJ 66. Essentials of China's Criminal Justice System
- OSPBEIJ 67. China-Africa and Middle East Relations
- OSPKYOCT 108. Lost in Translation
- OSPKYOCT 126. Japanese-American Cultural Interchange in a Global Age
- OSPKYOCT 161. Kyoto: The Past in the Present
- OSPKYOCT 165. Kyoto Houses and the Japanese Lifestyle
- OSPKYOCT 189. Japanese Religion in Context
- OSPKYOCT 198. Women's Issues in Japan
- OSPKYOTO 17R. Religion and Japanese Culture
- OSPKYOTO 25. Japanese Ghosts: The Supernatural in Japanese Art and Entertainment
- OSPKYOTO 26. Courtier, Monk, Warrior, Commoner: Japanese Literary Culture and its Milieu
- OSPKYOTO 60. Japan in World War II: Experiences and Memory
- OSPKYOTO 215X. The Political Economy of Japan
- POLISCI 140L/340L. China in World Politics
- POLISCI 148/348. Chinese Politics: The Transformation and the Era of Reform
- POLISCI 211. Political Economy of East Asia
- POLISCI 443S. Political Economy of Reform in China
- POLISCI 443T. Approaches to Chinese Politics
- RELIGST 14. Exploring Buddhism
- RELIGST 104. The Daoist Body
- RELIGST 113B. Japanese Religion Through Film
- RELIGST 114B. Religions of Korea
- RELIGST 216. Japanese Buddhism
- RELIGST 230B/330B. Zen Studies
- RELIGST 247. Chinese Buddhist Texts
- RELIGST 247B/347B. Readings in Chinese Religious Texts: The Lingbao Scriptures
- SOC 111/211. State and Society in Korea

JOINT AND DUAL DEGREE PROGRAMS IN EAST ASIAN STUDIES

EAST ASIAN STUDIES AND LAW

This joint degree program grants an M.A. degree in East Asian Studies and a Doctor of Jurisprudence (J.D.) degree. It is designed to train students interested in a career in teaching, research, or the practice of law related to East Asian legal affairs. Students must apply separately to the East Asian Studies M.A. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student's background and level of training in Chinese, Japanese, or Korean. Up to 45 units of approved courses may be counted towards both degrees. For more information, see the "Joint Degree Programs" section of this bulletin. Students who have been accepted by both programs should consult with the departments to determine which courses can be double-counted.

EAST ASIAN STUDIES AND EDUCATION

This dual degree program grants an M.A. degree in East Asian Studies and a secondary school teaching credential in social studies. To be eligible for this program, students should apply to the M.A. program in East Asian Studies and then apply to the Stanford Teacher Education Program during the first year at Stanford. Completing the dual program requires at least two years, including one summer session when beginning the education component of the program.

EAST ASIAN STUDIES AND BUSINESS

This dual degree program grants an M.A. degree in East Asian Studies and a Master of Business Administration degree. Students must apply separately to the East Asian Studies M.A. program and the Graduate School of Business and be accepted by both. Completing this combined course of study requires approximately three

academic years (perhaps including summer sessions), depending on the student's background and level of training in Chinese, Japanese, or Korean language.

ECONOMICS

Emeriti: (Professors) Takeshi Amemiya, Theodore Anderson, Masahiko Aoki, Kenneth J. Arrow, Paul A. David, Victor R. Fuchs, John G. Gurley, Peter J. Hammond, Donald Harris, Bert G. Hickman, Mordecai Kurz, Lawrence J. Lau, Ronald I. McKinnon, Roger G. Noll, Nathan Rosenberg, Thomas Sargent, David A. Starrett, Joseph E. Stiglitz

Honorary Emerita: (Professor) Anne O. Krueger

Chair: Lawrence Goulder

Professors: Kyle Bagwell, B. Douglas Bernheim, Michael J. Boskin, Timothy F. Bresnahan, Lawrence Goulder, Avner Greif, Robert E. Hall, Han Hong, Caroline Hoxby, Matthew O. Jackson, Peter Klenow, Jonathan Levin, Thomas E. MaCurdy, Paul R. Milgrom, John H. Pencavel, Monika Piazzesi, Joseph Romano, K. Martin Schneider, Ilya Segal, John B. Shoven, Robert Staiger, John B. Taylor, Frank Wolak, Gavin Wright

Associate Professors: Nicholas A. Bloom, Liran Einav, Muriel Niederle, Luigi Pistaferri

Assistant Professors: Ran Abramitzky, Manuel Amador, Giacomo DeGiorgi, Doireann Fitzgerald, Kyna Fong, Peter R. Hansen, Matthew Harding, Seema Jayachandran, Jakub Kastl, Fuhito Kojima, Pablo Kurlat, Aprajit Mahajan, Kalina Manova, Petra Moser, Florian Scheuer, Michele Tertilt

Senior Lecturer: Geoffrey Rothwell

Lecturers: Moussa Blimpo, Marcelo Clerici-Arias, Doru Cojoc, Maria Fitzpatrick, Gopi Shah Goda, Alexander Gould, Ward Hanson, Hamilton Helmer, Camille Landais, Peter Nilson, Nicholas Sanders, F. Victor Stanton, Faye Steiner, Mark Tendall

Courtesy Professors: Anat Admati, Lawrence Baker, David Baron, Jay Bhattacharya, Jeremy Bulow, Walter Falcon, John Ferejohn, Alan Garber, Judith Goldstein, Ilan Guttman, Stephen Haber, Peter Blair Henry, Saumitra Jha, David Kreps, N. Grant Miller, Rosamond Naylor, Maria Ogneva, Bruce Owen, A. Mitchell Polinsky, Peter C. Reiss, D. John Roberts, James Strnad, Alan Sykes, Barry Weingast, Robert Wilson

Visiting Professor: Enrico Moretti

Visiting Assistant Professor: John Lynham

Mail Code: 94305-6072

Phone: (650) 725-3266

Web Site: http://economics.stanford.edu

Courses offered by the Department of Economics are listed under the subject code ECON on the *Stanford Bulletin's* ExploreCourses web site.

The department's purpose is to acquaint students with the economic aspects of modern society, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. There is training for the general student as well as for those who plan careers as economists in civil service, private enterprise, teaching, or research.

The department's curriculum is an integral part of Stanford's programs in International Relations, Public Policy, and Urban Studies.

The faculty interests and research cover a wide spectrum of topics in most fields of economics, including behavioral economics, comparative institutional analysis, econometrics, economic development, economic history, experimental economics, industrial organization, international trade, labor, macro- and microeconomic theory, mathematical economics, environmental economics, and public finance.

MISSION OF THE UNDERGRADUATE PROGRAM IN ECONOMICS

The mission of the undergraduate program in Economics is to acquaint students with the economic aspects of modern society, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. The program introduces students to macro- and microeconomic theory, teaches them to think and write clearly about economic problems and policy issues and to apply the basic tools of economic analysis. The undergraduate major provides an excellent background for those who plan careers in government and private enterprise as well as those pursuing graduate degrees in professional schools or in the field of economics.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of core knowledge within Economics.
2. ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
3. ability to write clearly and persuasively and communicate ideas clearly.
4. ability to evaluate theory and critique research within the discipline.

GRADUATE PROGRAMS IN ECONOMICS

The primary objective of the graduate program is to educate students as research economists. In the process, students also acquire the background and skills necessary for careers as university teachers and as practitioners of economics. The curriculum includes a comprehensive treatment of modern theory and empirical techniques. Currently, 20 to 25 students are admitted each year.

Graduate programs in economics are designed to ensure that students receive a thorough grounding in the methodology of theoretical and empirical economics, while at the same time providing specialized training in a wide variety of subfields and a broad understanding of associated institutional structures. Toward these ends, the program is arranged so that the student has little choice in the curriculum at the outset but considerable latitude later on.

Students admitted to graduate standing in the department are expected to have a strong background in college-level economics, mathematics, and statistics. Preparation ordinarily consists of a college major in economics, a year-long calculus sequence that includes multivariate analysis, a course in linear algebra, and a rigorous course in probability and statistics.

GRADUATE FIELDS

A. ECONOMIC DEVELOPMENT

To receive credit for this field, students must complete two courses from 214, 216 and 217, and submit a paper from one of these courses. Students wishing to do research in the field are advised to take courses in international economics, such as 266, and in comparative institutional analysis.

B. ECONOMIC HISTORY/INSTITUTIONS

The requirement for the field is one research paper on a subject approved by one of the faculty teaching any of the following courses: 224, 225, 226, 227, 228, 229.

C. MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for this field are completion of two courses from 233, 234, and 235.

D. PUBLIC FINANCE

To receive credit for the field, students must complete 241 and 242 by passing the final examinations, and submit an acceptable research paper on a topic approved by the instructor for either course. Students may take Public Finance as a field and still count 243 and/or 244 toward satisfying their distribution requirements.

E. ECONOMICS OF LABOR

To receive credit for this field, students must complete two courses from 246, 247, and 248.

F. ECONOMICS OF INDUSTRY

To receive credit for the field, students must complete 257 and 258 and submit one research paper, the subject of which has been approved in advance by one of the faculty teaching 257, 258, or 260.

G. INTERNATIONAL ECONOMICS

To receive credit for this field, students must complete 265 and 266. Taking one or more of 267, 268, or 269 is recommended. A research paper from any of these courses must also be submitted.

H. ECONOMETRICS

A student may satisfy the requirements for the econometrics field by completing the requirements of one of two subfields:

1. *H-1:* Theoretical Econometrics: To receive credit in the theoretical econometrics subfield, students must complete 273 and 274.
2. *H-2:* Applied Econometrics: To receive credit in the applied econometrics subfield, students must complete 273 and either 275 or 276. Students must also complete a course or set of courses that is empirically oriented. The last requirements must be approved by the Director of Graduate Study in consultation with the instructor of 275 or 276.

I. MICROECONOMIC THEORY

To receive credit for this field, students must complete two courses from the following: 280, 281, 282, 283, 284, 286, 287, 289, 291.

J. ENVIRONMENTAL ECONOMICS

To receive credit for this field, students must complete 250 and 251. Students can petition to substitute another environment/natural resource course (e.g., MS&E 248) for either of these.

K. POLITICAL ECONOMY

To receive credit for this field, students must complete 220 and 221.

OTHER PROGRAMS

Other programs leading to dual degrees may be arranged. For example, the Ph.D. in Economics combines with one or two years of study in the School of Law, leading to the nonprofessional Master of Legal Studies (M.L.S.) degree. A dual degree program does not permit counting any courses toward both the Economics and the Law degrees. For more information, see http://www.law.stanford.edu/program/degrees.

FELLOWSHIPS AND ASSISTANTSHIPS

The department awards a number of fellowships for graduate study. Many first-year and a few second- or third-year students are typically awarded full fellowships, including a stipend and tuition. All students whose records justify continuation in the program may be assured support for the second through fourth years in the form of employment as a teaching or research assistant. These half-time appointments provide a stipend and tuition allowance. Entering students are not normally eligible for research or teaching assistantships.

BACHELOR OF ARTS IN ECONOMICS

The total number of units required for the major is 80. Students are encouraged to complete the core courses 1-6 below, as early as possible. Ideally, students should complete the core during the sophomore year, before taking upper division courses. Courses may not be taken before the prerequisites are completed. The required number of field courses is four. There is great flexibility in the choice of electives, including upper-division math and statistics.

Of the 80 units required for the major, at least 55 must be taken at Stanford in California. Students cannot declare Economics as their major or minor until they have completed ECON 50 with a grade of 'B' or better.

REQUIREMENTS FOR THE ECONOMICS MAJOR (80 UNITS)

1. ECON 1A (5 units): micro and elementary economics.
2. ECON 1B (5 units): macroeconomics. Prerequisite: ECON 1A.
3. ECON 102A (5 units): introduction to statistical methods. It is recommended that students satisfy this basic statistics requirement before proceeding with the rest of the program. Prerequisite: MATH 41 or equivalent.
4. ECON 50 (5 units, grade of 'B' or better): basic price theory. Prerequisites: ECON 1A and MATH 51 (letter grade required).
5. ECON 51 (5 units): intermediate microeconomics. Prerequisite: ECON 50.
6. ECON 52 (5 units): intermediate macroeconomics. Prerequisites: ECON 50 and 1B.
7. ECON 102B (5 units): econometrics. Prerequisites: ECON 50 and 102A. Material in ECON 102B is used in a number of field courses. Students are advised to design their program of study so that ECON 102B is not taken in their senior year but early in their program.

Field Courses (must be taken at Stanford in California; 20 units)—Four courses must be chosen from among ECON 111, 115, 118, 126, 137, 140,* 141, 144, 145, 147, 149, 153, 157, 158, 160, 164, 165, 166, 168, 169, 179 (5 units each).

Writing in the Major Course (must be taken at Stanford in California; 5 units)—This requirement is fulfilled by ECON 101. This course should be taken only after completing ECON 51 and 52, 102B, and at least two field courses.

Electives (20 units)—Choose from Economics courses numbered from 100 through 198, excluding 190 and 191. Up to 10 units may be satisfied by MATH 113, 114, 115, 136, 151, 171, 175; or STATS 200, 206, 207, 217, 218, 237.

A maximum of 10 units of transfer credit or of ECON 139D, Directed Reading, may be taken under this section. Suitable transfer credit must be approved in writing by the Associate Director of Undergraduate Studies. Advanced undergraduate majors with strong quantitative preparation may enroll in graduate (200-level) courses with permission of the Director of Undergraduate Studies and the course instructor. Some courses offered by Overseas Studies may be counted towards this requirement. The department does not give credit for internships.

* Students may not count units from both ECON 135 and 140 towards their major as the courses are too similar in content.

OTHER REQUIREMENTS

No courses receiving Department of Economics credit under the preceding requirements may be taken credit/no credit, and 55 of the 80 units required for the major must be taken at Stanford in California.

Students scoring a 5 on both the advanced placement microeconomics and advanced placement macroeconomics exam may petition the Director of Undergraduate Studies to have the ECON 1A (but not 1B) course requirement waived. Students do not receive units credit for placing out of ECON 1A.

A grade point average (GPA) of 2.0 (C) or better must be received for all units applied toward the preceding requirements.

To use transfer credit in partial satisfaction of the requirements, the student must obtain written consent from the department's Associate Director of Undergraduate Study, who establishes the amount of credit to be granted toward the department requirements

(see the *Information Book for Economics Majors)*. Students must have completed all Stanford prerequisites for approved transfer credit courses in order to use those courses towards the Economics major.

Course prerequisites are enforced. Students taking courses to satisfy prerequisites in another department or institution must petition for Stanford course substitution or transfer credit approval in order to satisfy course prerequisites.

The time limit for satisfactory completion of a course is one year from the date an incomplete is given, although instructors may set a shorter time limit. Students are responsible for seeing that all grades of 'incomplete' are cleared within the time limit.

SAMPLE PROGRAMS

Sample listings of upper-division economics electives may be examined in the department's *Information Book for Economics Majors*, available at http://economics.stanford.edu/undergraduate. Sample programs are provided for the following areas of emphasis: (1) liberal arts, (2) pre-business, (3) quantitative, (4) international, (5) political economy and regulation, and (6) preparation for graduate school in economics.

HONORS PROGRAM

The honors program offers an opportunity for independent research, creativity, and achievement. It is designed to encourage a more intensive study of economics than is required for the normal major, with course and research work of exceptional quality. Honors students may participate in an Honors Research Symposium during Spring Quarter, with those nominated for prizes making oral presentations. The honors program requires:

1. Completing all requirements for the major.
2. Achieving a grade point average (GPA) of at least 3.5 for the 80 units required of the Economics major. See details in the *Information Book for Economics Majors.*
3. Complete ECON 102B and at least two lecture courses most relevant for the proposed topic of the honors thesis by the end of the junior year. (These can be included in the basic 80 units.)
4. Candidates must write an honors thesis in their senior year for at least one unit and up to 10 units of credit (ECON 199D). The thesis must be of very high quality and written under the direction of a member of the department or its affiliated faculty. Units of 199D do not count toward the course work requirements for the basic economics major, or in the computation of the GPA requirement for honors. Students who take ECON 199D for 10 units may apply 5 of those units to meet the Writing in the Major (WIM) requirement. Such students complete the major with at least 85 units overall.

Juniors interested in the honors program should attend an informational meeting scheduled by the honors program director during the first week of each quarter. At this meeting, students receive information on organizing an honors project and are given details on honors programs. Prospective candidates for the honors program should submit an application to the director no later than the end of the first month of the third quarter before graduation (typically Autumn Quarter of the senior year). Also required, later in the same quarter, is a three-page thesis proposal that must be approved by the thesis adviser.

MINOR IN ECONOMICS

The minor in Economics has two main goals: to acquaint students with the rudiments of micro- and macroeconomic theory that are required of all majors; and to allow students to build competence in the application of this theory to two fields of economics of their choosing, and the opportunity to specialize further in any one of these fields by taking one additional advanced course in the Department of Economics.

COURSE WORK

1. ECON 1A (5 units): micro and elementary economics.
2. ECON 1B (5 units): macroeconomics. Prerequisite: ECON 1A.
3. ECON 50 (5 units, grade of 'B' or better): basic price theory. Prerequisites: ECON 1A and MATH 51 (letter grade required).
4. ECON 51 (5 units): intermediate microeconomics. Prerequisite: ECON 50.
5. ECON 52 (5 units): intermediate macroeconomics. Prerequisites: ECON 50 and 1B.
6. Two field courses (10 units; must be taken at Stanford in California) must be chosen from the following list: ECON 102A, 102B, 111, 115, 118, 126, 137, 140,* 141, 144, 145, 147, 149, 153, 157, 158, 160, 165, 166, 168, 179.

*Students may not count units from both ECON 135 and 140 towards their minor as the courses are too similar in content.

OTHER REQUIREMENTS

If the candidate's major requires basic Economics courses (items 1 through 5), then only half of the units from those courses apply toward the economics minor. To attain the overall 35 units required by the minor, the student must take additional Economics courses numbered from 100 through 198.

At least 20 out of the 35 units for the minor must be taken at Stanford. Students must have completed all Stanford prerequisites for approved transfer credit courses in order to use those courses towards the Economics minor.

No courses receiving Department of Economics credit under the preceding requirements may be taken credit/no credit. A grade point average (GPA) of 2.0 or better must be received for all units applied toward the minor.

Students must complete their declaration of the minor no later than the last day of the preceding quarter before their degree conferral.

MASTER OF ARTS IN ECONOMICS

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

The department does not admit students who plan to terminate their graduate study with the M.A. degree. Students may, but need not, elect to add this degree in addition to their current Ph.D. degree. A master's option is also available to Ph.D. candidates from other departments.

Admission—Prospective students must have completed the Stanford requirements for a B.A. in Economics or approximately equivalent training. Since students are required to take some of the same courses as Ph.D. candidates, similar preparation in mathematics and statistics generally is expected. Prospective applicants should submit their credentials together with a plan of study to the Director of Graduate Study for approval.

Requirements—A master's program must satisfy these criteria:

1. Completing, at Stanford, at least 45 units of credit beyond those required for the bachelor's degree, of which at least 40 units must be in the Department of Economics. Students must complete ECON 202 and at least three other 200-level courses. They must receive a grade of 'B-' or better in ECON 202. Undergraduate courses must be numbered 105 or higher (with the exception of the ECON 102A,B,C sequence listed below). No seminar courses numbered 300 or above can be counted.
2. Demonstrating competence in empirical methodology by receiving a grade of 'B-' or better in both ECON 270 and 271, or by receiving a grade of 'B-' or above in each of ECON 102A, B, and C.
3. Submitting two term papers (or a thesis of sufficient quality). At least one of these papers must be deemed to represent graduate-level work. Normally, this means that it is written in connection with a 200-level course. A maximum of 10 units of credit can be earned for a thesis toward the 45-unit degree requirement. In lieu of this paper requirement, students may elect to take two additional 200+ level Economics courses.
4. A grade point average (GPA) of 3.0 must be maintained for all master's level work. All courses must be taken for a letter grade.

DOCTOR OF PHILOSOPHY IN ECONOMICS

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

Admitted students must be adequately prepared in calculus, linear algebra, and statistics (see above). When deemed appropriate, a student may be required to complete the necessary background preparation at Stanford. All students take a common core curriculum at the outset and later branch out into the desired fields of specialization. Well-prepared students should anticipate spending, with some overlap, approximately two years in course work and another two years in seminars, independent study, and dissertation research. The goal is to complete the program in four years, although some types of research programs may require at least five years to complete. The department has a strong commitment to guiding students through the program expeditiously.

Questions and petitions concerning the program and the admissions process should be addressed to the Director of Graduate Study, who has responsibility for administering the graduate program.

Specific requirements are best discussed in two stages, the first consisting of requirements for admission to candidacy and the second involving further requirements for earning the degree.

Admission to Candidacy for Ph.D.—A student may apply for admission to candidacy when the following minimal requirements are met:

1. Successful results on comprehensive examinations in core economics (the examinations based on material from ECON 202, 203, 204; and 210, 211, 212), and econometrics (the examination based on material from ECON 270, 271, 272).
2. Completing the requirements in two additional fields of specialization from the list below or, if approved in advance by the Director of Graduate Study, in one such field together with a substantial amount of work toward a second field taught in a related department. Advanced fields include econometrics, economic development, economic history, industrial organization, international economics, labor economics, microeconomic theory, monetary theory and advanced macroeconomics, environmental economics, political economy, and public finance.

   Each field listed above can be satisfied by completing two courses, although students in some fields may be advised to add a third course, which can then be counted toward the distribution requirement discussed later. All courses (or comprehensive exams, when offered) must be passed with a grade of 'B' or better.
3. Completing a candidacy paper, normally written in conjunction with one of the special fields selected above. Satisfactory presentation of this paper or another research paper is required in Autumn Quarter of the third year, along with an additional presentation of an expanded research paper in Spring Quarter is also required for admission to candidacy.

It is expected that the student meet, and indeed exceed, the above standards by the end of the third year of residency. When this is not possible for any reason, the Director of Graduate Study should be consulted as early as possible during the third year. Once it is deemed that the above standards have been met, the student should complete the Application for Candidacy for Degree of Doctor of Philosophy. After approval, candidacy remains valid for five years (although it can be terminated earlier by the department if progress is deficient); it can be renewed or extended beyond this period only under unusual circumstances.

Further Requirements for the Ph.D. Degree—

1. *Distribution Requirement*: Students must complete four other graduate-level courses meeting the following requirements:
   a. at least one course from the area of economic history, unless history is one of the two fields of specialization.
   b. courses in at least two fields other than the two fields of specialization. Distribution courses cannot be crosslisted in those fields.
   c. with advance approval of the Director of Graduate Study, some of these distribution courses may be drawn from related fields taught in other departments. However, including courses taken to meet either the specialization or distribution requirements, no more than two courses in total may be taken outside the Economics department.
2. *Teaching Experience:* Each student must serve as a teaching assistant for at least one quarter. It is strongly recommended that this requirement be satisfied before the final year of residence.
3. *Seminar Participation:* Each student is expected to participate in at least two all-year research seminars by the end of the fourth year of residence. Normally, participation in a seminar requires one or more oral presentations and the submission of a research paper (which, however, need not be completely separate from dissertation research).
4. *Ph.D. Dissertation:* The process involves selecting a topic, choosing an appropriate adviser, submitting a prospectus (signed by the adviser) outlining the proposed research, selecting a three-member reading committee (usually all from the Department of Economics, although exceptions can be made under certain circumstances), passing the University oral examination at which these three faculty (and two other members of the Academic Council) ask questions about the completed research, and submitting a final draft of the work signed by all members of the reading committee. The student is advised to initiate this process as early as possible.

PH.D. MINOR IN ECONOMICS

PH.D MINOR

To be recommended for the Ph.D. degree with Economics as a minor subject, a student must qualify in three fields of economics, at least one of which must be in the core economics sequence. The standard of achievement in these fields is the same for minor as for major candidates, including the department's comprehensive examinations where appropriate.

JOINT DEGREE PROGRAM IN PH.D. IN ECONOMICS AND MASTER OF PUBLIC POLICY

The Ph.D./M.P.P. joint degree is designed for students who wish to prepare themselves for careers in areas relating to both policy and economics. Students interested in this degree first apply to the Economics Department, indicating an interest in the joint program. There is one admissions application and one fee. If the decision is made by the department to admit the applicant, the file is then forwarded to the M.P.P. program. An admission decision, based on the information in the Ph.D. application, is made promptly, and the department informs the student of the decision.

Students may also apply to the M.P.P. after having commenced study in the Economics Department at Stanford, by first receiving the consent of the Director of Graduate Studies in Economics and then applying to the Public Policy program.

Students must have a faculty adviser from the Economics Department to assist with the planning and supervising of the joint program. The adviser is usually chosen from among the department's Public Policy-affiliated faculty.

Tuition and financial aid arrangements are made through the Economics Department.

Requirements for the M.P.P./Ph.D. in Economics: Core M.P.P. curriculum of 45 units: PUBLPOL 301B (4 units), 302A (2 units), 302B (4 units), 304A (4 units), 304B (4 units), 305A (4 units), 305B (4 units), 306 (4 units), 307 (4 units), 309 (10 units), 311 (1 unit)

JOINT DEGREE PROGRAMS IN ECONOMICS WITH THE SCHOOL OF LAW

J.D./M.A. AND J.D./PH.D.

The Department of Economics and the School of Law offer a joint program leading to either a J.D. degree combined with an M.A. degree in Economics, or to a J.D. degree combined with a Ph.D. in Economics.

The J.D./M.A. and J.D./Ph.D. degree programs are designed for students who wish to prepare themselves for careers in areas relating to both law and economics. Students interested in either joint degree program must apply and gain entrance separately to the School of Law and the Department of Economics and, as an additional step, must secure permission from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or the Economics department may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or the Department of Economics. Faculty advisers from each academic unit participate in the planning and supervising of the student's joint program. Students must be enrolled full time in the Law School for the first year of law school, and, at some point during the joint program, may be required to devote one or more quarters largely or exclusively to studies in the Economics program regardless of whether enrollment at that time is in the Law School or in the Department of Economics. At all other times, enrollment may be in the graduate school or the Law School, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the M.A. or Ph.D. degrees as specified in this bulletin or by the School of Law.

The Law School approves courses from the Economics Department that may count toward the J.D. degree, and the Economics department approves courses from the Law School that may count toward the M.A. or Ph.D. degree in Economics. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The list may differ depending on whether the student is pursuing an M.A. or a Ph.D. in Economics.

In the case of a J.D./M.A. program, no more than 45 quarter hours of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 quarter hours of approved courses may be counted toward both degrees. In either case, no more than 36 quarter hours of courses that originate outside the Law School may count toward the Law degree. To the extent that courses under this joint degree program originate outside the Law School but count toward the Law degree, the Law School credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of Law School credits that may be counted toward the M.A. or the Ph.D. in Economics is the greater of: (a) 5 quarter hours in the case of the M.A. and 10 quarter hours in the case of the Ph.D.; or (b) the maximum number of hours from courses outside of the department that M.A. or Ph.D. candidates in Economics are permitted to count toward the applicable degree under general departmental guidelines or in the case of a particular student's individual program.

Tuition and financial aid arrangements are normally made through the school in which the student is then enrolled.

For more information, see http://www.law.stanford.edu/program/degrees.

OVERSEAS STUDIES COURSES IN ECONOMICS

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 24. China's Economic Development. 5 units, Scott Rozelle, GER:DB:SocSci

BERLIN

- OSPBER 115X. German Economy: Past and Present. 4-5 units, Ingo Klein, GER:DB:SocSci, EC:GlobalCom

FLORENCE

- OSPFLOR 35. European Economic and Monetary Integration. 5 units, Pompeo Della Posta, GER:DB:SocSci, EC:GlobalCom

MADRID

- OSPMADRD 54. Contemporary Spanish Economy and the European Union. 5 units, Miguel Buñuel, GER:DB:SocSci

MOSCOW

- OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia. 5 units, Vladimir Mau, Vadim Novikov, GER:DB:SocSci, EC:GlobalCom

OXFORD

- OSPOXFRD 45. British Economic Policy since World War II. 5 units, James Forder, GER:DB:SocSci

PARIS

- OSPPARIS 124X. Building the European Economy: Economic Policies and the Challenges Ahead. 5 units, Jacques Le Cacheux, GER:DB:SocSci

WINTER QUARTER

BERLIN

- OSPBER 161X. The German Economy in the Age of Globalization. 4-5 units, Ingo Klein, GER:DB:SocSci, EC:GlobalCom

PARIS

- OSPPARIS 91. Globalization and its Effect on France and the European Union. 5 units, Eloi Laurent, Jacques Le Cacheux, GER:DB:SocSci, EC:GlobalCom

SPRING QUARTER

BEIJING

- OSPBEIJ 46. Introduction to Chinese Economy. 5 units, Dong Chen, GER:DB:SocSci, EC:GlobalCom

KYOTO

- OSPKYOTO 215X. Political Economy of Japan. 4-5 units, Toshihiko Hayashi, GER:DB:SocSci

PARIS

- OSPPARIS 33. The Economics of Climate Change: Policies in Theory and in Practice in the EU and the US. 5 units, Christian de Perthuis, Benoit Leguet, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies. 5 units, GER:DB:SocSci

ENGLISH

Emeriti: (Professors) George H. Brown, W. B. Carnochan, John Felstiner, Charles N. Fifer, Albert J. Gelpi, Barbara C. Gelpi, David Halliburton, Shirley Heath, John L'Heureux, Herbert Lindenberger, John Loftis, Thomas C. Moser, Nancy H. Packer, Marjorie G. Perloff, Robert M. Polhemus, Arnold Rampersad, Ronald A. Rebholz, David R. Riggs, Lawrence V. Ryan, Wilfred H. Stone, Elizabeth C. Traugott, Wesley Trimpi; *(Associate Professor)* Sandra Drake; *(Professor, Teaching)* Larry Friedlander; *(Senior Lecturer)* Helen B. Brooks

Chair: Jennifer Summit

Director of Creative Writing Program: Eavan Boland

Director of Program in Writing and Rhetoric: Nicholas Jenkins

Professors: John B. Bender (English, Comparative Literature), Eavan Boland, Terry Castle, W. S. Di Piero (on leave Autumn), J. Martin Evans, Kenneth W. Fields, Shelley Fisher Fishkin, Denise Gigante (on leave Autumn), Roland Greene (English, Comparative Literature), Ursula Heise, Gavin Jones (on leave), Andrea A. Lunsford, Franco Moretti (English, Comparative Literature), Stephen Orgel, Patricia A. Parker (English, Comparative Literature), Peggy Phelan (English, Drama), Nancy Ruttenburg, Ramón Saldívar (English, Comparative Literature), Jennifer Summit, Elizabeth Tallent, Tobias Wolff

Associate Professors: Michele Elam, Blair Hoxby, Nicholas Jenkins, Adam Johnson, Paula Moya, Blakey Vermeule (on leave), Alex Woloch (on leave)

Assistant Professors: Claire Jarvis, Michelle Karnes, Saikat Majumdar, G. Vaughn Rasberry, Stephen Sohn, Hannah Sullivan

Senior Lecturers: Judith Richardson, Christopher Rovee

Courtesy Professors: David Palumbo-Liu, Bryan Wolf

Courtesy Associate Professor: Joshua Landy

Lecturers: Molly Antopol-Johnson, Harriet Clark, Marvin Diogenes, Keith Ekiss, John Evans, Sarah Frisch, Andrew Goldstone, Danielle Heard, Skip Horack, Maria Hummel, Scott Hutchins, Matthew Jockers, Tom Kealey, Ammi Keller, Peter Kline, David MacDonald, Sarah Michas-Martin, Hilton Obenzinger, Stephanie Soileau, Justin St. Germain, Alice Staveley, Shimon Tanaka, Karen Zumhagen-Yekplé

Consulting Professors: Valerie Miner, Carol Shloss

Visiting Professors: Charles Baxter, Stephen Dobyns, Nicholas Halmi

Department Offices: Building 460, Room 201

Mail Code: 94305-2087

Phone: (650) 723-2635

Web Site: http://english.stanford.edu

Courses offered by the Department of English are listed under the subject code ENGLISH on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE DEPARTMENT OF ENGLISH

The world is saturated with the written word. The English Department studies the culture of the word in its most sophisticated form, literature, with a focus on literary traditions in English across a range of media. The department's courses emphasize interpretive thinking and creative writing, examining the dynamics of literary and cultural history, the structures of literary form and genre, and the practices of reading, writing, and critical analysis. The undergraduate English major provides an excellent background for many professional fields, including law, education, writing, publishing, medicine, and technology. The graduate program features rigorous training in the research and analysis of British, American, and Anglophone literary histories and texts, preparing students to produce scholarship of originality and importance, and to teach literature at the highest levels.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of major theories, methods, and concepts of literary study and critical analysis.
2. an awareness of how authors and texts develop in relation to their historical contexts.
3. a comprehension of the formal qualities of key literary genres, forms, and styles. Alternatively, students pursuing the creative writing emphasis can offer a writing sample that develops particular literary genres or forms.
4. a critical ability to evaluate and appreciate the aesthetic and cultural achievement of literary texts.
5. an effective style of writing and a powerful use of language.

BACHELOR OF ARTS IN ENGLISH

In the undergraduate program, students explore the traditions of literature in English. Courses emphasize interpretive thinking and creative writing, examining the dynamics of literary and cultural history, the structures of literary form and genre, and the practices of reading, writing, and critical analysis.

GRADUATE PROGRAM IN ENGLISH

The graduate program features rigorous training in the research and analysis of British, American and Anglophone literary histories and texts, preparing students to produce scholarship of originality and importance, and to teach literature at advanced levels.

OTHER PROGRAMS IN ENGLISH

Ph.D. in English and Humanities—The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in English and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the Stanford Bulletin's ExploreCourses web site.

Ph.D. in Modern Thought and Literature—Stanford also offers a Ph.D. degree in Modern Thought and Literature. Under this program, students devote approximately half of their time to a modern literature from the Enlightenment to the present, and the other half to interdisciplinary studies. Interested students should see the "Modern Thought and Literature" section of this bulletin and consult the director of the program.

Creative Writing Fellowships—The Creative Writing Program each year offers five two-year fellowships in poetry and five two-year fellowships in fiction. These are not degree-granting fellowships. Information is available in the Creative Writing office, (650) 725-1208.

BACHELOR OF ARTS IN ENGLISH

The English major is designed to provide students with both an understanding of the development of literatures in English and an appreciation of the variety and richness of literary texts. It offers a rigorous training in interpretive thinking and precise expression.

SUGGESTED PREPARATION FOR THE MAJOR

Prospective English majors are advised to consider IHUM 34A,B. A Life of Contemplation or Action: Debates in Western Literature and Philosophy, to satisfy their IHUM-2,3 requirements.

Further recommended is any introductory seminar taught by English department faculty offered by Stanford Introductory Studies.

FIELDS OF STUDY OR DEGREE OPTIONS

Because the Department of English recognizes that the needs and interests of literature students vary, it has approved several major programs of study. Each of these has different objectives and requirements; students should consider carefully which program of study corresponds most closely to their personal and intellectual objectives. The department offers the following fields of study for degrees in English:

- Literature
- Literature with Creative Writing Emphasis
- Literature with Interdisciplinary Emphasis
- Literature and Foreign Language Literature
- Literature and Philosophy

See below for further information on these fields of study.

DEGREE REQUIREMENTS

Those interested in majoring in English are encouraged to declare during their sophomore year, but no later than the beginning of their junior year. They are urged to discuss their plans with the undergraduate student services specialist as early as possible, and to take recommended preparatory courses for the major in their freshman and sophomore years. To declare the major, a student must fill out the Declaration of Major in Axess; choose a faculty adviser; and submit a completed program proposal form approved by the adviser. It is recommended that a student meet with the adviser at least once per quarter to discuss progress towards degree completion. Students who declared prior to September 2010 should refer to previous guidelines and requirements for the major.

With the exception of the required courses listed below, which must be taken for a letter grade, any two of the elective courses may be taken on a credit/no credit basis at the discretion of the instructor. Students may apply as many as four literature courses taken at approved universities towards the English major electives. Approval of such courses towards the major is at the discretion of the Director of Undergraduate Studies. Requests for transfer credit, including course syllabi and official transcript, should be submitted to the undergraduate student services coordinator, and to the Office of the University Registrar's external credit evaluation section.

The total number of units required to graduate for each degree option is specified in the relevant section following. All courses should be taken for 5 units. Irrespective of field of study or degree option, all English majors must complete the following requirements:

Required Courses (40 units)—

1. Three Methodology courses
   a. ENGLISH 160. Poetry and Poetics (5 units)
   b. ENGLISH 161. Narrative and Narrative Theory (5 units)
   c. ENGLISH 162. Critical Methods (5 units)
2. Four Historical courses
   a. ENGLISH 100A. Literary History I (5 units)
   b. ENGLISH 100B. Literary History II (5 units)
   c. ENGLISH 100C. Literary History III (5 units)
   d. One additional history of literature course (5 units, denoted by H-suffix)
3. One Senior Seminar (5 units, denoted by S-suffix, WIM)

Rules that apply to all English majors irrespective of field of study or degree option—

1. Courses can only be counted once, i.e. can only satisfy one requirement.
2. Two of the elective courses may be taken on a credit/no credit basis at the discretion of the instructor.

FIELD OF STUDY I. LITERATURE

This field of study is declared in Axess. This program provides for the interests of students who wish to understand the range and historical development of British, American and Anglophone literatures and a variety of critical methods by which their texts can be interpreted. The major emphasizes the study of literary forms and genres and theories of textual analysis. In addition to degree requirements required of all majors and listed above, students must complete at least 30 additional units of courses consisting of:

1. Six additional approved elective courses, only one of which may be a creative writing course, chosen from among those offered by the Department of English. In place of one of these six elective courses, students may choose one upper-division course in a foreign literature read in the original language.

FIELD OF STUDY II. LITERATURE WITH CREATIVE WRITING EMPHASIS

This field of study is declared in Axess. This program is designed for students who want a sound basic knowledge of the English literary tradition as a whole and at the same time want to develop skills in writing poetry or prose. In addition to degree requirements required of all majors and listed above, students must complete at least 30 additional units of approved courses including:

1. One course in literature in English
2. One beginning prose course: ENGLISH 90, Fiction Writing *or* ENGLISH 91, Creative Nonfiction
3. One beginning poetry course: ENGLISH 92, Reading and Writing Poetry
4. Three courses specifically designed for either the prose *or* poetry concentration.

   Prose writers—
   a. ENGLISH 146. Development of the Short Story
   b. Two intermediate or advanced prose classes: any ENGLISH 190 series, 191 series, 198L, or 290.

   Poetry writers—
   a. One literature Course in Poetry approved by a Creative Writing Professor
   b. Two intermediate or advanced poetry classes: any ENGLISH 192 series, 198L, or 292

FIELD OF STUDY III. LITERATURE WITH INTERDISCIPLINARY EMPHASIS

This field of study is declared in Axess. This program is intended for students who wish to combine the study of one broadly defined literary topic, period, genre, theme or problem with an interdisciplinary program of courses relevant to that inquiry. In addition to degree requirements required of all majors and listed above, students must complete at least 35 additional units of approved courses including:

1. Three elective literature courses chosen from among those offered by the Department of English. Students must select two of these courses in relation to their interdisciplinary focus.
2. Four courses related to the area of inquiry. These courses may be chosen from disciplines such as anthropology, the arts (including the practice of one of the arts), classics, comparative literature, European or other literature, feminist studies, history, modern thought and literature, political science, and African American studies. These courses should form a coherent program and must be relevant to the focus of the courses chosen by the student to meet the requirement. Each of these courses must be approved in advance by the interdisciplinary program director. In addition, students in this program must write at least one interdisciplinary paper. This may be ENGLISH 197. Senior Honors Essay; ENGLISH 199. Senior Independent Essay; ENGLISH 194 or 198. Individual Research ; or a paper integrating the material in two courses the student is taking in two different disciplines.

FIELD OF STUDY IV. LITERATURE AND FOREIGN LANGUAGE LITERATURE

This major provides a focus in British and American literature with additional work in French literature; German literature; Italian literature; Spanish or Spanish American literature. These are interdepartmental majors declared in Axess. In addition to degree requirements required of all majors and listed above, students must

complete at least 30 additional units of approved courses including:

1. Two elective courses chosen from among those offered by the Department of English, one of which may be a creative writing course.
2. A coherent program of four courses in the foreign language literature, read in the original language, approved by the Director of Undergraduate Studies in English and by the relevant foreign language department.

FIELD OF STUDY V. LITERATURE AND PHILOSOPHY

This field of study is declared in Axess. Students should meet with the undergraduate director concerning the Literature and Philosophy focus. This track is for students who wish to explore interdisciplinary studies at the intersection of literature and philosophy while acquiring knowledge of the English language literary tradition as a whole. In addition to degree requirements required of all majors and listed above, students must complete at least 35-40 additional units of approved courses (at least eight 5-unit courses of the total units required must be within the English department) including:

1. PHIL 80. Mind, Matter, and Meaning (Writing in the Major): Prerequisite: introductory philosophy course.
2. Gateway course: ENGLISH 81 (same as PHIL 81, CLASSGEN 81, COMPLIT 181, FRENGEN 181 and ITALGEN 181), Philosophy and Literature. This course should be taken as early as possible in the student's career, normally in the sophomore year.
3. Aesthetics, Ethics, Political Philosophy: one course from PHIL 170 series.
4. Language, Mind, Metaphysics, and Epistemology: one course from PHIL 180 series.
5. History of Philosophy: one course in the history of Philosophy, numbered above PHIL 100.
6. Two upper division courses of special relevance to the study of Philosophy and Literature. At least one of these courses needs to be in the English department. A list of approved courses is available from the Director of Undergraduate Studies in English.
7. Capstone seminar of relevance to the study of Philosophy and Literature.

HONORS PROGRAM

Students wishing to undertake a formal program of advanced literary criticism and scholarship, including the honors seminar and independent research, are invited to apply for the honors program in the Winter Quarter of the junior year. Any outstanding student is encouraged to engage in an honors thesis project.

Admission is selective. Provisional admission is announced in March. Permission to continue in the program is contingent upon submission, by May 15 of the junior year, of a senior honors essay proposal with a bibliography. Honors students are encouraged to complete before the start of their senior year the three methodology courses that are English major requirements: ENGLISH 160, 161, and 162.

In September before the senior year, students are encouraged to participate in the Bing Honors College. In Autumn Quarter of the senior year, students take a 3-unit honors seminar on critical approaches to literature. The senior-year seminar is designed to introduce students to the analysis and production of advanced literary scholarship. In addition, in Autumn Quarter of the senior year, honors students take a 2-unit essay workshop focused on the process of researching and writing the essay. Students who are studying at Oxford or at other institutions may be exempted from these requirements on request and with the approval of the director of the honors program.

In Winter and Spring quarters of the senior year, honors students complete the senior honors essay for 10 units under supervision of a faculty adviser.

The deadline for submitting the honors essay is May 15. Essays that receive a grade of 'A-' or above are awarded honors.

Students in the honors program complete the requirements of the major and the following:

Required Courses—
ENGLISH 196A. Honors Seminar, 3 units
ENGLISH 196B. Honors Essay Workshop, 2 units
ENGLISH 197. Senior Honors Essay, 10 units

MODULES

Advanced Individual Research—Students taking 100- or 200-level courses may, with the consent of the instructor, write a follow-up 5-unit paper based on the course material and due no later than the end of the succeeding quarter (register for ENGLISH 194). The research paper is written under the direct supervision of the professor; it must be submitted first in a preliminary draft and subsequently in a final version.

Senior Independent Essay—The senior independent essay gives senior English majors the opportunity to work throughout the year on a sustained piece of critical or scholarly work of around 10,000 words on a topic of their choice, with the close guidance of a faculty adviser. Each student is responsible for finding an adviser, who must approve the proposed topic before the end of the third quarter prior to expected graduation. The senior essay is read and graded by the adviser and one other member of the English faculty. Senior independent essay students register for ENGLISH 199.

OVERSEAS STUDIES OR STUDY ABROAD

The flexibility of the English major permits students to attend an overseas campus in any quarter, but it is advisable, and in some cases essential, that students spend their senior year at Stanford if they wish to participate in the Honors Program or in a special in-depth reading course. For more information on Stanford overseas programs, see the "Overseas Studies" section of this bulletin.

Students should consult their advisers and the undergraduate program officer to make sure that they can fulfill the requirements before graduation. The Stanford Program in Oxford usually offers courses which apply toward both University requirements and area requirements for the English major. In either case, students should save the syllabi from their courses if they wish to apply to use them to fulfill an English major requirement.

MINOR IN ENGLISH OR IN CREATIVE WRITING

Both the Department of English and the Creative Writing program offer a distinct minor.

MINOR IN ENGLISH LITERATURE

The minor in English Literature offers some flexibility for those students who want to pursue specific interests within British and American literature, while still requiring certain courses that ensure coverage of a variety of periods, genres, and methods of studying literature.

Requirements—In order to graduate with a minor in English, students must complete the following program of seven 5-unit courses, at least one of which must be a seminar, for a total of 35 units:

Required Courses for the Minor—

1. Two of the three Methodology courses
   a. ENGLISH 160. Poetry and Poetics (5 units)
   b. ENGLISH 161. Narrative and Narrative Theory (5 units)
   c. ENGLISH 162. Critical Methods (5 units)
2. Two of the three Historical courses
   a. ENGLISH 100A. Literary History I (5 units)
   b. ENGLISH 100B. Literary History II (5 units)
   c. ENGLISH 100C. Literary History III (5 units)

Elective Courses for the Minor—

1. Three elective courses from those offered in the English department, only one of which may be a course in Creative Writing.

MINOR IN CREATIVE WRITING

The minor in Creative Writing offers a structured environment in which students interested in writing prose or poetry develop their skills while receiving an introduction to literary forms. Students choose a concentration in either prose or poetry.

Requirements—In order to graduate with a minor in Creative Writing, students must complete the following program of six 5-unit courses for a total of 30 units. All courses must be taken for a letter grade.

Required Courses for the Minor—

1. ENGLISH 94. Writing Across Genres
2. One beginning prose course: ENGLISH 90. Fiction Writing *or* ENGLISH 91. Creative Nonfiction
3. One beginning poetry course: ENGLISH 92. Reading and Writing Poetry
4. Three courses specifically designed for either the prose OR poetry concentration.

   Prose writers:
   a. ENGLISH 146. Development of the Short Story
   b. Two intermediate or advanced prose classes: any ENGLISH 190 series, 191 series, 198L, or 290.

   Poetry writers:
   a. ENGLISH 160. Poetry and Poetics
   b. Two intermediate or advanced poetry classes: any ENGLISH 192 series, 198L, or 292

MASTER OF ARTS IN ENGLISH

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN ENGLISH LITERATURE

Students in the major who are interested in further postgraduate work in English may apply for Stanford's coterminal master's program. Candidates for a coterminal master's degree must fulfill all requirements for the M.A. in English (including the language requirement), as well as general and major requirements for the B.A. in English. A minimum GPA of 3.7 in the major is required of those applying for the coterminal master's degree. Students must also take the general GRE exam in the year in which they apply. No courses used to satisfy the B.A. requirements (either as General Education Requirements or department requirements) may be applied toward the M.A. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree. For University coterminal degree program rules and University application forms, see http://ual.stanford.edu/AP/choosing_coterm/Coterm.html. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin.

M.A. candidates must complete with a 3.0 (B) grade point average (GPA) at least nine courses (a minimum of 45 units), at least two of which must be 300-level courses. Ordinarily, graduate students enroll in courses numbered 200 and above. They may take no more than two courses numbered 101-199 without the consent of the Director of Graduate Studies, and no more than two courses outside the department. The master's student may take no more than 10 units of directed reading and research (ENGLISH 398). No creative writing courses may be used to fulfill the requirements. M.A. candidates must also demonstrate a reading knowledge of one foreign language. (For ways of fulfilling this requirement, see the section below on language requirements for the Ph.D.) Interested students should consult their faculty adviser or the graduate program adviser for further details.

DEGREE REQUIREMENTS

Required Courses—

1. Two courses in literature before 1800
2. Two courses in literature after 1800

Optional Courses—Five elective courses; these courses should represent a mixture of survey and specialized courses chosen to guarantee familiarity with a majority of the works on the reading list for doctoral candidates. Candidates who can demonstrate unusually strong preparation in the history of English literature may undertake a 40 to 60 page master's thesis. Each student is responsible for finding an adviser, who must approve the proposed topic before the end of Winter Quarter prior to anticipated graduation. Candidates register for up to 10 units of ENGLISH 399 with the faculty member who supervises the thesis work. The thesis is read and graded by the adviser and one other member of the English faculty.

Candidates who write a master's thesis may petition to be excused from up to 10 units of the electives described above. The additional 35 units normally consist of the four required courses and three elective courses. These courses are chosen by the student and approved by the adviser and the Director of Graduate Studies.

COTERMINAL PROGRAM WITH SCHOOL OF EDUCATION

Students interested in becoming middle school and high school teachers of English may apply for admission to the coterminal teaching program (CTP) of the Stanford Teacher Education Program (STEP) in the School of Education. CTP students complete a special curriculum in English language, composition, and literature that combines a full English major with supplemental course work in subjects commonly taught in California public schools and a core program of foundational courses in educational theory and practice. They are then admitted to STEP for a fifth year of pedagogical study and practice teaching. Students who complete the curriculum requirements are able to enter STEP without the necessity of taking either the GRE or the usual subject matter assessment tests. At the end of five years, CTP students receive a B.A. in English, an M.A. in Education, and a California Secondary Teaching Credential. Students normally apply to the coterminal teaching program at the end of their sophomore year or at the beginning of their junior year. For complete program details and for information on how to apply, consult the Director of Undergraduate Studies in English or the CTP coordinator in the School of Education.

DOCTOR OF PHILOSOPHY IN ENGLISH

ADMISSION

Students with a bachelor's degree in English or a closely related field may apply to pursue graduate work toward an advanced degree in English at Stanford. Applicants for admission to graduate work must take the General Test of the Graduate Record Examination and the Subject Test in Literature. International students whose first language is not English are also required to take the TOEFL examination (with certain exceptions: see http://gradadmissions.stanford.edu).

DEGREE REQUIREMENTS

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

Tracks—Doctoral students may follow one of two tracks: English and American Literature or English and Comparative Literature.

Requirements—The following department requirements, dealing with such matters as residence, dissertation, and examinations, are in addition to the University's basic requirements for the doctorate. Students should consult the most recent edition of *The Ph.D. Handbook*; copies are available in the English graduate studies office.

A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree. Candidates are required to complete at least 135 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of graduate work, and the final course work in the doctoral program, must be taken at Stanford.

A student may count no more than 65 units of non-graded courses toward the 135 course units required for the Ph.D., without the written consent of the Director of Graduate Studies. A student takes at least 70 graded units (normally fourteen courses) of the 135 required total units (396L, 397A, 398, and 399 do not count toward the 70 graded units). No more than 10 units (normally two courses) may come from 100-level courses.

This program is designed to be completed in five years. Five quarters of supervised teaching, two as a teaching assistant in a literature course, one as a teaching apprentice, and two as the instructor of a Program in Writing and Rhetoric (PWR) course, are a requirement of the Ph.D. program.

In the first quarter of their first year, students take a 2-unit seminar in pedagogy as preparation for their initial teaching assistantship. In the first quarter of their second year, students take a pedagogy seminar and an apprentice teaching program. The seminar and apprentice teaching constitute a 50-percent teaching appointment. Apprentice teachers attend the classes and conferences of a senior mentor/instructor for two to three weeks. While teaching during the second and third quarters of the second year, students continue to participate in a series of PWR pedagogy workshops and visit one another's classrooms.

I. *English and American Literature*—Students are expected to do course work across the full range of English and American literature. Students would be required to fulfill the following requirements. Note: fulfillment of requirements 1, 2, and 3 must be through Stanford courses; students will not be excused from these three requirements or granted credit for course work done elsewhere.

1. ENGLISH 396, Introduction to Graduate Study for Ph.D. Students (5 units), a course that introduces students to the methods of literary study, and ENGLISH 396L, Pedagogy Seminar I, for first year students (2 units).
2. Graduate-level (at least 200-level) course work in English literature before 1700, and English and American literature after 1700 (at least 5 units of each).
3. Graduate-level (at least 200-level) course work in some aspect of literary theory such as courses in literary theory itself, narrative theory, poetics, rhetoric, cultural studies, gender studies (at least 5 units).
4. Students concentrating in British literature are expected to take at least one course (5 units) in American literature; students concentrating in American literature are expected to take at least one course (5 units) in British literature.
5. Of all courses taken, a minimum of six courses for a letter grade must be graduate colloquia and seminars, of which at least three must be graduate seminars. The colloquia and seminars should be from different genres and periods, as approved by the adviser.
6. Completion, in Autumn Quarter of the second year, of a pedagogy seminar which includes the apprentice teaching program described above, and a series of pedagogy workshops during Winter and Spring Quarters. There are no units associated with this work.
7. The remaining units of graded, graduate-level courses and seminars should be distributed according to the adviser's judgment and the candidate's needs. A student may receive graduate credit for no more than two 100-level courses in the Department of English.
8. Consent of the adviser if courses taken outside the Department of English are to count toward the requirement of 70 graded units of course work.
9. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the graduate studies committee in consideration of the student's overall record for the first year's work in conjunction with performance on the examination. Note: A student coming to the doctoral program who has done graduate work at another university must petition in the first year at Stanford for transfer credit for course work completed elsewhere. The petition should list the courses and grades, and describe the nature and scope of course work, as well as the content, contact hours, and writing requirements. A syllabus must be included. The Director of Graduate Studies considers the petition in conjunction with the student's overall performance.
10. *University Oral Examinations*—A University oral examination covering the field of concentration (as defined by the student and the student's adviser). This examination, based on a reading list established by the candidate in consultation with his or her adviser, is normally taken no later than the Spring Quarter of the third year of graduate study.
11. *Dissertation*—As early as possible during graduate study, a Ph.D. candidate is expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. Candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work. After the dissertation topic has been approved, the candidate should file a formal reading committee form as prescribed by the University. The dissertation must be submitted to the adviser as a rough draft, but in substantially final form, at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree.
12. *Committee*—The doctoral dissertation reading committee consists of the principal dissertation adviser and two other readers. At least one member must be from the student's major department. Normally, all members are on the Stanford Academic Council.

II. *English and Comparative Literature*—The Ph.D. program in English and Comparative Literature is designed for students wishing an extensive knowledge of the literature, thought, and history of England and of at least one foreign country, for one period. Approximately half of the student's course work and reading is devoted to this period, with the remainder of the time given to other periods of English and American literature since 1350.

This degree, administered by the Department of English, is to be distinguished from the Ph.D. in Comparative Literature. The latter program is intended for students unusually well prepared in foreign languages and involves advanced work in three literatures, one of which may be English. Interested students should consult a Department of English adviser, but faculty from Comparative Literature may also provide useful supplementary information.

The requirements are as follows:

1. Knowledge of the basic structure of the English language and of Chaucer. This requirement may be met by examination, or by taking 10 units of courses chosen from among those offered in linguistics, English philology, and early and middle English literature including Chaucer. No particular courses are required of all students.
2. A 5-unit course, ENGLISH 396, Introduction to Graduate Study, and a 2-unit course, ENGLISH 396L, Seminar in Pedagogy I.
3. Completion, in Autumn Quarter of the second year, of a pedagogy seminar, which includes the Apprentice Teaching Program described above, and a series of pedagogy workshops during winter and spring quarter. There are no units associated with this work.
4. A knowledge of one foreign language sufficient to take graduate-level literature courses in a foreign-language department and an advanced reading knowledge of a second language.
5. A minimum of 45 units in the history, thought, and literature of one period, in two or more languages, one of which must be English and one foreign. Students normally include at least two courses in a foreign literature read in the original language and two courses listed under Comparative Literature or Modern Thought and Literature. As many as 20 units of this re-

quirement may be satisfied through courses in reading and research. A student may receive graduate credit for no more than two 100-level courses in the Department of English.

6. A minimum of six courses for a letter grade from graduate colloquia and graduate seminars, of which three must be graduate seminars and of which at least four must be in the Department of English. Among these courses, students should take one in literary theory or criticism. These colloquia and seminars should be in different genres and periods as approved by the adviser.
7. An oral qualifying examination: see item 9 under requirements of the Ph.D. program in English Literature. For qualifications in the doctoral program in English and Comparative Literature, candidates are not held responsible for literature before 1350, but instead include on their reading list a selection of works from a foreign literature read in the original language.
8. *University Oral Examinations*—A University oral examination covering the field of concentration (as defined by the student and the student's adviser). This examination, based on a reading list established by the candidate in consultation with his or her adviser, is normally taken no later than the Spring Quarter of the third year of graduate study.
9. *Dissertation*—As early as possible during graduate study, a Ph.D. candidate is expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. Candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work. After the dissertation topic has been approved, the candidate should file a formal reading committee form as prescribed by the University. The dissertation must be submitted to the adviser as a rough draft, but in substantially final form, at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree.
10. *Committee*—The doctoral dissertation reading committee consists of the principal dissertation adviser and two other readers. At least one member must be from the student's major department. Normally, all members are on the Stanford Academic Council.

LANGUAGE REQUIREMENTS

Candidates for the Ph.D. degree (except those in English and Comparative Literature, for whom special language requirements prevail) must demonstrate a reading knowledge of two foreign languages. Candidates in the earlier periods must offer Latin and one of the following languages: French, German, Greek, Italian, or Spanish. In some instances, they may be required to offer a third language. Candidates in the later period (that is, after the Renaissance) must offer either French, German, or Latin as one language and may choose the second language from the following: Greek, Latin, French, German, Italian, Spanish, Russian, or another language relevant to the student's field of study. In all cases, the choice of languages offered must have the approval of the candidate's adviser. Any substitution of another language must be approved by the Director of Graduate Studies.

The graduate studies committee does not accept courses taken as an undergraduate in satisfaction of the language requirement for doctoral candidates. For students coming to doctoral work at Stanford from graduate work done elsewhere, satisfaction of a foreign language requirement is determined by the Director of Graduate Studies based on the contact hours, syllabus, reading list, etc. Transfer is not automatic.

The candidate must satisfy one language requirement by the end of the first year (that is, before the qualifying examination), and the other by the end of the third year.

Foreign language requirements for the Ph.D. may be fulfilled in any of the following ways:

1. A reading examination given each quarter by the various language departments, except for Latin and Greek.
2. For Latin and Greek, an examination given by one of the Department of English faculty.
3. Passage with a grade of 'B' or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford. As an alternative for Latin, French, Italian, German, and Spanish, passage of CLASSLAT 51 and 52 or CLASSLAT 10, FRENLANG 50, ITALLANG 50, GERLANG 52, and SPANLANG 50, respectively, with a grade of 'B' or higher.

OVERSEAS STUDIES COURSES IN ENGLISH

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

OXFORD

- OSPOXFRD 17. The Novel of Sensation: Gothic, Detective, Prohibition and Transgression in Victorian Fiction. 5 units, Emma Plaskitt, GER:DB:Hum
- OSPOXFRD 163X. Shakespeare: Critical Commentary. 5 units, Richard Rowley, GER:DB:Hum

SPRING QUARTER

OXFORD

- OSPOXFRD 57. The Rise of the Woman Writer, 1660-1860. 4-5 units, Emma Plaskitt, GER:DB:Hum
- OSPOXFRD 61. Castles and Satanic Mills: the Medieval in British Art, Architecture and Literature, 1750-1914. 4 units, Rosemary Hill

ETHICS IN SOCIETY PROGRAM

Director: Rob Reich

Affiliated Faculty: Kenneth Arrow (Economics, emeritus), Donald Barr (School of Medicine), Barton Bernstein (History), Michael Bratman (Philosophy), Eamonn Callan (Education), Albert Camarillo (History), Joshua Cohen (Philosophy, Political Science, Law), Barbara Fried (Law), Leah Gordon (Education), Nadeem Hussain (Philosophy), Allyson Hobbs (History), David Kennedy (History), Aishwary Kumar (History), Scotty McLennan (Dean of Religious Life), Benoît Monin (Psychology), Josiah Ober (Classics, Political Science), Eric Roberts (Computer Science), Debra Satz (Philosophy), Tamar Schapiro (Philosophy), Mitchell Stevens (Education), David K. Stevenson (Pediatrics), Brent Sockness (Religious Studies), Allen Wood (Philosophy), Sylvia Yanagisako (Anthropology), Lee Yearley (Religious Studies)

Program Offices: Galvez Modular, Room 117

Mail Code: 94305-3099

Phone: (650) 736-2629

Email: akuduk@stanford.edu

Web Site: http://ethicsinsociety.stanford.edu

Courses offered by the Program in Ethics in Society are listed under the subject code ETHICSOC on the *Stanford Bulletin's* ExploreCourses web site. There are many course offerings at Stanford that address moral and political questions. Not all of these courses are crosslisted with the Program in Ethics in Society.

The Program in Ethics in Society, which operates under the umbrella of the Bowen H. McCoy Family Center for Ethics in Society, is designed to foster scholarship, teaching, and moral

reflection on fundamental issues in personal and public life. The program is grounded in moral and political philosophy, but it extends its concerns across a broad range of traditional disciplinary domains. The program is guided by the idea that ethical thought has application to current social questions and conflicts, and it seeks to encourage moral reflection and practice in areas such as business, international relations, law, medicine, politics, science, and public service.

HONORS IN ETHICS IN SOCIETY

The Program in Ethics in Society offers undergraduates the opportunity to write a senior honors thesis within a community of interdisciplinary scholars. The course of study combines the analytical rigor of moral and political philosophy with the subject matter of each student's self-chosen major to develop a sophisticated understanding of problems of social concern. Such problems include: the nature and implications of treating people with equal dignity and respect; the scope of liberty; the legitimacy of government; and the meaning of responsibility. The program poses these issues and others in the context of debates which arise in our common public life. It thus extends moral concern and reflection across disciplines such as medicine, law, economics, political science, sociology, international relations, and public policy.

Students in the program write honors theses on topics which use moral and political philosophy to address practical problems. Previous theses have considered such questions as the just distribution of health care, obligations to future generations, the role of moral values in education, the moral implications of genetic engineering, and the relationship between gender inequality and the structures of work and family. Students in the program have won scholarships to graduate study including Marshall, Rhodes, and Fulbright fellowships. Others have taken the step from moral analysis to moral commitment, pursuing careers of public service.

The honors program in Ethics in Society is open to majors in every field and must be taken in addition to a department major. Students should apply for entry at the end of Spring Quarter of the sophomore year or at the beginning of Autumn Quarter of the junior year. Applicants should have a cumulative grade point average (GPA) of 3.3 (B+) or higher. They should also maintain this minimum average in the courses taken to satisfy the requirements. Required courses must be taken for a letter grade. Students interested in pursuing honors in Ethics in Society should contact the program coordinator for more information and to begin the application process.

REQUIREMENTS

1. ETHICSOC 20. Introduction to Moral Theory (same as PHIL 20); *or* ETHICSOC 170. Ethical Theory (same as PHIL 170)
2. ETHICSOC 171. Justice (same as IPS 208, PHIL 171, POLISCI 136S, PUBLPOL 207)
3. Two 4- or 5-unit undergraduate courses on a subject approved by the faculty director, designed to encourage students to explore those issues in Ethics in Society that are of particular interest to them, ideally with the honors thesis in mind.
4. ETHICSOC 190. Honors Seminar
5. ETHICSOC 200 A, B. Honors Thesis. On a subject approved by the honors adviser, with the work spread over two quarters. To receive honors in Ethics in Society, students must receive a grade of 'B+' on their thesis.

Typically, requirements 1 and 2 are completed before the Winter Quarter of the junior year. ETHICSOC 190 is taken in Winter Quarter of the junior year and requirement 3 at any time during the sophomore, junior, or Autumn Quarter of the senior year. The honors thesis is written during Autumn and Winter quarters of the senior year. Exceptions to this must be approved by the faculty director. Courses taken to fulfill the Ethics in Society honors requirement may be double-counted for Philosophy and other majors.

COURSES

ETHICS IN SOCIETY

- ETHICSOC 10. Ethics in Theory and Practice (same as PHIL 22)
- ETHICSOC 20. Introduction to Moral Philosophy (same as PHIL 2)
- ETHICSOC 132X. Theories of Civil Society, Philanthropy, and the Nonprofit Sector (same as POLISCI 132X)
- ETHICSOC 136R. Introduction to Global Justice (same as INTNLREL 136R, PHIL 76, POLISCI 136R, POLISCI 336)
- ETHICSOC 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (same as EDUC 261X, POLISCI 137R, POLISCI 337R)
- ETHICSOC 157. Moral Foundations of Capitalism
- ETHICSOC 170. Ethical Theory (same as PHIL 170/270)
- ETHICSOC 171. Justice (same as IPS 208, PHIL 171/271, POLISCI 136S, PUBLPOL 207)
- ETHICSOC 175M. Ethics of War (same as PHIL 80)
- ETHICSOC 177M/277M. Human Rights and Moral Questions (same as PHIL 177M/277M)
- ETHICSOC 178M/278M. Environmental Justice (same as PHIL 178M/278M)
- ETHICSOC 185M. Contemporary Moral Problems (same as PHIL 72)
- ETHICSOC 190. Honors Seminar
- ETHICSOC 200 A and B. Honors thesis credits

COGNATE COURSES

This is a partial list of courses that may be used to fulfill requirement 3. Courses not on this list can be submitted to the faculty director for approval.

- ANTHRO 90A. History of Archaeological Thought (same as ARCHLGY 103)
- ANTHRO 90B. Theory of Cultural and Social Anthropology
- ANTHRO 179. Cultures of Disease: Cancer
- BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution (same as GENE 109Q)
- CLASSGEN 81. Philosophy and Literature (same as PHIL 81)
- COMM 131/231. Media Ethics and Responsibility
- COMPLIT 226. Narrative and Ethics (same as GERLIT 242)
- CS 181. Computers, Ethics, and Public Policy
- EDUC 165/265. History of Higher Education in the U.S. (same as HISTORY 158C)
- EDUC 167. Educating for Equity and Democracy
- EDUC 201. History of Education in the United States (same as HISTORY 158B)
- EDUC 216X. Education, Race, and Inequality in African American History (same as HISTORY 255E)
- EDUC 220C. Education and Society (same as SOC 130/230)
- EDUC 247. Moral Education
- HISTORY 209C. Liberalism and Violence: A Conceptual History
- HUMBIO 122S. Social Class, Race, Ethnicity, Health
- HUMBIO 174. Foundations of Bioethics
- IPS 241. International Security in a Changing World (same as POLISCI 114S)
- MED 83Q. Ethical, Legal, and Social Dimensions of Stem Cell Research
- MS&E 254. The Ethical Analyst
- POLISCI 1. Introduction to International Relations
- POLISCI 123. Politics and Public Policy (same as PUBLPOL 101/201)
- PUBLPOL 183. Philanthropy and Social Innovation
- URBANST 131. Social Innovation and the Social Entrepreneur

MINOR IN ETHICS IN SOCIETY

The Ethics in Society minor is open to students in any department who wish to explore moral issues in personal and public life.

Students must declare the minor in Axess no later than the last day of Autumn Quarter of their senior year, although they are advised to declare sooner. The student should discuss the minor with an adviser and prepare a proposal that includes a list of courses planned to fulfill the requirements, theme of minor study, and the name of the faculty adviser. The faculty director approves this proposal. Students interested in pursuing a minor in Ethics in Society should contact the Program Coordinator for more information and to begin the planning process.

A minor in Ethics in Society requires six courses for a minimum of 25 and a maximum of 30 units. Required courses must be taken for a letter grade.

REQUIREMENTS

1. ETHICSOC 20. Introduction to Moral Theory (same as PHIL 20) *or* ETHICSOC 170. Ethical Theory (same as PHIL 170)
2. ETHICSOC 171. Justice (same as IPS 208, PHIL 171, POLISCI 136S, PUBLPOL 207)
3. Three courses at the 100 level or above that address some dimension of moral or political theory or practice.
4. One course at the 200 level or above that addresses a moral or political problem, in either theory or practice.

See the course list in the "Honors in Ethics and Society" section of this bulletin for courses that fulfill requirements 3 and 4. The program director may approve additional courses.

The 100- and 200-level courses should be focused around a central theme such as biomedical ethics, ethics and economics, ethics and politics, or environmental ethics. The courses at the 100 and 200 level are normally taken after completion of requirements 1 and 2.

Subject to the approval of the director of the Ethics in Society Program, a course covering similar subject matter in another department or program may be substituted for ETHICSOC 20, 170, or 171. No course credited to the Ethics in Society minor may be double-counted toward major requirements.

FEMINIST STUDIES

Director: Heather Hadlock

Program Committee: Heather Hadlock (Music), Shelley Correll (Sociology), Helen Longino (Philosophy), Valerie Miner (Feminist Studies), Elizabeth Tallent (English), Christine Min Wotipka (Education)

Resource Faculty:

American Studies: Shelley Fisher Fishkin

Anthropology: Melissa Brown, Paulla Ebron, Miyako Inoue, Sarah Jain, Matthew Kohrman, Barbara Voss, Sylvia Yanagisako

Art and Art History: Terry Berlier, Wanda Corn (emerita), Pamela Lee, Melinda Takeuchi

Asian Languages: James R. Reichert, Yoshiko Matsumoto

Biology: Joan Roughgarden

Business: Joanne Martin (emerita)

Classics: Maud Gleason, Susan Stephens

Comparative Literature: Patricia Parker

Developmental Biology: Ellen Porzig

Drama: William Eddelman (emeritus), Harry J. Elam, Cherríe Moraga, Peggy Phelan

Education: Susanna Loeb, Myra Strober (emerita), Christine Min Wotipka

English: Eavan Boland, Helen Brooks, Terry Castle, Michele Elam, Barbara Gelpi (emerita), Andrea Lunsford, Paula Moya, Stephen Orgel, Ramón Saldívar, Stephen Hong Sohn, Jennifer Summit, Elizabeth Tallent

Feminist Studies: Nicole Baran, Kathleen Coll, Patricia Karlin-Neumann, Susan Krieger, Valerie Miner

French and Italian: Carolyn Springer

German Studies: Russell Berman, Kathryn Strachota

History: Philippe Buc, Paula Findlen, Estelle Freedman, Allyson Hobbs, Katherine Jolluck, Nancy Kollmann, Carolyn Lougee Chappell, Paul Robinson (emeritus), Londa Schiebinger, Matthew Sommer, Laura Stokes, Kären Wigen

Human Biology: Anne Firth-Murray, Marcia Stefanick

Iberian and Latin American Cultures: Yvonne Yarbro-Bejarano

Law: Deborah Rhode

Linguistics: Penelope Eckert, Arnold Zwicky

Medical School: Ann Arvin, Helen Blau, Roy King, Cheryl Koopman, Iris Litt (emerita)

Music: Heather Hadlock

Philosophy: Helen Longino, Debra Satz

Political Science: Lisa Blaydes, Terry Karl

Psychology: Albert Bandura, Laura Carstensen, Hazel Markus

Religious Studies: Charlotte Fonrobert, Hester Gelber, Linda Hess

Slavic Languages and Literatures: Monika Greenleaf

Sociology: Shelley Correll, Paula England, Cecilia Ridgeway

Program Office: Serra House, 589 Capistrano Way

Mail Code: 94305-8640

Phone: (650) 723-2412

Email: zamoram@stanford.edu

Web Site: http://feminist.stanford.edu

Courses offered by the Program in Feminist Studies are listed under the subject code FEMST on the *Stanford Bulletin's* ExploreCourses web site.

Each Feminist Studies student builds an individual program of study around a self-defined thematic focus, integrating courses from multiple departments. The Program offers an undergraduate major and minor, and an interdisciplinary honors program that is open to students in all majors. The program encourages work in the arts and supports creative honors theses.

Feminist Studies awards the annual Michelle Z. Rosaldo Prizes and Francisco Lopez Prizes for the best undergraduate scholarship on women, feminism, gender, or sexuality. The Rosaldo Prizes are awarded for the best essay and honors thesis or master's paper in the social sciences, and the Lopez Prizes for the best essay and honors thesis or master's paper in the humanities. See http://stanford.edu/dept/femstudies/opportunities for details.

Curriculum guidelines and forms for the major, minor, and honors are available at the Feminist Studies office or at http://feminist.stanford.edu. Students interested in Feminist Studies should consult the program mentor.

MISSION OF THE UNDERGRADUATE PROGRAM IN FEMINIST STUDIES

The interdepartmental Program in Feminist Studies provides students with the background and skills to investigate the significance of gender and sexuality in all arenas in human life. The program coordinates courses offered across the University into a curriculum in feminist and queer/LGBT studies, with an emphasis on diversity and transnationality. Feminist Studies majors examine how societies structure gender roles, relations, and identities, and how these intersect with other relations of power, such as class, race, ethnicity, sexuality, and age. Students employ feminist theories and methodologies to expand and reevaluate the assumptions about gender and sexuality that inform the study of individuals, cultures, social institutions, policy, and other areas of scholarly inquiry. The program prepares majors for graduate study in humanities and social sciences, and for professional schools.

LEARNING OUTCOMES

The program expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the program's undergraduate program. Students are expected to demonstrate:

1. knowledge of the histories of feminist and/or queer social movements and their intersections with other social justice movements.

2. understanding of how the interdisciplinary field of Feminist Studies relates to feminist and/or queer social movements.
3. knowledge and comprehension of feminist and/or queer theories and methods for social and cultural-literary analysis.
4. skill in making and communicating feminist/queer analyses of data, texts, and arguments.

BACHELOR OF ARTS IN FEMINIST STUDIES

The major in Feminist Studies requires 63 units and may be taken as a single major, as one of multiple majors, or as a secondary major. If taken as one of multiple majors, none of the 63 units counted toward the major in Feminist Studies may overlap with units counted toward the major in another department or program. If taken as a secondary major, up to 30 of the units counted toward the Feminist Studies major may also be counted as fulfilling the major requirements in another department or program if that department or program consents. A maximum of 10 of the 63 units for the major may be taken on a credit/no credit or satisfactory/no credit basis; a maximum of 10 may be taken as independent study or directed reading. FEMST core courses must be taken for a letter grade.

The major should be declared before the beginning of the junior year. Students declare the major by developing a proposal with the help of the program mentor and a faculty adviser from the list of resource faculty. The proposal describes the student's thematic focus and outlines a course of study. The proposal must be approved by the student's adviser and the Program Director.

CURRICULUM

The major in Feminist Studies includes a total of at least 12 courses at the 100 level or above for 63 units. The courses are divided among the core, the focus, and electives to reach the total course requirement.

THE CORE

1. FEMST 101. Introduction to Feminist Studies. This course must be taken before FEMST 103.
2. Designated feminist theory course. The Feminist Studies web site lists courses that fulfill the theory requirement this year.
3. FEMST 103. Feminist Theories and Methods Across the Disciplines. Prerequisite: FEMST 101
4. FEMST 104A,B. Practicum
5. One Feminist Studies or cognate course in the social sciences. (e.g. Anthropology, Communication, Education, History, Human Biology, Law, Medicine, Political Science, Psychology, or Sociology).
6. One Feminist Studies or cognate course in the humanities (e.g. English, Linguistics, Philosophy, Religious Studies, the arts, and languages).

PRACTICUM

The practicum (FEMST 104 A, B) brings together theory and practical experience. The practicum should involve field research, community service, or other relevant experience such as a public service internship. Students plan their practicum during Winter Quarter of the junior year in FEMST 104A, Junior Seminar and Practicum (1 unit). The practicum is normally done over the summer between junior and senior year, and may be taken for additional units. It is followed by FEMST 104B, Senior Seminar and Practicum (2 units), in Autumn Quarter of the senior year.

THE FOCUS

Every student designs a thematic focus consisting of at least five courses in addition to the core. These foci are not declared on Axess; they do not appear on the transcript or diploma.

1. The focus should be designed in consultation with the student's advisers. The following are examples, and students are encouraged to develop new ones:
   Chicana Feminisms
   Cross Cultural Perspectives on Gender
   Feminist Perspectives on Science and Technologies
   Gender and Education
   Gender, Race and Nation/Transnational Feminisms
   Gender Justice and Human Rights
   Masculinities
   Queer/LGBT Studies
   Race, Class and Gender
   Women, Creativity, and the Arts
   Gender, Health and Medicine
   Gender, Spirituality and Religion
2. At least three of the focus courses should be Feminist Studies or cognate courses.
3. At least one course should be a major survey, methodology, or theory course offered by a department or interdepartmental program as an initiation into the practice of study in the field.
4. At least one course within the thematic focus should address crosscultural issues.

ELECTIVES

Students are encouraged to take electives that provide intellectual breadth and contribute to the 63-unit requirement..

WRITING IN THE MAJOR (WIM)

Majors in Feminist Studies may satisfy the Writing in the Major (WIM) requirement by taking FEMST 153, Women and the Creative Imagination, or one of the approved WIM cognate courses. Honors students satisfy the WIM requirement through their honors work.

HONORS CERTIFICATION

FEMINIST STUDIES MAJORS/MINORS

Admission—The honors program offers an opportunity to do independent research for a senior thesis. It is open to students with a grade point average (GPA) of 3.3 or better in course work in Feminist Studies. Students must begin the application process for honors certification by meeting with the program mentor by May 1 of their junior year, but are encouraged to apply earlier. During the application process, students will design a project in consultation with their proposed thesis adviser and the Feminist Studies honors mentor. A proposal describing the project and the number of units to be taken toward the honors directed project must be submitted to the director of the program for final approval. All projects must have a primary focus on gender or sexuality. See the Feminist Studies web site for details.

Requirements—

1. In addition to the normal requirements for the major, students enroll in FEMST 105 with their honors thesis adviser for 10-15 units towards the preparation of the honors thesis. These units may be distributed throughout the academic year.
2. Throughout the senior year, students work with faculty advisers and the honors tutor. The final thesis must be submitted by the last day of classes in the Spring of their senior year. The completed thesis must carry the adviser's signature of approval. Creative projects must include a section of critical analysis. For guidelines, see http//feminist.stanford.edu.
3. Each student must participate in a yearlong writing workshop with the honors mentor. See the website for more information.

MAJORS IN OTHER DEPARTMENTS

Honors certification in Feminist Studies for majors in other departments or programs, as distinguished from honors for students pursuing a major in Feminist Studies, is intended to complement study in any major.

Admission—Honors certification is open to students majoring in any field with a GPA of 3.3 or better.

As a prerequisite, students must complete the following courses with a grade of (B+) or better:

1. FEMST 101 and a designated feminist theory course
2. *or* three Feminist Studies courses and/or cognate courses related to the topic of their proposed honors research.

Students must begin the application process for honors by meeting with the program mentor by May 1st of their junior year, but are encouraged to begin earlier. During the application process,

students outline a plan for course work and design an honors project in consultation with their proposed thesis adviser and the honors mentor. The final proposal describing the project and the number of units to be taken toward the honors directed project must be submitted to the director of the program for final approval. See the Feminist Studies web site for more details.

Requirements—

1. Students enroll in FEMST 105 with their honors thesis adviser for 10-15 units towards the preparation of the honors thesis. These units may be distributed throughout the academic year.
2. Throughout the senior year, students work with faculty advisers and the honors tutor. The final thesis must be submitted by the last day of classes in the Spring of their senior year. The completed thesis must carry the adviser's signature of approval. Creative projects must include a section of critical analysis. For more information, see http//feminist.stanford.edu.
3. Each student must participate in a yearlong writing workshop with the honors mentor. See the website for more information.

COGNATE COURSES

The following is a partial list of cognate courses for Feminist Studies. Please refer to the program web site for updated lists throughout the year. See respective department listings for course descriptions and General Education Requirements (GER) information. See degree requirements above or the program mentor for applicability of these courses to a major or minor program.

AFRICAAM 144. African Women Writers
AFRICAAM 255. Racial Identity in the American Imagination
AMSTUD 156H. History of Women and Medicine in the United States
ANTHRO 111. Archaeology of Sex, Sexuality, and Gender
ANTHRO 151. Women, Fertility, and Work
ANTHRO 180. Science, Technology, and Gender
ANTHRO 218. Literature, Politics, and Gender in Africa
BIO 185. Evolution of Reproductive Social Behavior
CHICANST 122. Introduction to Latina Literature
CHICANST 160N. Salt of the Earth: Docudrama in America
CHICANST 165A. Chicana/o History
CHICANST 197. The Rite to Remember: Performance and Chicana Indigenous Thought
CHINGEN 235. Chinese Bodies, Chinese Selves
CLASSGEN 119. Gender and Power in Ancient Rome
COMPLIT 141. Literature and Society in Africa and the Caribbean
CSRE 145A. Poetics and Politics of Caribbean Women's Literature
CSRE 177. Writing for Performance: The Fundamentals
CSRE 183. Border Crossings and American Identities
DANCE 160. Performance, Dance, and History: The Ballerina
DRAMA 150T. Racial Erotics
DRAMA 163. Performance and America
DRAMA 177. Writing for Performance: The Fundamentals
DRAMA 189Q. Mapping and Wrapping the Body
ECON 144. Family Economics
EDUC 113X. Gender and Sexuality in Schools
EDUC 197. Education, Gender, and Development
EDUC 201. History of Education in the United States
EDUC 201B. Education for Liberation
EDUC 273. Gender and Higher Education: National and International Perspectives
ENGLISH 139B. American Women Writers, 1850-1920
ENGLISH 145. Another Way to be: Writings by Women of Color
FRENLIT 133. Literature and Society in Africa and the Caribbean
HISTORY 134A. The European Witch Hunts
HISTORY 161. U.S. Women's History, 1890s-1990s
HISTORY 208. Private Lives, Public Stories: Autobiography in Women's History
HISTORY 208B. Women Activists' Response to War
HISTORY 221B. The Woman Question in Modern Russia
HISTORY 227. East European Women and War in the 20th Century
HISTORY 233B. Early Modern Sexualities
HISTORY 244C. The History of the Body in Science, Medicine, and Culture
HISTORY 255D. Racial Identity in the American Imagination
HISTORY 258. History of Sexuality in the U.S.
HISTORY 261. Race, Gender, and Class in Jim Crow America
HISTORY 293B. Homosexuality in Historical and Comparative Perspective
HISTORY 295J. Chinese Women's History
HUMBIO 125. Current Controversies in Women's Health
HUMBIO 129. Critical Issues in International Women's Health
ILAC 117N. Film, Nation, Latinidad
ILAC 193. The Cinema of Pedro Almodóvar
ILAC 272E. Clarice Lispector: the Style of Ecstasy
ILAC 280. Latina/o Literature
ILAC 326. Philosophies of Otherness: Aesthetics of Difference
ILAC 380E. Critical Concepts in Chicana/o Literature
ILAC 389E. Race, Gender and Sexuality in Cultural Representations
INDE 245. Women and Health Care
LINGUIST 156. Language and Gender
MED 108Q. Human Rights and Health
MED 240. Sex Differences in Human Physiology and Disease
OBGYN 240. Sex Differences in Human Physiology and Disease
OBGYN 256. Current Controversies in Women's Health
POLISCI 141. The Global Politics of Human Rights
RELIGST 112. Handmaids and Harlots: Biblical Women in Jewish and Christian Traditions
RELIGST 156. Goddesses and Gender in Hinduism
RELIGST 172. Sex, Body, and Gender in Medieval Religion
RELIGST 263. Judaism and the Body
SOC 123. Sex and Love in Modern Society
SOC 134. Education, Gender, and Development
SOC 142. Sociology of Gender
SOC 273. Gender and Higher Education: National and International Perspectives
SOC 323. Sociology of the Family
SOC 339. Gender Meanings and Processes

MINOR IN FEMINIST STUDIES

Students interested in minoring in Feminist Studies should consult the program mentor. The minor proposal should be drafted in discussion with a faculty adviser selected from the Feminist Studies resource faculty list.

The minor in Feminist Studies consists of at least six courses at the 100 level or above for a minimum of 30 and a maximum of 36 units. None of the units for the minor may count towards the student's major. The minor in Feminist Studies should be declared by Winter Quarter of a student's junior year.

Requirements—

1. FEMST 101. Introduction to Feminist Studies. This must be taken before 103.
2. Designated feminist theory course, or FEMST 103, Feminist Theories and Methods Across the Disciplines.

Focus—

A four-course thematic focus may be designed by the student or may follow one of the suggested clusters listed in the "Bachelor of Arts in Feminist Studies" section of this bulletin. One course within the thematic focus should address crosscultural issues.

OVERSEAS STUDIES COURSES IN FEMINIST STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

SPRING QUARTER

FLORENCE

OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality and the Image. 4 units, Ermelinda Campani, GER:DB:Hum, EC:Gender

FINANCIAL MATHEMATICS

Director: Tze Leung Lai
Steering Committee: A. Dembo, K. Giesecke, T. Lai, A. Owen, G. Papanicolaou, J. Primbs, K. Singleton
Core Faculty:
Business: D. Duffie, J. M. Harrison, K. Singleton
Economics: T. Amemiya, P. Hansen, M. Kurz, J. Shoven
Electrical Engineering: T. Cover
Management Science and Engineering: K. Giesecke, P. Glynn, D. Luenberger, J. Primbs
Mathematics: S. Brendle, I. Camilier, A. Dembo, P. Diaconis, G. Papanicolaou
Statistics: T. Cover, A. Dembo, P. Diaconis, D. Donoho, T. Lai, A. Owen, B. Rajaratnam

The departments of Mathematics and Statistics, in close cooperation with the departments of Economics and Management, Science, and Engineering, and the Graduate School of Business, offer an interdisciplinary Master of Science degree in Financial Mathematics. The Financial Mathematics program provides a master's-level education in applied and computational mathematics, statistics, and financial applications.

GRADUATE PROGRAM IN FINANCIAL MATHEMATICS

The department offers a Master of Science in Financial Mathematics. University requirements for the M.S. are described in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE IN FINANCIAL MATHEMATICS

Admission—To be eligible for admission, students are expected to have excelled in the following courses or their equivalent:

1. Linear algebra at the level of MATH 104.
2. Real analysis (Advanced Calculus) at the level of MATH 115.
3. Basic ordinary and partial differential equations at the level of MATH 131 and 132.
4. Probability at the level of STATS 116; theory of statistics at the level of STATS 200; and stochastic processes at the level of STATS 217 or, preferably, MATH 136/STATS 219.
5. Computer programming at the level of CS 106A,B or X.

Some of these courses (e.g. STATS 116) are usually offered during the Summer Quarter so candidates lacking the required background may take them then.

Candidates for admission must take the general Graduate Record Examination and may take the subject test in Mathematics as well. Information about these exams can be found at http://www.gre.org.

Requirements—The program requires completion of 45 units of course work. Ordinarily, four quarters are needed to complete all requirements. Students who do not complete all requirements within three years of admission are terminated from the program.

Of these 45 units, six courses must be taken from the list of required courses and six must be taken from the list of elective courses, available below and on the program web site at http://finmath.stanford.edu/academics/required.html and http://finmath.stanford.edu/academics/electives.html. These courses must be taken for letter grades, but students may elect to take one of the 12 courses CR/NC. An overall grade point average (GPA) of 2.75 is required. There is no thesis requirement.

Any remaining units required to complete the 45 total must be taken from the following options, and may be taken for letter grades or CR/NC:

1. from the approved list of electives with emphasis on computation, information technology or finance
2. STATS 200, STATS 217, STATS 218, MATH 131, MATH 132, MATH 202 or ECON 140
3. additional (practical) CS courses
4. in the form of an industrial internship in the Bay Area or elsewhere, with the approval and supervision of a faculty member. A written report must be submitted upon completion of the internship. Students who choose to take credit for practical training must sign up for STATS 297 (1-3 units).

Required Courses—In partial fulfillment of the M.S. degree in Financial Mathematics, students must fulfill six required courses, with two from each of the following three core areas:

1. Stochastic Processes and Statistics
2. Differential Equations, Modeling, Simulation and Computing
3. Finance

The selection of these courses is to be done in consultation with the Program Director. The following courses can be counted toward the six required courses:

Mathematics:

- MATH 227. Partial Differential Equations and Diffusion Processes
- MATH 236. Introduction to Stochastic Differential Equations
- MATH 238. Mathematical Finance (same as STATS 250)
- MATH 239. Computation and Simulation in Finance

Statistics:

- STATS 240. Statistical Methods in Finance
- STATS 241. Financial Modeling Methodology and Applications
- STATS 242. Algorithmic Trading and Quantitative Strategies
- STATS 243. Statistical Methods and Models for Risk Management and Surveillance
- STATS 315B. Modern Applied Statistics: Data Mining
- STATS 362. Monte Carlo Sampling

Management Science & Engineering:

- MS&E 347. Credit Risk: Modeling and Management

Graduate School of Business:

- FINANCE 622. Dynamic Asset Pricing Theory

At the Program Director's discretion, courses taken previously that are equivalent to the above may be waived; in which case they must be replaced by elective courses in the same subject area.

Elective Courses—Each candidate must take at least six approved elective courses from the list below, with two from each of the three core areas:

1. Stochastic Processes and Statistics
2. Differential Equations, Modeling, Simulation and Computing
3. Finance

Other elective courses may be authorized by the Program Director if they provide skills relevant to financial mathematics and do not overlap with courses in the candidate's program.

Mathematics:

- MATH A136. Stochastic Processes (same as STATS 219)
- MATH 180. Introduction to Financial Mathematics
- MATH 205A/B. Real Analysis
- MATH 220. PDE of Applied Mathematics
- MATH 222A. Computational Methods for Fronts, Interfaces, and Waves
- MATH 227. Partial Differential Equations and Diffusion Processes
- MATH 237. Stochastic Equations and Random Media
- MATH 256A/B. Partial Differential Equations
- MATH 261A/B. Functional Analysis
- MATH 266. Time Frequency Analysis and Wavelets

Statistics:
- STATS 202. Data Mining and Analysis
- STATS 206. Applied Multivariate Analysis
- STATS 207. Introduction to Time Series Analysis
- STATS 212. Applied Statistics with SAS
- STATS 219. Stochastic Processes (same as MATH 136)
- STATS 220. Continuous Time Stochastic Control
- STATS 227. Statistical Computing
- STATS 235. Decision Making in Financial Services
- STATS 237. Time Series Modeling and Forecasting
- STATS 240. Statistical Methods in Finance
- STATS 243. Introduction to Mathematical Finance (summer version of MATH 180)
- STATS 252. Data Mining and Electronic Business
- STATS 254. Correspondence Analysis and Related Methods (one time offering Aut 08-09)
- STATS 305. Introduction to Statistical Modeling
- STATS 306A. Methods for Applied Statistics
- STATS 310A/B/C. Theory of Probability
- STATS 315A/B/C. Modern Applied Statistics
- STATS 317. Stochastic Processes
- STATS 318. Modern Markov Chains
- STATS 322. Function Estimation in White Noise
- STATS 324. Multivariate and Random Matrix Theory
- STATS 343. Time Series Analysis
- STATS 376A. Information Theory

Computer Science:
- CS 106B. Programming Abstractions
- CS 106X. Programming Abstractions (Accelerated)
- CS 193D. C++
- CS 224M. Multi-Agent Systems
- CS 295. Software Engineering
- CS 229. Machine Learning
- CS 249A. Object-Oriented Programming: A Modeling and Simulation Perspective
- CS 261. Optimization and Algorithmic Paradigms
- CS 339. Topics in Numerical Analysis
- CS 365. Randomized Algorithms

Economics:
- ECON 190. Introduction to Financial Accounting
- ECON 202N-203N. Core Economics: Modules 1 and 2, 5 and 6 - For Non-Economics Ph.D. Students
- ECON 210. Core Economics: Modules 3 and 7
- ECON 211. Core Economics: Modules 11 and 12
- ECON 269. International Financial Markets and Monetary Institutions
- ECON 275. Time Series Econometrics
- ECON 281. Economics of Uncertainty
- ECON 284. Topics in Dynamic Economics

Management Science & Engineering:
- MS&E 242H. Investment Science Honors
- MS&E 247G. International Financial Management (same as GSB F323)*
- MS&G 247S. International Investments
- MS&G 272. Entrepreneurial Finance
- MS&E 310 . Linear Programming
- MS&E 311. Optimization
- MS&E 312. Advanced Methods in Numerical Optimization
- MS&E 313. Vector Space Optimization
- MS&E 323. Simulation Theory
- MS&E 339. Approximate Dynamic Programming
- MS&E 341. Advanced Economic Analysis
- MS&E 342. Advanced Investment Science
- MS&E 345. Advanced Topics in Financial Engineering
- MS&E 348. Optimization of Uncertainty and Applications in Finance
- MS&E 349. Capital Deployment
- MS&E 351. Dynamic Programming and Stochastic Control
- MS&E 444. Investment Practice
- MS&E445. Projects in Wealth Management

Computational & Mathematical Engineering:
- CME 340. Computational Methods in Data Mining

Graduate School of Business (GSB), Finance:
- FINANCE 320*. Debt Markets
- FINANCE 326*. Derivative Securities
- FINANCE 328* Portfolio Management
- FINANCE 620*. Financial Markets I
- FINANCE 621*. Financial Markets II
- FINANCE 622*. Dynamic Asset Pricing Theory
- FINANCE 629*. Tax and Finance Seminar

Graduate School of Business (GSB), Economic Analysis and Policy:
- MGTECON 600. Microeconomic Analysis I*
- MGTECON 604. Econometric Methods II*
- MGTECON 609. Applied Econometric and Economics Research*

Graduate School of Business (GSB), Operations, Information, and Technology:
- OIT 667. Revenue Management*

*Indicates courses of limited enrollment and/or that instructor consent is required for registration.

FRENCH AND ITALIAN

Emeriti: (Professors) John G. Barson, Marc Bertrand, Robert G. Cohn, John Freccero, René Girard, Ralph M. Hester, Elisabeth Mudimbe-Boyi, Roberto B. Sangiorgi
Director: Carolyn Springer
Chairs of Graduate Studies: Cécile Alduy (French), Carolyn Springer (Italian)
Chairs of Undergraduate Studies: Dan Edelstein (French), Laura Wittman (Italian)
Professors: Jean-Marie Apostolidès, Jean-Pierre Dupuy, Hans U. Gumbrecht, Robert Harrison, Jeffrey T. Schnapp (on leave), Michel Serres, Carolyn Springer
Associate Professors: Cécile Alduy, Dan Edelstein, Joshua Landy
Assistant Professors: Marisa Galvez, Laura Wittman
Lecturers: Sarah Carey (Humanities Fellow), Yann Robert (Humanities Fellow)
Courtesy Professors: Keith Baker, Margaret Cohen, Paula Findlen, Michael Marrinan
Visiting Professors: Remo Ceserani, Samia Kassab-Charfi
Visiting Associate Professor: Ewa Domanska
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Courses offered by the Department of French and Italian are listed on the Stanford Bulletin's ExploreCourses web site under the subject codes FRENGEN (French General), FRENLIT (French Literature), ITALGEN (Italian General), and ITALLIT (Italian Literature). For courses in French or Italian language instruction with the subject code FRENLANG or ITALLANG, see the "Language Center" section of this bulletin.

FRENCH SECTION

The French section provides students with the opportunity to pursue course work at all levels in French language, literature, cultural and intellectual history, theory, film, and Francophone studies. It understands the domain of French Studies as encompassing the complex of cultural, political, social, scientific, com-

mercial, and intellectual phenomena associated with French-speaking parts of the world, from France and Belgium to Canada, Africa, and the Caribbean.

Three degree programs are available in French: a B.A., a terminal M.A., and a Ph.D. A Ph.D. in French and Italian is also available.

Visiting faculty and instructors contribute regularly to the life of the French section. The section maintains contacts with the Ecole Normale Supérieure, the Institut d'Etudes Politiques, and the Ecole Polytechnique.

A curator for Romance languages oversees the extensive French collection at Green Library. The Hoover Institute on War, Revolution, and Peace also includes materials on 20th-century France and French social and political movements.

France-Stanford Center for Interdisciplinary Studies—The center, founded in partnership with the French Ministry of Foreign Affairs, aims to bridge the disciplines of the humanities, social sciences, sciences, engineering, business, and law, to address historical and contemporary issues. Its programs bring faculty and students from across Stanford's departments and schools in contact with colleagues in France to explore issues of common intellectual concern. The center invites French-speaking scholars to offer courses or give lectures or seminars on campus. It facilitates internships for Stanford students in computer science and engineering in Sophia-Antipolis, France's new high-tech center near Nice.

La Maison Française—La Maison Française, 610 Mayfield, is an undergraduate residence that serves as a campus French cultural center, hosting in-house seminars as well as social events, film series, readings, and lectures by distinguished representatives of French and Francophone intellectual, artistic, and political life. Assignment is made through the regular housing draw.

Stanford in Paris—The Bing Overseas Studies Program in Paris offers undergraduates the opportunity to study in France during Autumn, Winter, and Spring quarters. It provides a wide range of academic options, including course work at the Stanford center and at the University of Paris, independent study projects, and internships. In addition, the program promotes interaction with the local community through volunteer employment, homestays, and internships. The minimum language requirement for admission into Stanford in Paris is one year of French at the college level.

Courses offered in Paris may count toward fulfillment of the requirements of the French major or minor. Students should consult with the Chair of Undergraduate Studies before and after attending the program, in order to ensure that course work and skills acquired abroad can be coordinated appropriately with their degree program. Detailed information, including program requirements and curricular offerings, may be obtained from the "Overseas Studies" section of this bulletin, the Stanford in Paris web site http://osp.stanford.edu/program/paris, or the Overseas Studies Program Office in Sweet Hall.

MISSION OF THE UNDERGRADUATE PROGRAM IN FRENCH

The mission of the undergraduate program in French is to expose students to a variety of perspectives in French Language, culture, and history by providing majors with training in writing and communication as well as cultural, textual, and historical analysis in order to develop students into critical and global thinkers prepared for careers in business, social service, and government, or for graduate study in French.

ITALIAN SECTION

The Italian section offers graduate and undergraduate programs in Italian language, literature, culture, and intellectual history. Course offerings range from small, specialized graduate seminars to general courses open to all students on authors such as Dante, Boccaccio, and Machiavelli.

Three degree programs are available in Italian: a B.A., a terminal M.A., and a Ph.D. A Ph.D. in French and Italian is also available.

Collections in Green Research Library are strong in the medieval, Renaissance, and contemporary periods; the Italian section is one of the larger constituents of the western European collection at the Hoover Institution for the Study of War, Revolution, and Peace; and the Music Library has excellent holdings in Italian opera.

La Casa Italiana—La Casa Italiana, 562 Mayfield, is an undergraduate residence devoted to developing an awareness of Italian language and culture. It works closely with the Italian Cultural Institute in San Francisco and with other local cultural organizations. It hosts visiting representatives of Italian intellectual, artistic, and political life. A number of departmental courses are taught at the Casa, which also offers in-house seminars. Assignment is made through the regular undergraduate housing draw.

Stanford in Italy—The Bing Overseas Studies Program in Florence affords undergraduates with at least three quarters of Italian language the opportunity to take advantage of the unique intellectual and visual resources of the city and to focus on two areas: Renaissance history and art, and contemporary Italian and European studies. The program is structured to help integrate students into Italian culture through homestays, Florence University courses, the Language Partners Program, research, internship and public service opportunities, and by conducting some of the program's classes in Italian. Many courses offered in Florence may count toward the fulfillment of requirements for the Italian major or minor. Students are encouraged to consult with the Italian undergraduate adviser before and after a sojourn in Florence to ensure that their course selections meet Italian section requirements. Information on the Florence program is available in the "Overseas Studies" section of this bulletin, the Stanford in Florence web site http://osp.stanford.edu/program/florence, or at the Overseas Studies office in Sweet Hall.

MISSION OF THE UNDERGRADUATE PROGRAM IN ITALIAN

The mission of the undergraduate program in Italian is to expose students to a variety of perspectives in Italian Language, culture, and history by providing majors with training in writing and communication as well as cultural, textual, and historical analysis in order to develop students into critical and global thinkers prepared for careers in business, social service, and government, or for graduate study in Italian.

GRADUATE PROGRAMS IN FRENCH AND ITALIAN

The Department of French and Italian offers three Ph.D. programs: a Ph.D. in French, a Ph.D. in Italian, and a Ph.D. in French and Italian.

Students for each of these programs must complete the requirements outlined in the "General Requirements for the Ph.D. in French or Italian" section of this bulletin, as well as the requirements outlined for their respective Ph.D. program.

ADMISSION TO THE M.A. AND PH.D. PROGRAMS

Applications and admissions information may be obtained from Graduate Admissions at http://gradadmissions.stanford.edu. Applicants should read the general regulations governing degrees in the "Graduate Degrees" section of this bulletin. Applicants to the French program should have preparation equivalent to an undergraduate major in French; applicants to the Italian program should have done significant course work in Italian literature and/or Italian studies on the undergraduate level; in both cases, applicants should also have reached a high level of speaking and writing proficiency in the language. Previous study of an additional language is also highly desirable. Recent Graduate Record Examination (GRE) results are required, as are two writing samples representative of the applicant's best undergraduate work. One sample should be in English, one in the language of study.

ADVISING

Given the interdisciplinary nature of the Ph.D. programs and the opportunity they afford each student to create an individualized program of study, regular consultation with an adviser is of the utmost importance. The adviser for all entering graduate students is the Chair of Graduate Studies, whose responsibility it is to assist students with their course planning and to keep a running check on progress in completing the course, teaching, and language requirements. By the end of the first year of study, each student must choose a faculty adviser whose expertise is appropriate to his or her own area of research and interests.

BACHELOR OF ARTS IN FRENCH

The French section offers a major and a minor in French. Students are encouraged to pursue a course of study tailored to their individual needs and interests. A degree in French serves as a stepping stone to entering international business, law, translation, and teaching, or as preparation for graduate studies in French, history, or comparative literature.

The French literature, culture, and civilization specialization allows students to combine their work in French with work from another field such as African studies, linguistics, art history, music, economics, history, education, medicine, international relations, political science, or other foreign languages and literatures. The literature and philosophy specialization offers students the opportunity to pursue interdisciplinary studies at the intersection of literature and philosophy in a structured manner and alongside similarly interested students from a variety of humanistic disciplines.

Students who complete the department's two-quarter Epic Journeys IHUM sequence are eligible for 5 units towards the French major or minor. Students enrolled in the French language discussion section of the IHUM sequence receive, in addition to these 5 units, an additional 4 units (2 per quarter), assuming that they complete the written work in French.

Prerequisites—Before declaring a French major, a student must be proficient in written and spoken French at an end-of-second-year college level. Such proficiency must be demonstrated either:

1. by having completed the entire language sequence up to and including FRENLANG 23;
2. by having scored a 5 or better on the French language Advanced Placement (AP) exam; *or*
3. by having demonstrated equivalent proficiency on the Language Center placement exam offered at the beginning of each academic quarter.

Students not meeting at least one of these criteria are required to complete the portion of the language sequence as deemed necessary by the department before beginning to take courses toward the major.

REQUIREMENTS

FRENCH

The French major requires a minimum of 56 units. All courses must be taken for a letter grade and can only be used to fulfill the French major requirements. Courses must be selected in accordance with the following requirements:

1. *Advanced language* (ca. 4 units)—All students must take:
   - FRENLANG 124. Advanced French Grammar
2. *Gateway courses* (ca. 8 units)—Students are recommended to take two courses in the FRENLIT 120 sequence:
   - FRENLIT 120. Coffee and Cigarettes: The Making of French Intellectual Culture
   - FRENLIT 121. French Classics: The Novel
   - FRENLIT 122. Great Moments in French Culture and History
3. *Introductory series on French and Francophone literature and culture* (ca. 12 units)—Three courses must be taken from the FRENLIT 130 sequence. Any one of these courses fulfills the Writing in the Major requirement:
   - FRENLIT 130. Introduction to Medieval and Renaissance French Literature
   - FRENLIT 131. Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France
   - FRENLIT 132. Literature, Revolutions, and Changes in 19th- and 20th-Century France
   - FRENLIT 133. Literature and Society in Africa and the Caribbean
4. *Medieval/Early Modern courses* (ca. 8 units)—At least two courses must concern the period before 1800. Courses fulfilling this requirement within the department must be drawn from the 140 level or above. Courses chosen from outside the department must be preapproved by the Chair of Undergraduate Studies.
   - FRENGEN 172/272. Dream Visions: The Roman de la Rose
   - FRENGEN 219. The Renaissance Body
   - FRENGEN 260. Voltaire's Work and Life, or: Managing Enlightenment
   - FRENLIT 280. Women in Print: Gender, Authorship, and Book Culture in Early Modern France
5. *Capstone course*—At least one course must be taken at the 200-level. For this course, the student writes a final paper of no less than 20 pages that engages critically with at least two secondary sources.
6. *Remaining courses*—In total, at least 32 units of coursework must be taken within the department. Of these courses, only one, for a maximum of 4 units, may be drawn from individual work (FRENLIT 199). No more than four courses numbered lower than 130 may be counted towards the major. Where possible, students are encouraged to complete their written work in French.

   Upper-level French courses—
   - FRENGEN 168. American Writers in 20th-Century Paris
   - FRENGEN 181. Philosophy and Literature
   - FRENGEN 190Q. Parisian Cultures of the 19th and Early 20th Centuries
   - FRENGEN 269. Transfigurative Lyric: Baudelaire and Mallarmé
   - FRENGEN 277. Introduction to Rene Girard's Theory: Mimesis, Desire, Violence, and the Sacred
   - FRENGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
   - FRENGEN 286. Michel Foucault and Literary Theory
   - FRENLIT 152. Fashion and Image in Post-Romantic Paris
   - FRENLIT 159. Confessions in 19th-Century French Literature
   - FRENLIT 204. Revolutions in Prose: The 19th-Century French Novel
   - FRENLIT 244. The Politics of Spectacle in a Time of Revolution
   - FRENLIT 267. National Literatures, *Littérature-monde*: A New Comparatism
   - FRENLIT 272. Francophone Literature: Bilingualism and Cultural Polyphonies in North African Literature
   - FRENLIT 293A,B. Topics in French Literature and Philosophy

Cognate Courses—Credits earned for completion of the following cognate courses may be applied to unit requirements for the departmental major:

- COMPLIT 101. What is Literature?
- DLCL 189. Honors Thesis Seminar
- OSPPARIS 30. The Avant Garde in France through Literature, Art, and Theater
- OSPPARIS 32. Understanding French Politics
- OSPPARIS 45. Notre-Dame de Paris: A Course on French Literature and the History of Paris
- OSPPARIS 58. Tintin as a Hero and a Myth
- OSPPARIS 186F. Contemporary African Literature in French

Relevant courses from other departments or programs may also earn credit toward the major with the consent of the Director of Undergraduate Studies.

FRENCH AND PHILOSOPHY

The French and Philosophy major specialization requires a minimum of 16 courses, for a minimum total of 65 units, distributed as follows:

1. *Advanced language* (ca. 4 units)—All students must take FRENLANG 124. Advanced French Grammar
2. *Introductory Series on French and Francophone Literature and Culture* (ca. 12 units)—Three courses must be taken from the FRENLIT 130 sequence.
3. *Philosophy Writing in the Major* (5 units)—PHIL 80. Prerequisite: introductory philosophy class.
4. *Philosophy and Literature Gateway Course* (4 units)—FRENGEN 181 (same as PHIL 81). This course should be taken as early as possible in the student's career, normally in the sophomore year.
5. *Aesthetics, Ethics, Political Philosophy* (ca. 4 units)—One course from the PHIL 170 series.
6. *Language, Mind, Metaphysics, and Epistemology* (ca. 4 units)—One course from the PHIL 180 series.
7. *History of Philosophy* (ca. 8 units)—Two courses in the history of philosophy, numbered above PHIL 100.
8. *Upper Division French Courses* (ca. 12 units)—At least three courses numbered FRENLIT/FRENGEN 140 or higher.
9. *Related Courses* (ca. 8 units)—Two upper division courses relevant to the student's chosen area of specialization. One course (4 units) may be FRENLIT 199, Individual Work.
10. *Capstone Seminar* (ca. 4 units)—This year's capstone seminars are:
    - COMPLIT 226/GERLIT 242. Narrative and Ethics
    - FRENGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
    - RELIGST 271A. Dante's Spiritual Vision

    One of these courses must be taken in the student's senior year.

The capstone seminar and the two related courses must be approved by both the undergraduate adviser of French and the undergraduate adviser of the initiative in philosophical and literary thought administered through the DLCL. Substitutions, including transfer credit, are not normally permitted for items 5, 6, and 7, and are not permitted under any circumstances for items 3, 4, and 10. Up to 10 units of courses taken in the Philosophy department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade.

EXTENDED MAJORS

Requirements for both extended majors are essentially identical to those of the French major with a concentration in French literature.

French and English Literatures—In addition to the requirements for the B.A. in French, candidates complete four English literature courses numbered 100 and above related to their French program.

French and Italian Literatures—In addition to the requirements for the B.A. in French, students complete four Italian courses numbered 200 and above related to their concentration in French.

FRENCH AND LINGUISTICS

Linguistics majors may elect to specialize in the French language. In addition to 50 units in Linguistics, of which two courses (LINGUIST 110 and 160) may be replaced by comparable courses in French, students opting for a French Language specialization must take three courses in the introductory series devoted to French and Francophone literature and culture (FRENLIT 130-133). For details, contact the Department of Linguistics.

MINOR IN FRENCH

Students considering a minor in French are encouraged to design a course of studies that fosters their understanding of the interaction between French and their major field of specialization. A minimum of 24 units of undergraduate work beyond the French 23 level must be completed. All courses must be taken for a letter grade.

Requirements for the minor include FRENLANG 124 (Advanced French Grammar); three of the introductory series on French and Francophone literature and culture (FRENLIT 130-133); and a minimum of two additional courses in language or literature numbered 120 and above. Of these, only one may be taught in English. All courses must be chosen in consultation with the Chair of Undergraduate Studies.

Courses used to satisfy French minor requirements may not be counted toward a student's major or toward a second minor.

HONORS PROGRAM

Majors are eligible to apply to the honors program if they have maintained an average grade point average (GPA) of 3.5 in five upper-division French courses. The honors program candidate must fulfill all regular requirements for the major, as well as the writing of a research paper no shorter than 50 pages in length, written in French or English, on a specialized topic.

No later than the end of Spring Quarter of the junior year, the student must submit to the Chair of Undergraduate Studies an Application for Honors, the central portion of which must contain an outline of the proposed honors essay. If it is in need of revisions, the Chair of Undergraduate Studies helps the student through the revision process until the proposal is granted his or her approval. The Chair of Undergraduate Studies also helps the student identify an appropriate adviser for the essay.

Students may enroll for 2 units of credit in FRENLIT 189B for the drafting or revision of the thesis proposal in Spring Quarter of the junior year. In Autumn Quarter of the senior year, honors students must enroll in DLCL 189, a 5-unit seminar that focuses on researching and writing the honors thesis. Students then enroll for 5 units of credit in FRENLIT 189A while composing the thesis during Winter Quarter. Students who did not enroll in a 189B course in the junior year may enroll in FRENLIT 189B in Spring Quarter of the senior year while revising the thesis, if approved by the thesis adviser.

A total of 10-12 units are awarded for completion of honors course work, independent study, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15 of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

Honors College—The Department of French and Italian encourages honors students to enroll in the honors college run by the Division of Literatures, Cultures, and Languages (DLCL). The college meets at the end of every summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted by Spring Quarter of the same calendar year. For more information, contact the undergraduate student services officer in the DLCL.

BACHELOR OF ARTS IN ITALIAN

REQUIREMENTS

ITALIAN

The Italian major offers students the opportunity to develop an in-depth knowledge of Italian literature, language, and civilization through a highly flexible program combining course work in Italian with work in such fields as art history, classics, comparative literature, economics, English, French, history, international relations, music, philosophy, and political science. All Italian majors are required to have completed three second-year language courses (or the equivalent taken at the Florence campus):

- ITALLANG 21. Second-Year Italian, First Quarter
- ITALLANG 22. Second-Year Italian, Second Quarter
- ITALLANG 23. Second-Year Italian, Third Quarter

Completion of the department's two quarter Epic Journeys IHUM sequence entitles a student to 5 units towards the Italian major or minor. Students considering an Italian major should consult with the Italian undergraduate adviser as early as possible (even before completing the language requirement) in order to ensure a maximum of flexibility in designing a course of study suited to individual needs and cultural interests.

Italian majors must complete 60 units of course work.

The requirements for the major are:

1. A minimum of 32 units of Italian courses:
   - ITALGEN 155. Mafia in Society, Film, and Literature
   - ITALGEN 181. Philosophy and Literature
   - ITALGEN 172/272. Dream Visions: The Roman de la Rose
   - ITALGEN 230. Italian Renaissance Epic: Ariosto
   - ITALGEN 235E. Inferno
   - ITALGEN 261. Rebels, Outlaws and Iconoclasts: Italian Cinema from 1943 to 1975
   - ITALGEN 275. Pasolini: Cinema and Subversion
   - ITALGEN 281. Novels into Film
   - ITALGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
   - ITALLIT 142. Literature and the City
   - ITALLIT 282. Solid or Liquid Modernity
   - ITALLIT 292. Machiavelli
2. Of these courses, at least one on Dante is required, as well as at least one in each of the following areas:
   a. the Middle Ages (ITALGEN 172/272, ITALGEN 235E); a Dante course may fulfill the Middle Ages requirement.
   b. the early modern period (ITALGEN 230, ITALLIT 292); and
   c. the modern period (ITALGEN 155, 261, 275, 281, 284, ITALLIT 142, 282).
3. The complete intermediate-level survey sequence (any one of these courses fulfills the Writing in the Major Requirement):
   - ITALLIT 127. Inventing Italian Literature: Dante, Boccaccio, Petrarca
   - ITALLIT 128. The Italian Renaissance and the Path to Modernity
   - ITALLIT 129. Modern Italian History and Literature
4. One advanced language course:
   - ITALLANG 113. Italian Cultural Studies
   - ITALLANG 114. Advanced Stylistics and Composition
   - ITALLANG 115. Academic and Creative Writing

Of the 60 units required for the major, up to 28 units of course work in related fields may be taken outside the department.

Cognate Courses—Credits earned for completion of the following cognate courses may be applied to unit requirements for the departmental major:

- COMPLIT 101. What is Literature?
- DLCL 189. Senior Honors Thesis
- OSPFLOR 23. European Universities: The New Renaissance of Italian Higher Education
- OSPFLOR 34. The Woman in Florentine Art
- OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought
- OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition
- OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
- OSPFLOR 54. High Renaissance and *Maniera*
- OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality and the Image
- OSPFLOR 106V. Italy: From an Agrarian to a Post-industrial Society
- OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence
- OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization
- OSPFLOR 134F. Modernist Italian Cinema

Relevant courses from other departments or programs may also earn credit toward the major with the consent of the Chair of Undergraduate Studies.

ITALIAN AND PHILOSOPHY

A second option is now possible within the Italian major, offering students the opportunity to combine studies in literature and philosophy. Students take most of their courses alongside students from departments specializing in the intersection of literature and philosophy.

The Italian and Philosophy major track requires a minimum of 16 courses, for a minimum total of 65 units, distributed as follows:

1. *Italian Survey Sequence* (ca. 12 units): ITALLIT 127, 128, 129.
2. *Advanced Language Course* (ca. 4 units): ITALLANG 113 and above.
3. *Philosophy Writing in the Major* (5 units): PHIL 80. Prerequisite: introductory philosophy class.
4. *Philosophy and Literature Gateway Course* (4 units): ITALGEN 181 (same as PHIL 81). This course should be taken as early as possible in the student's career, normally in the sophomore year.
5. *Aesthetics, Ethics, Political Philosophy* (ca. 4 units): one course from the PHIL 170 series.
6. *Language, Mind, Metaphysics, and Epistemology* (ca. 4 units): one course from the PHIL 180 series.
7. *History of Philosophy* (ca. 8 units): two courses in the history of philosophy, numbered above PHIL 100.
8. *Upper Division Italian Courses* (ca. 12 units): at least three courses numbered ITALLIT/ITALGEN 100 or higher.
9. *Related Courses* (ca. 8 units): two upper division courses relevant to the student's chosen area of specialization.
10. *Capstone Seminar* (ca. 4 units): this year's capstone seminars are:
    - COMPLIT 226/GERLIT 242. Narrative and Ethics
    - FRENGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
    - RELIGST 271A. Dante's Spiritual Vision

    One of these courses must be taken in the student's senior year.

The capstone seminar and the two related courses must be approved by both the undergraduate adviser of Italian and the undergraduate adviser of the program in philosophical and literary thought administered through the DLCL. No more than 24 units may be drawn from courses offered overseas. Substitutions, including transfer credit, are not normally permitted for items 5, 6, and 7, and are not permitted under any circumstances for items 3, 4, and 10. Up to 10 units of courses taken in the Philosophy department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade.

EXTENDED MAJORS

Requirements for both extended majors are essentially identical to those of the Italian major with a concentration in Italian literature.

Italian and English Literatures—In addition to the 32 departmental units required for the B.A. in Italian, candidates must complete four English literature courses numbered 100 and above related to the field of concentration in Italian Studies.

Italian and French Literatures—In addition to the 32 departmental units required for the B.A. in Italian, candidates must complete four French literature courses numbered 100 and above related to the field of concentration in Italian Studies.

MINOR IN ITALIAN

Students considering a minor in Italian are encouraged to design a course of studies that fosters their understanding of the interaction between Italian and their second area of expertise. A minimum of 24 units of undergraduate work beyond ITALLANG 21 must be completed.

Requirements for the minor include ITALLANG 22 and 23 (or equivalent); all three of the introductory series on Italian literature and culture (ITALLIT 127, 128, 129); and a minimum of one advanced course in language or literature numbered 113 and above. All courses must be chosen in consultation with the Chair of Undergraduate Studies, who is responsible for evaluating all requests and individual study plans for the minor.

HONORS PROGRAM

Italian majors with a grade point average (GPA) of 3.3 (B+) or better in all Italian courses are eligible for department honors. Students interested in the honors program should consult the Italian undergraduate adviser early in their junior year. In addition to the requirements listed above, the student must submit to the Italian faculty a proposal for the honors essay by the end of Spring Quarter of the junior year. During the quarter, students may enroll in ITALLIT 189B while drafting and revising the proposal and conducting preliminary research. In Autumn Quarter of the senior year, honors students must enroll in DLCL 189, a 5-unit seminar that focuses on researching and writing the honors thesis. Students then enroll for 5 units of credit in ITALLIT 189A while composing the thesis during Winter Quarter. Students who did not enroll in a 189B course in the junior year may enroll in ITALLIT 189B in Spring quarter of the senior year while revising the thesis, if approved by the thesis adviser. A total of 10-12 units are awarded for successful completion of honors course work, independent study, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15 of the terminal year. If an essay is found deserving of grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

Honors College—The Department of French and Italian encourages honors students to enroll in the honors college run by the Division of Literatures, Cultures, and Languages (DLCL). The college meets at the end of every summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted by Spring Quarter of the same calendar year. For more information, contact the undergraduate student services officer in the DLCL.

MINOR IN LITERATURE AND MINOR IN MODERN LANGUAGES

The Division of Literatures, Cultures, and Languages offers two undergraduate minor programs: the minor in Literature and the minor in Modern Languages. Both of these minors draw on literature and language courses offered through this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about the minors and their requirements.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN FRENCH OR ITALIAN

Each year the department admits a small number of undergraduates to the coterminal B.A. and M.A. degree in French or in Italian. Applications must be submitted by January 31 of the senior year to the Director of the Department and must include:

- a written statement of purpose
- two letters of recommendation from faculty at Stanford
- a transcript.

Students accepted into the coterminal program must have been undergraduate majors in the relevant language and must meet all requirements both for the B.A. and the M.A.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN FRENCH

The terminal M.A. in French provides a flexible combination of language, literature, cultural history, and methodology course work designed to enhance the preparation of secondary school, junior college, or college teachers.

Candidates must complete a minimum of 45 units of graduate work, all courses being taken for a letter grade, with a grade point average (GPA) of 3.3, as well as pass the master's examination at the end of their training. To fulfill the requirements in a single year, enrollment must be for an average of 15 units per quarter.

Candidates must take one cultural history course (to be taken either inside or outside the Department of French and Italian). All remaining units are to be taken in advanced French literature courses (200 level or above), three of which must be concerned with the pre-revolutionary period of French cultural history.

Applications for admission to the Masters of Arts program must be received by the last Friday of March in the prior academic year. Candidates for this degree are not eligible for financial aid or for teaching assistantships.

EXAMINATION

The terminal M.A. examination is normally administered two weeks before the end of the Spring Quarter by the two members of the examination committee, selected each year by the Chair of Graduate Studies. It consists of two parts:

1. The written exam (two hours) tests the candidate's general knowledge of French literature and is based on the same reading list as that for the Ph.D. qualifying exam (see below).
   The exam requires that the candidate answer two questions (out of three) in a manner that demonstrates his/her ability to synthesize and draw parallels between periods, genres, and systems of representation on the basis of the standard reading list. At least one question must be answered in French and two in English. Use of a dictionary is allowed.
   If the student's performance on the exam is deemed a 'pass' by two out of three of the members of the examining committee, the student is then permitted to go on to the oral examination (which is ordinarily taken later the same week).
   Should the candidate fail the M.A. written exam, he/she is given a second chance at the end of the Spring Quarter.
2. The oral exam (90 minutes) assumes as its point of departure the student's answers on the written exam. It examines the candidate's knowledge and understanding of French literary history on the basis of the standard reading list.

At the conclusion of the oral exam, the examination committee meets in closed session and discusses the student's performance on the written and the oral portions of the examination. If it is judged adequate, the M.A. degree is granted. In no event may the master's written and oral exams be taken more than twice.

MASTER OF ARTS IN ITALIAN

The terminal M.A. in Italian provides a combination of language, literature, civilization, and general courses designed to prepare secondary school, junior college, or college teachers.

Reading knowledge of a second Romance language is required. French is recommended.

Candidates must complete a minimum of 45 units of graduate work, all courses being taken for a letter grade, with a GPA of 3.3 (B+). To fulfill the requirements in one year, students should enroll for an average of 15 units per quarter. The basic course program is nine graduate courses, one of which may be taken outside the department but must be in a related field. The option of substituting a master's thesis for two literature courses is available.

Requirements for the completion of the M.A. include a comprehensive literature and language oral examination, which is normally given before the end of Spring Quarter. Before taking the exam, a candidate for the degree must submit to the Italian faculty a sample graduate seminar paper representative of the quality of his or her graduate work. On the basis of this paper, the results of the comprehensive examination, and the student's overall progress,

members of the department vote for or against awarding of the M.A. degree.

Applications for admission must be received by the last Friday of March in the prior academic year. It is preferred that applicants have an undergraduate degree in Italian or in a related field. Candidates for this degree are not eligible for financial aid or teaching assistantships.

GENERAL REQUIREMENTS FOR THE PH.D. IN FRENCH OR ITALIAN

The Department of French and Italian offers three Ph.D. programs: a Ph.D. in French, a Ph.D. in Italian, and a Ph.D. in French and Italian.

Students for each of these programs must complete the requirements following, as well as the requirements outlined for their respective Ph.D. program.

REQUIREMENTS

A candidate for the Ph.D. degree must complete at least 135 units of graduate-level study and teach five language courses in the section. 72 of the 135 units must be taken within the department. The remaining units must be selected in consultation with the Chair of Graduate Studies. Of the 72 department units, candidates for the Ph.D. in French must take a minimum of five courses taught in French (FRENLIT) for a minimum of 20 units during the course of their studies; three courses taught in French (FRENLIT) must be taken in the first year.

Students entering with a master's degree or previous graduate work may receive credit as determined on a case-by-case basis, up to a maximum of 45 units.

The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.

Required Courses—Three courses are required:

1. FRENGEN/ITALGEN 369. Introduction to Graduate Studies: Criticism as Profession, a 5-unit seminar offered in Autumn Quarter of each year, designed to acquaint students with the theoretical and methodological concerns of literary study. This course must be taken in the first quarter of study.
2. Definition and Inquiry: FRENGEN/ITALGEN 301E, New Methods and Sources in French and Italian Studies, a 3 unit course designed to familiarize graduate students with research materials and techniques. This course must be taken no later than the end of the third year of study.
3. DLCL 201. The Learning and Teaching of Second Languages: The second-language pedagogy course offered by the Stanford Language Center in the Spring Quarter of each year in order to prepare entering graduate students for teaching in their second year.

Distribution of Elective Courses—Apart from these requirements, students are granted considerable freedom in structuring a course of study appropriate to their individual needs. During the first year, most course work is usually done within the department, in order to ensure an adequate preparation for the qualifying examination. Students are encouraged to take a variety of courses in order to be exposed to different periods and issues. Students are not allowed to take Independent Study during their first year. In the second and third years, however, the program of study is tailored to the specific interests of the student.

Candidacy—By the sixth quarter of graduate study, students must have satisfied all requirements to advance to candidacy for the Ph.D. The requirements to advance to candidacy are the following:

- Students must have passed the qualifying examination and satisfactorily completed at least 72 units of graduate-level study beyond the bachelor's degree.
- Students cannot have any incompletes.
- Students must have reached an advanced level of proficiency in French or Italian.

A candidacy form, available from the student services officer, should be completed, signed and approved the department. The requirements to advance to candidacy are the following:

TGR status—Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the dissertation, completed 135 units, and submitted a Doctoral Dissertation Reading Committee form, must request Terminal Graduate Registration status to complete their dissertations. Each quarter, all TGR students must enroll in FRENGEN 802 or ITALGEN 802 for zero units, in the appropriate section for their adviser.

EXAMINATIONS

There are three examinations: the qualifying exam, the field exam, and the University oral examination.

Qualifying Examination—The first oral examination, which takes place in the first two weeks of October of the second year of study, tests the student's knowledge of language and literature and his or her aptitude for critical thinking. The examining committee (see below) schedules the precise exam date and time.

The exam is based on a standard reading list covering major works from all periods of literature in the language(s) of study, from the Middle Ages to the present day. The list may be expanded to reflect a student's particular interests, but not abridged.

Half of the exam takes place in the language of study, half in English (with the student free to choose which portion transpires in which language).

The exam is 90 minutes in length and consists of two parts:

1. A 20-minute presentation by the candidate on a topic to be determined by the student. This presentation may be given in English or in the language of study and should engage, in a succinct and synthetic manner, an issue or set of issues of broad relevance to the literary history of the language(s) of study. The presentation must not simply be a text read aloud, but rather must be given from notes. It is meant to be suggestive and not exhaustive, so as to provoke further discussion.
2. A 70-minute question and answer period in which the examining committee follows up on the candidate's presentation and discusses the reading list with the student. At least part of this portion of the exam takes place in the language of study. The student is expected to demonstrate a solid knowledge of the texts on the reading list and of the basic issues which they raise, as well as a broader sense of the cultural/literary context into which they fit and demonstrate the ability to formulate an original point of view on such texts and contexts.

The examining committee is determined yearly by the Director of the Department.

Two weeks before the exam, the student must also submit three graduate seminar papers which he or she considers representative of the quality of his or her graduate work at Stanford. At least one of these papers must be in French for the Ph.D. in French or Italian for the Ph.D. in Italian.

Students may not take the Qualifying Exam while incompletes are pending.

On the basis of these papers, the results of the qualifying examination, and an evaluation of the student's overall progress, the members of the student's examining committee vote for or against admission to candidacy for the Ph.D. The terminal master's degree may be awarded to students who have completed the qualifying procedure, but whose work is judged insufficient for admission to candidacy for the Ph.D. If the overall case for or against promotion to candidacy is deemed uncertain, students may be asked either to retake the qualifying exam, to submit a new paper, or they may be admitted to candidacy on a probationary basis. Subject to approval by the Chair of Graduate Studies and the Director of the Department, students already holding an advanced degree in the relevant area may be excused from the qualifying exam. However, they must present a formal request for a waiver to the Chair of Graduate

Studies upon their arrival at Stanford. Such a request must document the course work completed elsewhere and include all relevant reading lists. Only in cases where taking the qualifying exam would involve considerable repetition of already completed work is such a waiver likely to be granted.

Field Examination—The second oral examination, which normally takes place in the Autumn Quarter of the third year of study, consists of two parts:

1. A 20-minute presentation by the student on a topic (a particular literary genre or a broad theoretical, historical, or interdisciplinary question) freely chosen and developed by the individual student working in collaboration with his or her adviser and the Chair of Graduate Studies. The student should design this research project so that it has the breadth and focus of a book he or she might write or a seminar he or she might teach. The student should discuss the proposed topic with the Chair of Graduate Studies before the end of the quarter preceding the quarter in which he or she plans to take the exam; together they choose a committee of two faculty members with interests close to the proposed topic. (In most cases, one of these committee members is the student's adviser.) In addition to these two members, the examination committee includes the Chair of Graduate Studies, who serves in an ex officio capacity as the third member of the examination committee. This presentation is followed by a 20-minute discussion.
2. An 80-minute discussion of a reading list, assembled by the student, which covers about a century of writing. The reading list should include works in all genres relevant to the period covered and should be around two single-spaced pages in length. The list may well include critical and scholarly works or texts from outside the traditional domain of literary studies in the chosen tradition (such as film, philosophy, other literary traditions), but such coverage should be regarded as supplemental except in rare instances where the chair and faculty advisers have agreed to define these materials as the student's field. Students are required to discuss the reading list for the examination with the Chair of Graduate Studies and with members of their committee during the quarter preceding the examination. A final reading list must be in the hands of the committee no later than two weeks preceding the examination; two copies of the final reading list must be given to the student services officer for the Division of Languages, Cultures, and Literatures (one for the student's file and one for a special file which subsequent students can consult).

   Each member of the committee is assigned a 20-minute period to question the candidate on the reading list and its intellectual-historical implications. The aim of these questions is to establish the student's credentials as a specialist in the period of his or her choosing, so the core of the reading list must be made up of texts that are essential to any specialist. It follows that reading lists must not focus on the narrow area of the student's research interests. The tendency to bias reading lists toward the dissertation topic, be it an author or a genre, does not cancel the obligation to cover the major figures and genres. It is understandable that some students, by their third year, have become so deeply committed to their work toward the dissertation that they wish to use the preparation period for the examination as part of their dissertation research. Certainly, some of the exam work may prove relevant, but students should also remember that the examination is the central means of certifying their expertise in a literary period.

The University Oral—The University Ph.D. examination takes the form of a dissertation proposal defense. It is to be taken no later than Autumn Quarter of the student's fourth year (or third year, if the student received four years of funding). Normally students put one, and at most two, full-time quarters of study into preparation for the exam. Students must complete minimum course requirements (as listed in this bulletin) and all language and course requirements before the quarter in which they take the University oral examination. By the time of the examination, they must have no outstanding incompletes. Students must submit the Request for University Oral Exam form to the student services officer at least three weeks before the proposed date of the exam. At the same time this form is submitted, students should also submit the Notice of Appointment of the Ph.D. dissertation reading committee. In addition, a Report on Ph.D. Foreign Language must be completed, certifying a reading knowledge of the foreign language the student presents to meet the language requirements.

Two weeks before the exam, at the latest, the student must submit to the committee a 25-35 page proposal (two other copies must be given to the student services officer of the Division of Languages, Cultures, and Literatures, one of which is added to a file for subsequent students to consult). This proposal must contain the following parts: 1) a clear presentation of the student's central thesis; 2) a synthetic overview of the dissertation; 3) a description of the methodology that is used in the dissertation; 4) an in-depth discussion of current secondary sources on the topic. The student must also append a bibliography, but this does not take the place of 4. The prospectus must be prepared in close consultation with the dissertation director during the months preceding the colloquium.

The exam committee consists of four members, in addition to a committee chair from outside the Department of French and Italian whose principal functions are to keep track of time and to call on the four members of the committee who question the candidate on the talk and on the reading list.

After a 20-minute presentation on the part of the candidate, each member of the committee (apart from the committee chair) questions the student for 20 minutes. At the end of the hour and forty minutes, the faculty readers vote on the outcome of the exam. If the outcome is favorable (by majority vote), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory (by majority vote), the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second exam.

The University oral examination is a formal University event. It represents the last occasion for the faculty to evaluate a student's overall preparation as a candidate for the Ph.D. After the University oral, only the certification of the final dissertation by the student's reading committee must be obtained before conferral of the Ph.D. The examination, therefore, is a uniquely significant event and is designed to evaluate the student's preparation to write a dissertation at the highest standards of excellence.

Evaluation—At the end of each examination, the committee meets briefly and immediately informs the student whether he or she has passed. In the week following, the student is expected to meet individually with members of the committee to discuss strengths and weaknesses revealed during the examination.

DISSERTATION

The fourth and (if necessary) fifth years of graduate study are devoted to writing and researching the doctoral dissertation. The doctoral dissertation should demonstrate the ability to carry out research, organize, and present the results in publishable form. The scope of the dissertation should be such that it could be completed in 12 to 18 months of full-time work.

DOCTOR OF PHILOSOPHY IN FRENCH

The Department of French and Italian provides students with the opportunity to pursue advanced work in French language, literature, cultural history, theory, and Francophone studies within a uniquely flexible interdisciplinary framework. Unlike conventional Ph.D. programs, it encourages students to construct a highly individualized course of study, integrating specialization in a particular literary period or area with work in such fields as art history, classics, film studies, the history of science and technology, linguistics, literary theory, music, and philosophy. The program is founded on the belief that such a balance between period/area specialization and interdisciplinary breadth is not only desirable but essential in a field such as French Studies.

Students in the Ph.D. program are normally admitted as French Fellows on a four- to five-year fellowship plan that integrates their

financial support with training as scholars and as prospective university faculty.

Students admitted to the program work closely with the Chair of Graduate Studies in structuring a plan consistent with their needs and interests. Aside from the benefits of the program's flexible structure, a number of unique resources are available to students. The French section's exchange program with the Ecole Normale Supérieure provides candidates (selected on a competitive basis) with the opportunity to pursue dissertation research in Paris.

REQUIREMENTS

Students must complete the requirements outlined in the "General Requirements for the Ph.D. in French or Italian" section of this bulletin, as well as the requirements outlined following.

LANGUAGE REQUIREMENTS

Attaining a native or near-native fluency in French is the responsibility of all candidates in the Ph.D. program and a requirement to qualify for the Ph.D. degree.

Upon entering the program, candidates must take the OPI (Oral Proficiency Interview) with the Language Center to determine their fluency in French. An advanced level or above must have been reached by the time candidates take their qualifying exams in the Autumn Quarter of the second year of study. If a student fails to score in the advanced bracket of the OPI test upon entering, he or she is tested again at the beginning of the second year. It is the responsibility of the candidates to design a course of study to improve their proficiency in French during the first summer, for instance by applying to a French language program. Candidates should discuss these plans with the Chair of Graduate Studies well in advance.

In addition, candidates are required to achieve a high level of proficiency in one additional foreign language, with the language in question to be determined by the student and the adviser as a function of the student's area of specialization. Such proficiency may be demonstrated either by completing a third-year level or above undergraduate course; or, more recommended, a graduate seminar in the language in question; or by passing an exam that establishes a third-year or above level of competence in writing, reading, and speaking. In no case is passage of a standard reading competence exam considered sufficient. In the case of ancient Greek and Latin, a high level of proficiency means a level superior to a second-year collegiate level of proficiency in reading and writing.

The second foreign language requirement should be completed as soon as possible, but in any case not later than the end of the third year for students who entered the program without an M.A., and not later than the end of the second year for students who entered the program with a master's degree. Completion of the language requirements is a prerequisite for taking the University oral examination.

DOCTOR OF PHILOSOPHY IN ITALIAN

Stanford's Ph.D. program in Italian offers the opportunity for advanced work in Italian literature and studies within a flexible interdisciplinary framework. It is independent of the Ph.D. program in French and aims to encourage students to bring broad methodological and interdisciplinary concerns to bear on the study of Italian literature. While it places primary emphasis on developing a command of Italian literature as a whole, it allows students to construct a highly individualized course of study, integrating specialization in a particular literary period with work in such fields as art history, classics, comparative literature, feminist studies, film, French, history, history of science, linguistics, literary theory, Medieval or Renaissance studies, philosophy, and religion. The program is founded on the belief that balance between period specialization and interdisciplinary breadth is essential in a small field such as Italian studies, particularly given the diversity of the Italian literary canon which extends over many disciplines.

Students admitted into the Ph.D. program in Italian work closely with the adviser in structuring a plan of study appropriate to needs and interests. Such a plan usually involves a mix of teaching and courses taken within the Italian program, courses taken in other departments, and independent work under supervision of a member of the Italian faculty, thus integrating financial support with training as scholars and prospective university teachers. Assuming satisfactory academic progress, fellowships are typically offered for three or four years. Graduate-level work completed elsewhere may be counted as fulfilling part of the requirements for the degree. Students in the fifth year normally apply for outside fellowships or part-time teaching positions in the department.

Aside from the benefits of the program's structure and fellowship plan, a number of unique resources are available to Ph.D. students in Italian at Stanford. During their years of study, students may be permitted to take courses, pursue dissertation research, and do independent work at the Stanford campus in Florence under supervision of a member of the Italian faculty. The Florence center, located in a palazzo along the Arno, is near important Florentine libraries and archives and the University of Florence. Graduate students also have at their disposal the resources of La Casa Italiana, a residential theme house which serves as an Italian cultural center and hosts such events as colloquia, lectures, and film series.

REQUIREMENTS

Students must complete the requirements outlined in the "General Requirements for the Ph.D. in French or Italian" section of this bulletin, as well as the requirements outlined following.

LANGUAGE REQUIREMENTS

As soon as possible, but not later than the end of the third year, the candidate must have passed reading examinations in two additional foreign languages. If the candidate's period of concentration is earlier than the Romantic period, one of these must be Latin; if Romantic or later, French. Completion of the language requirement is a prerequisite for taking the University oral examination.

DOCTOR OF PHILOSOPHY IN FRENCH AND ITALIAN

The Department of French and Italian provides students with the opportunity to pursue a Ph.D. in French and Italian studies. This unique program encourages students to construct a highly individualized course of study within an interdisciplinary framework, in order to foster a thorough and creative knowledge of both traditions and their intersections. Students are expected to specialize in one of three periods, (a) medieval and renaissance, (b) renaissance and early modern, or (c) modern and contemporary. Students in the Ph.D. program are normally admitted either as French Fellows or as Italian Fellows on a four- to five-year fellowship plan that integrates their financial support with rigorous training as scholars and as prospective university faculty.

Students admitted to the program work closely with the Chair of Graduate Studies in structuring a plan consistent with their needs and interests. Where general requirements call for the participation of a Chair of Graduate Studies, candidates for the Ph.D. in French and Italian should understand that the participation of the chairs of both French and Italian, if they are different, is required.

Aside from the benefits of the program's flexible structure, a number of unique resources are available to students. The French Section's exchange program with the Ecole Normale Supérieure provides candidates (selected on a competitive basis) with the opportunity to pursue dissertation research in Paris. Students may also be permitted to take courses, pursue dissertation research, and do independent work at the Stanford campus in Florence under supervision of a member of the Italian faculty.

REQUIREMENTS

Students must complete the requirements outlined in the "General Requirements for the Ph.D. in French or Italian" section of this bulletin, as well as the requirements outlined following.

LANGUAGE REQUIREMENTS

Attaining a native or near-native fluency in both French and

Italian is the individual responsibility of all candidates in the Ph.D. program, and remedial course work needed to achieve such fluency cannot count towards the Ph.D. degree.

For students specializing in areas (a) medieval and renaissance and (b) renaissance and early modern, proficiency in Latin equivalent to a second year collegiate level of proficiency (the equivalent of CLASSLAT 101, 102, and 103) in reading is also required. Such proficiency may be demonstrated by successfully completing a course in the language in question (at least second-year level, but preferably a graduate seminar); or by passing an exam that establishes a second-year or above level of competence. In no case is passage of a standard reading competence exam considered sufficient.

For students specializing in area (c) modern and contemporary, proficiency in a third language (beyond French and Italian) is not required; students are, however, encouraged to acquire competency in a third language or area that is relevant to their research (e.g. German, Film Studies).

The language requirements should be completed as soon as possible, but in any case not later than the end of the third year for students who entered the program without a master's degree, and not later than the end of the second year for students who entered the program with an external master's degree. Completion of the language requirements is a prerequisite for taking the University Oral Examination.

Distribution of Elective Courses—Students must take a minimum of four advanced courses on French literature and culture, and four advanced courses on Italian literature and culture.

Qualifying Examination—Students may take either two qualifying exams, one in French and one in Italian, or a single qualifying exam in French and Italian. The combined French and Italian qualifying exam covers one of three periods, (a) medieval and renaissance, (b) renaissance and early modern, or (c) modern and contemporary. For each period it is based on a standard reading list. The list may be expanded to reflect a student's particular interests, but not abridged. One third of the combined exam takes place in English, one third in French, and one third in Italian (with the student free to choose which portion transpires in which language).

An M.A. in French and Italian is awarded in the eventuality that a student completes the qualifying examination but whose work is judged insufficient for admission to candidacy for the Ph.D. This M.A. option is open only to students approved for the French and Italian Ph.D., and is not available to coterminal students, to M.A.-only students, or to Ph.D. students in French only or Italian only.

If, at the qualifying exam stage, a student's work is judged insufficient for admission to candidacy for the Ph.D., the student may petition to continue in French only or Italian only. This petition is reviewed by the qualifying exam committee, the relevant Chair of Graduate Studies, and the Director of the Department of French and Italian.

Special Topic Examination—The chosen topic must focus equally on French and Italian literature and culture, and actively explore their relationship. Two weeks before the exam, the student must also submit not one but two graduate seminar papers, one in French on a French topic and one in Italian on an Italian topic.

University Oral Examination—The reading list should include works in both French and Italian in all genres relevant to the period covered.

Dissertation—The dissertation topic must include a substantial quotient of material from both the French and the Italian tradition, and the dissertation must include, either (1) at least one chapter on French materials and one chapter on Italian materials, or (2) at least two chapters focusing on a comparison between French and Italian materials.

Teaching—Out of the five courses the student is required to teach, at least one must be a French language course and at least one an Italian language course.

PH.D. IN FRENCH OR ITALIAN AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to the joint Ph.D. in French and Humanities, or Italian and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

PH.D. MINOR IN FRENCH AND ITALIAN

The Ph.D. may be combined with a minor in a related field, including Comparative Literature, Linguistics, Modern Thought and Literature, Art History, History, Music, Philosophy, and Spanish. Ph.D. candidates in French may minor in Italian, and vice versa. Students interested in a minor should design their course of study with their adviser(s).

Ph.D. Minor in French Literature—The department offers a minor in French Literature. The requirement for a minor in French is completion of 24 units of graduate course work in the French section. Interested students should consult the graduate adviser.

Ph.D. Minor in Italian Literature—The department offers a minor in Italian Literature. The requirement for a minor in Italian is a minimum of 24 units of graduate course work in Italian literature. Interested students should consult the graduate adviser.

OVERSEAS STUDIES COURSES IN FRENCH AND ITALIAN

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

FLORENCE

- OSPFLOR 34. The Woman in Florentine Art. 4 units, Timothy Verdon, GER:DB:Hum, EC:Gender
- OSPFLOR 106V. Italy: From an Agrarian to a Post-industrial Society. 5 units, Giuseppe Mammarella, GER:DB:SocSci, EC:GlobalCom
- OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization. 4 units, Timothy Verdon, GER:DB:Hum
- OSPFLOR 134F. Modernist Italian Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

PARIS

- OSPPARIS 32. Understanding French Politics. 4-5 units, Patrick Chamorel, GER:DB:SocSci
- OSPPARIS 45. Notre-Dame de Paris: A Course on French Literature and the History of Paris. 5 units, Jean-Marie Apostolidès
- OSPPARIS 58. Tintin as a Hero and a Myth. 5 units, Jean-Marie Apostolidès

WINTER QUARTER

FLORENCE

- OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought. 5 units, Paolo Galluzzi, GER:DB:Hum
- OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition. 4 units, Filippo Rossi, Timothy Verdon, GER:DB:Hum
- OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema. 5 units, Ermelinda Campani, GER:DB:Hum
- OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence. 4 units, Timothy Verdon, GER:DB:Hum

PARIS

- OSPPARIS 186F. Contemporary African Literature in French. 4 units, Françoise Rullier, GER:DB:Hum, EC:GlobalCom

SPRING QUARTER

FLORENCE

- OSPFLOR 23. European Universities: The New Renaissance of Italian Higher Education. 3 units, Eric. P. Bettinger
- OSPFLOR 54. High Renaissance and *Maniera*. 5 units, Timothy Verdon, GER:DB:Hum
- OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image. 4 units, Ermelinda Campani, GER:DB:Hum, EC:Gender

PARIS

- OSPPARIS 30. The Avant Garde in France through Literature, Art, and Theater. 4 units, Tiphaine Karsenti, GER:DB:Hum

GERMAN STUDIES

Emeriti: (Professors) Theodore M. Andersson, Gerald Gillespie, Walter F. W. Lohnes, Katharina Mommsen, Kurt Müller-Vollmer
Director: Russell A. Berman
Chair of Graduate Studies: Amir Eshel
Chair of Undergraduate Studies: Adrian Daub
Professors: Russell A. Berman, Elizabeth Bernhardt, Amir Eshel, Orrin W. Robinson III (on leave, Autumn)
Assistant Professors: Adrian Daub, Márton Dornbach, Charitini Douvaldzi (on leave Winter)
Senior Lecturers: William E. Petig, Kathryn Strachota
Visiting Professor: Kurt Müller-Vollmer (Winter)
Department Office: Building 260, Room 108
Mail Code: 94305-2030
Phone: (650) 723-3266
Email: germanstudies@stanford.edu
Web Site: http://germanstudies.stanford.edu

Courses offered by the Department of German Studies are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes GERGEN (German General) and GERLIT (German Literature). For courses in German language instruction with the subject code GERLANG, see the "Language Center" section of this bulletin.

The department's goal is to provide students with the linguistic and analytic ability to explore the significance of the cultural traditions and political histories of the German-speaking countries of Central Europe. At the same time, the interdisciplinary study of German culture, which can include art, history, literature, media theory, philosophy, and political science, encourages students to evaluate broader and contradictory legacies of modernity, such as how the literary, artistic, and cultural responses to the belated and rapid modernization of Germany allow for reflection on the modern condition in general.

Similarly, the German experience of national identity and political unification sheds light on wider issues of cultural cohesion and difference, as well as on the causes and meaning of phenomena such as racial prejudice, anti-Semitism, and the Holocaust. In general, an education in German Studies not only encourages the student to consider the effects of German-speaking thinkers and artists on the modern world, but also provides a lens through which the contours of the present and past can be evaluated.

The department offers students the opportunity to pursue course work at all levels in the languages, cultures, literatures, and intellectual histories of the German-language traditions. Whether interested in German literature or the influence of German thought on other fields in the humanities, students find a broad range of courses covering language acquisition and refinement, literary history and criticism, cultural history and theory, history of thought, continental philosophy, and linguistics.

By carefully planning their programs, students may fulfill the B.A. requirements for a double major in German Studies and another subject. An extended undergraduate major in English and German literature is available, as are coterminal programs for the B.A. and M.A. degrees in German Studies. Doctoral students may elect Ph.D. minors in Comparative Literature, Linguistics, and Modern Thought and Literature.

Special collections and facilities at Stanford offer possibilities for extensive research in German Studies and related fields pertaining to Central Europe. Facilities include the Stanford University Libraries and the Hoover Institution on War, Revolution, and Peace. Special collections include the Hildebrand Collection (texts and early editions from the 16th to the 19th century), the Austrian Collection (with emphasis on source material to the time of Maria Theresa and Joseph II, the Napoleonic wars, and the Revolution of 1848), and the Stanford Collection of German, Austrian, and Swiss Culture. New collections emphasize culture and cultural politics in the former German Democratic Republic. The Hoover Institution has a unique collection of historical and political documents pertaining to Germany and Central Europe from 1870 to the present. The department also has its own reference library.

The Republic of Austria has endowed the Distinguished Visiting Professorship in Austrian Studies. The professorship rotates on a yearly basis through several departments.

Haus Mitteleuropa, the German theme house at 620 Mayfield, is an undergraduate residence devoted to developing an awareness of the culture of Central Europe. A number of department courses are regularly taught at the house, and there are in-house seminars and conversation courses. Assignment is made through the regular undergraduate housing draw.

MISSION OF THE UNDERGRADUATE PROGRAM IN GERMAN STUDIES

The mission of the undergraduate program in German Studies is to provide students with the linguistic and analytic background necessary to explore the significance of cultural traditions and political histories of the German-speaking countries of Central Europe. In addition, its interdisciplinary component prepares students to evaluate how the literary, artistic, and cultural responses to the belated yet rapid modernization of Germany allow for reflection of its modern condition. Students pursue course work at all levels in the languages, literatures, and intellectual histories of the Germanic nations. The program prepares students for careers in business, social service, and government, and for graduate work in German Studies.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. oral proficiency beyond the interpersonal level with presentational language abilities.
2. writing proficiency beyond the interpersonal level with presentational language abilities.
3. close reading skills of authentic texts in German.
4. the ability to develop effective and nuanced lines of interpretation.

STANFORD IN BERLIN

Undergraduates interested in Germany are encouraged to enroll in the Berlin program, which is open for academic study during the Autumn, Winter, and Spring quarters. The program also offers internships in German industry, government, and cultural organizations year round. Through the Center, students with at least two years of college-level German can also take courses at the Freie Universität, Technische Universität, or Humboldt Universität. Most students live in homes with German hosts.

Most credits earned in Berlin can be applied to the undergraduate major in German Studies. All students who are planning to study at Stanford in Berlin or engage in an internship are encouraged to consult with the Chair of Undergraduate Studies and the Overseas Studies office about integrating work done abroad into their degree program. Returning interns who wish to develop a paper based on their experience should enroll in GERLIT 298. More detailed information is available at the Overseas Studies Program in Sweet Hall or with the Chair of Undergraduate Studies.

COTERMINAL PROGRAMS

Students may elect to combine programs for the B.A. and M.A. degrees in German Studies. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

GRADUATE PROGRAMS IN GERMAN STUDIES

The University requirements for the M.A. and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

BACHELOR OF ARTS IN GERMAN STUDIES

Majors must demonstrate basic language skills, either by completing GERLANG 1,2,3, First-Year German, or the equivalent such as an appropriate course of study at the Stanford in Berlin Center. Students then enroll in intermediate and advanced courses on literature, culture, thought, and language. Requirements for the B.A. include at least two courses at the 120-129 level and three core literature courses. Every major is expected to complete at least one Writing in the Major (WIM) course. Including GERLANG 1,2,3, the total requirement for the B.A. is a minimum of 60 units of work; the German and Philosophy option requires 65 units. At the discretion of the Chair of Undergraduate Studies, appropriate courses offered by other departments or relevant transfer units can be accepted toward this total, up to a maximum of 25 units. All GERLANG courses count as department electives. Courses counted toward degree requirements must be taken for a letter grade unless that grading option is not available.

Requests for exceptions to any of these requirements must be referred to the Chair of Undergraduate Studies who, in consultation with the Director, makes a final decision.

Internships—Internships in Germany are arranged through the Overseas Studies Program. In addition, students may consult with the department to arrange local internships involving German language use or issues pertaining to Germany or Central Europe. Interns who prepare papers based on their experience enroll in GERLIT 298.

Extended Major in English and German Literatures—Students may enter this program with the consent of the Director of German Studies and the Chair of the Department of English. See the "Field of Study IV. Literature and Foreign Language Literature" section in the "Bachelor of Arts in English" section of this bulletin.

Multiple Majors—Students can combine a major in German Studies with a major in any other field. By choosing courses in such disciplines as history, international relations, or economics, students can prepare themselves in the area of Central Europe. Multiple majors are especially recommended for students spending one or more quarters at the Stanford in Berlin Center.

Degree Requirements—

1. Completion of two GERLIT courses at the 120-level
2. Completion of German Studies Core series:
   a. GERLIT 131. Eighteenth-Century German Literature
   b. GERLIT 132. Nineteenth-Century German Literature
   c. GERLIT 133. Twentieth-Century German Literature
3. GERLIT 190: German Studies (WIM)
   a. Remaining 33 units to be completed through elective courses approved in consultation with the Chair of Undergraduate Studies. A maximum of 27 units of GERLANG courses and/or 25 units from courses covering German material taught in other departments may be applied to these elective units.

GERMAN AND PHILOSOPHY

The German and Philosophy major option offers students the opportunity to combine studies in literature and philosophy. Students take most of their courses from departments specializing in the intersection of literature and philosophy. This option is not declared in Axess; it does not appear on the transcript or diploma.

The German and Philosophy major option requires a minimum of 16 courses, for a minimum total of 65 units, distributed as follows:

1. 35 units in German Studies, including:
   a. completion of two GERLIT courses at the 120-level
   b. completion of German Studies Core series:
      1. GERLIT 131. Eighteenth-Century German Literature
      1. GERLIT 132. Nineteenth-Century German Literature
      2. GERLIT 133. Twentieth-Century German Literature.
   c. GERLIT 190. German Studies (WIM)
2. GERGEN 181/PHIL 81, the gateway course in philosophy and literature, preferably in the sophomore year.
3. Requirements in Philosophy:
   a. Prerequisite: an introductory philosophy class
   b. PHIL 80. Mind, Matter, and Meaning
   c. a course in the PHIL 180 series
   d. a course in the PHIL 170 series
   e. two courses in the history of philosophy numbered above 100
4. Two additional elective courses of special relevance to the study of philosophy and literature as identified by the committee in charge of the program. In German, these courses include the GERGEN 120Q, Is God Dead?; GERGEN 122Q, The Culture of Pessimism; GERGEN 125, Varieties of Freedom in Modern German Culture; GERGEN 211, Theodor W. Adorno; GERGEN 212, The Invention of Experience; GERGEN 246, Kant's Third Critique; GERGEN 268A, Freud and the Enterprise of Psychoanalysis; and other advanced seminars in German thought and literature. Students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought.
5. *Capstone:* One of the courses must be taken in the student's senior year. When choosing courses, students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought.
6. Units devoted to meeting the department's language requirement are not counted toward the 65-unit requirement.

The capstone seminar and the two related courses must be approved by both the German Studies Chair of Undergraduate Studies and the undergraduate adviser of the program in philosophical and literary thought administered through the DLCL. Substitutions,

including transfer credit, are not normally permitted for items 3b, 3c, and 3d, and are not permitted under any circumstances for items 2, 3a, and 5. Up to 10 units taken in the Philosophy Department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade.

HONORS

Majors with a minimum grade point average (GPA) of 3.3 in German courses are eligible for departmental honors. Students interested in the honors program should consult the undergraduate adviser early in their junior year. The essay topic is chosen in consultation with a faculty member of the department, and opportunities to start research projects are offered at the Stanford in Berlin Center. In addition to the requirements listed above, the student must submit a proposal for the honors essay to the German faculty by the end of Spring Quarter of the junior year. During this quarter, students may enroll for 2 units of credit in GERLIT 189B for the drafting or revision of the thesis proposal. In Autumn Quarter of the senior year, the student must enroll in DLCL 189, a 5-unit seminar that focuses on researching and writing the honors thesis. Students then enroll for 5 units of credit in GERLIT 189A while composing the thesis during Winter Quarter. Students who did not enroll in 189B in the junior year may enroll in GERLIT 189B in Spring Quarter of the senior year while revising the thesis, if approved by the thesis supervisor. A total of 10-12 units are awarded for completion of honors course work, independent study, and the finished thesis.

MINOR IN GERMAN STUDIES

The department offers two minor options; the DLCL offers two additional minor options.

MINOR IN GERMAN LANGUAGE AND CULTURE

Students may choose to minor in German Language and Culture if they are particularly interested in developing a strong ability in the German language, or in pursuing linguistic issues pertinent to German. Students satisfy the requirements for the minor in German Language and Culture by completing 35 units of course work, including at least three courses at the 100-139 level in either GERLANG or GERLIT, taught in German. Study at the Stanford in Berlin Center for at least one quarter is highly recommended.

MINOR IN GERMAN CULTURAL STUDIES

Students who wish to study German literature, culture, or thought, without necessarily acquiring facility in the German language, may pursue a minor in German Cultural Studies. Students meet the requirements for the minor in German Cultural Studies by completing 35 units of course work in German literature, culture, and thought in translation, including at least three courses at the 130- or 140- level.

MINOR IN LITERATURE AND MINOR IN MODERN LANGUAGES

The Division of Literatures, Cultures, and Languages offers undergraduate minor programs in Literature and in Modern Languages. Both of these minors draw on literature and language courses offered through this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about the minors and their requirements.

MASTER OF ARTS IN GERMAN STUDIES

This program is designed for those who do not intend to continue studies through the Ph.D. degree. Students desiring the M.A. degree must complete a minimum of 45 units of graduate work. If students enroll for three quarters for a minimum of 15 units per quarter, they can fulfill the M.A. requirements in one year. The program normally includes at least one course in each of the three areas of concentration: language and linguistics, literature, and thought.

In addition, students must take graduate-level courses in German and/or approved courses in related fields such as art history, comparative literature, linguistics, history, or philosophy.

M.A. candidates must take an oral examination toward the end of their last quarter.

DOCTOR OF PHILOSOPHY IN GERMAN STUDIES

The requirements for the Ph.D. include:

1. A minimum of 36 graduate units during the first year of graduate study, 45 units for the completion of the M.A., and a minimum of 10 units per quarter during the six quarters following the first year. A total of 135 units is required for the Ph.D.; doctoral candidates are advised to complete at least one course with each member of the department.
2. A reading knowledge of one language other than English and German, normally French. Students in Medieval Studies must also have a reading knowledge of Latin.
3. A master's oral examination, unless the student has an M.A. upon entering the program
4. A qualifying paper
5. A qualifying examination
6. The University oral examination
7. A dissertation

During the first year of work, the student should select courses that provide an introduction to the major areas of the discipline. During Spring Quarter of the first year, students, except those admitted with a master's degree, must take an oral M.A. examination. During the one-hour examination, the student is questioned by three faculty members, two of whom are regular faculty in the department, chosen by the student, on work undertaken in specific graduate courses.

By July 1 of the summer following the first year of graduate study, students should present as a qualifying paper an example of their course work. Although ordinarily not meant to represent an original contribution to scholarship, it should demonstrate the candidate's ability to grasp complex subject matter with sufficient competence to organize materials and to present arguments in a clear and concise manner commensurate with scholarly standards. The paper is submitted to the department director, who passes it on for approval by the student's faculty adviser and a second reader appointed by the director in consultation with the Chair of Graduate Studies.

Students who enter the program with a master's degree from another institution must submit, in lieu of a qualifying paper, a master's thesis or a major research paper as evidence of ability to pursue advanced scholarly work.

At the end of the sixth quarter of study (and only if the qualifying paper has been accepted), the student takes a one-hour oral qualifying exam with two faculty members from German Studies, the student's chosen adviser, and another faculty member appointed by the director. The purpose of this examination is to demonstrate a broad familiarity with the literature of the major periods, movements, and some major figures. Only after completion of the qualifying procedure does the department approve the student's admission to candidacy. A student who fails the qualifying examination may retake it once at the beginning of the seventh quarter.

After passing the qualifying exam, the student should consult with appropriate faculty members in order to develop a dissertation topic. It is important to consider scholarly significance, access to resources, and feasibility of completion within a reasonable period. The student then prepares a preliminary statement describing the topic (no more than five pages), which is circulated to prospective committee members for discussion at a meeting normally held during the eighth quarter. The purpose of this meeting is to provide the student with feedback and guidance in the preparation of the formal prospectus.

The University oral examination in the Department of German Studies is based on the dissertation prospectus. The prospectus, normally 25 pages plus bibliography, elaborates on the topic, the

proposed argument, and the organization of the dissertation. It must be distributed to the committee members and the outside chair at least two weeks before the formal University oral examination. Students should plan this examination for the end of the third year or the end of the subsequent summer. The examination lasts approximately two hours, permitting each of the four examiners a 25-minute question period and reserving an optional ten minutes for questions from the chair of the examination.

Students, regardless of their future fields of concentration, are expected to acquire excellence in German and a thorough knowledge of the grammatical structure of German. The department expects Ph.D. candidates to demonstrate teaching proficiency in German; DLCL 201, The Learning and Teaching of Second Languages, is required. The teaching requirement is five quarters during the second and third years of study and mandatory for continued enrollment or support in the program. Students may request to teach and additional literature course at a latter time in the course of study, contingent upon department need and approval of the director. Such teaching does not extend the length or scope of support.

The department expects candidates to demonstrate research skills appropriate to their special areas of study. The requirement can be fulfilled in the capacity of either a University Fellow or a Research Assistant.

Graduate students are also advised to start developing skills in the teaching of literature by participating in the teaching of undergraduate literature courses. Students can earn up to 3 units of graduate credit for practice teaching in literature.

Regular attendance at the departmental colloquium is mandatory. Each student is expected to make a formal presentation, no earlier than the third year, at the colloquium for public discussion. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of University, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.

PH.D. IN GERMAN STUDIES AND HUMANITIES

The department of German Studies participates in the Graduate Program in Humanities leading to the joint Ph.D. in German and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted.The University remains committed to abroad-based graduate education in the humanities: the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at (650) 724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on Stanford Bulletin's ExploreCourses web site.

GERMAN STUDIES AND A MINOR FIELD

Students may work toward a Ph.D. in German Studies with minors in such areas as Comparative Literature, Modern Thought and Literature, Linguistics, or History. Students obtaining a Ph.D. in such combinations may require additional training.

OVERSEAS STUDIES COURSES IN GERMAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

- OSPBER 101A. Contemporary Theater. 5 units, Karen Kramer, GER:DB:Hum

WINTER QUARTER

BERLIN

- OSPBER 62. Shades of Green: Environmental Policy in Germany and the U.S. in Historical Perspective. 5 units, Sylke Tempel, GER:DB:SocSci

SPRING QUARTER

BERLIN

- OSPBER 11. The Vanishing City: Lost Architecture and the Art of Commemoration in Berlin. 4-5 units, Knut Ebelingr, GER:DB:Hum
- OSPBER 101A. Contemporary Theater. 5 units, Karen Kramer, GER:DB:Hum
- OSPBER 174.Sports Culture and Gender in Comparative Perspective. 5 units, Wolf Junghanns, GER:DB:SocSci, EC:Gender

HISTORY

Emeriti: (Professors) Barton J. Bernstein, Carl N. Degler, Peter Duus, Terence Emmons, Harold L. Kahn, David M. Kennedy, George H. Knoles, Richard W. Lyman, Mark Mancall, Peter Paret, Paul A. Robinson, Paul Seaver, James J. Sheehan, Peter Stansky, David B. Tyack, Lyman P. Van Slyke; (*Senior Lecturer*) Joseph J. Corn

Chair: Paula Findlen

Professors: Keith M. Baker, Joel Beinin, Philippe Buc, Albert Camarillo, James T. Campbell, Clayborne Carson, Gordon Chang, Paula Findlen, Estelle Freedman, Stephen Haber, Tamar Herzog, David Holloway, Nancy S. Kollmann, Mark E. Lewis, Carolyn Lougee Chappell, Ian Morris, Norman M. Naimark, Robert Proctor, Jack N. Rakove, Richard L. Roberts, Aron Rodrigue, Richard P. Saller, Londa Schiebinger, Richard White, Kären E. Wigen, Caroline Winterer, Steven J. Zipperstein

Associate Professors: David R. Como, Robert Crews, James P. Daughton, Zephyr Frank, Jessica Riskin, Matthew H. Sommer, Amir Weiner

Assistant Professors: Sean Hanretta, Allyson V. Hobbs, Aishwary Kumar, Yumi Moon, Thomas S. Mullaney, Priya Satia, Edith Sheffer, Laura Stokes, Jun Uchida

Courtesy Professors: Giovanna Ceserani, Lawrence Friedman, Leah Gordon, Avner Greif, Amalia Kessler, Larry Kramer, David F. Labaree, Reviel Netz, Walter Scheidel, Sam Wineburg, Gavin Wright

Senior Lecturers: Katherine Jolluck, Martin W. Lewis

Acting Assistant Professor: Sophie Roberts

Lecturers: Heather Ferguson, Bradley Naranch

Department Office: Building 200, Room 113

Mail Code: 94305-2024

Phone: (650) 723-2651

Web Site: http://history.stanford.edu

Courses offered by the Department of History are listed under the subject code HISTORY on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE DEPARTMENT OF HISTORY

History courses teach the analytical, interpretive, and writing knowledge and skills necessary for understanding the connections between past and present. History is a pragmatic discipline in which the analysis of change over time involves sifting the influ-

ences and perspectives that affect the course of events, and evaluating the different forms of evidence historians exploit to make sense of them. Teaching students how to weigh these sources and convert the findings into persuasive analysis lies at the heart of the department's teaching. Graduates with a History major pursue careers and graduate study in law, public service, business, writing, education, and journalism.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of what it means to think historically: locating subjects in time and place and being sensitive to the contingencies of context and to change over time.
2. critical and interpretive thinking skills using course's primary source materials.
3. the ability to identify different types of sources of historical knowledge.
4. analytical writing skills and close reading skills.
5. effective oral communication skills

DEGREES OFFERED

The Department of History offers the following degree programs: Bachelor of Arts, coterminal Bachelor of Arts and Master of Arts, Master of Arts, and Doctor of Philosophy.

GRADUATE PROGRAMS IN HISTORY

The primary goal of the Stanford Department of History's graduate program is the training of scholars. Most students who receive doctorates in the program go on to teach at colleges or universities. Other students have obtained positions in university administration and research.

HISTORY COURSE CATALOG NUMBERING SYSTEM

	Introductory Seminars: Freshmen, Sophomores	Sources and Methods Seminars	Lectures	Colloquia	Research Seminars and Workshops
International, Global, Thematic	6N, 95N		102, 103D, 106A,B, 107, 108	201, 202C, 203E, 204E, F, 206, 207C, 208S, 209B,C,D, 233D, 299E,X, 301, 303E, 304, 305, 306G, 307C,E, 309A,B,F, 333D, 399A	307A, 401A
Ancient and Medieval Europe	11N	17S			
Early Modern and Modern Europe	31Q	30S, 32S, 37S	110B,C, D, 131, 132A, 133B, 135, 135A, 137, 138A, 139, 185B, 186D, 187D	230D,F, 231G, 233, 234, 234F, 236A,D, 238K, 239D, 285F, 287E,G,K, 328K, 330A,D,F, 331G, 333, 334, 334F, 335, 336A,D, 337, 338A, 339D, 385F, 387E,G,K	430A, 432A, 438
Eastern Europe, Russia, Eurasia	20Q		125	224A, 227, 322, 327	424A,B
History of Science			130A	231A, 242A, 331A, 342A	
Africa	48Q	43S, 45S	145B, 147	248S, 345B, 346	448A,B
United States	35N, 36N, 58N, 62N	51S, 53S, 58S, 60S, 61S, 62S	150A,B, C, 158B,C, 161, 164C, 166, 166B	201, 243J, 250A, 251C,G, 255E, 258, 258D,E, 260, 301, 337C, 351A,B,C,E, 352B, 358, 360	461A,B
Latin America			170	278A, 371, 378E, 470	
Middle East	82N		181B, 182C, 183, 187D	224B, 282, 284, 287S, 288, 324B, 382, 384, 388	481
Jewish History			137, 185B, 186D, 187D	285F, 286E, 287D,E,K, 337, 385F, 386E, 387D,E,K	
Asia		92S	191C, 193, 194B, 195, 195C, 196, 197, 198	291D, 292, 292D,F, 391C,D, 392, 392B,D,F, 393C, 396D	495A,B

BACHELOR OF ARTS IN HISTORY

The following History Bachelor of Arts degree requirements apply to students declaring the History major on or after September 1, 2008. Students who declared on or before August 31, 2008 should consult the 2007-08 edition of the *Stanford Bulletin* for the History B.A. degree requirements.

PREREQUISITES FOR THE MAJOR

Before declaring the History major, students must take two lecture courses. Fulfilling this requirement are courses numbered HISTORY 101-199. (Winter/Spring IHUM History offerings are also allowed.) The choices for 2010-11 are:

- IHUM 11A,B. Origins of the World: Europe and Latin America
- HISTORY 102. The History of the International System
- HISTORY 103D. Human Society and Environmental Change
- HISTORY 106A. Global Human Geography: Asia and Africa
- HISTORY 106B. Global Human Geography: Europe and Americas
- HISTORY 107. Introduction to Feminist Studies
- HISTORY 108. Mass Violence in Modern History
- HISTORY 110B. Early Modern Europe
- HISTORY 110C. Introduction to Modern Europe
- HISTORY 110D. Europe in the High and Late Middle Ages, 1000-1500
- HISTORY 125. 20th-Century Eastern Europe
- HISTORY 130A. The Rise of Scientific Medicine
- HISTORY 131. Science, Technology, and Art: The Worlds of Leonardo da Vinci
- HISTORY 132A. Enlightenment and the Arts
- HISTORY 133B. Revolutionary England: The Stuart Age
- HISTORY 135. History of European Law, Medieval to Contemporary
- HISTORY 135A. Globalization and the Making of Modern Europe
- HISTORY 137. The Holocaust
- HISTORY 138A. Germany and the World Wars, 1870-1990
- HISTORY 139.Modern Britain and the Empire
- HISTORY 145B. Africa in the 20th-Century
- HISTORY 147. History of South Africa
- HISTORY 150A. Colonial and Revolutionary America
- HISTORY 150B. 19th-Century America
- HISTORY 150C. The United States in the 20th-Century
- HISTORY 158B. History of Education in the United States
- HISTORY 158C. History of Higher Education in the U.S.
- HISTORY 161. Women in Modern America
- HISTORY 164C. From Freedom to Freedom Now: African American History, 1865-1965
- HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
- HISTORY 166B. Immigration in 20th-Century America: Ethnicity, Race, Nation
- HISTORY 170. Colonial Latin America
- HISTORY 181B. Formation of the Contemporary Middle East
- HISTORY 182C. From Prophet to Empire: The Making of the Muslim Middle East, 600-1500
- HISTORY 183. Modern Iran
- HISTORY 185B. Jews in the Modern World
- HISTORY 186D. Jews, Citizenship, and Europe's Others
- HISTORY 187D. Zionism and Its Critics
- HISTORY 191C. Early Imperial China
- HISTORY 191D. China: The Northern and Southern Dynasties
- HISTORY 193. Late Imperial China
- HISTORY 194B. Japan in the Age of the Samurai
- HISTORY 195. Modern Korean History
- HISTORY 195C. Modern Japanese History
- HISTORY 196. The Idea of India
- HISTORY 197. Southeast Asia: From Antiquity to the Modern Era
- HISTORY 198. The History of Modern China

BACHELOR OF ARTS REQUIREMENTS

History majors are required to complete the following:

1. Completion of a minimum of 63 units and at least 13 courses of at least 3 units each, to include:
   a. one Sources and Methods seminar (HISTORY 1S-99S)
   Note: Students must complete the Sources and Methods Seminar requirement prior to enrolling in the Research Seminar for Majors.
   b. two 200-level undergraduate colloquia (HISTORY 200-298)
   c. at least one other small group course, to be chosen among the department's undergraduate colloquia, research seminars, or Stanford Introductory Seminars.
   d. two lecture courses, one of which must be either a Europe survey course (such as HISTORY 110A,B,C) or a United States survey course (such as HISTORY 150A,B,C); the second must be a lecture course in African, Asian, Middle East, or Latin American History. Students may count courses they took as prerequisites to the major for this requirement.
2. Courses comprising the 63 units must be taken for a letter grade, and the student must maintain a grade point average (GPA) in History courses of 2.0 or higher.
3. At least nine courses must be taken from within the Stanford Department of History. Transfer students and those who study abroad may be granted exemptions from this requirement at the discretion of the Director of Undergraduate Studies.
4. Completion of the Writing in the Major requirement. This requirement is satisfied by completing a Research Seminar for Majors (HISTORY 209S) and writing a 20-25 page essay based on original research and including at least two drafts. The Research Seminar for Majors may be taken in either the junior or the senior year. Students must complete the Sources & Methods seminar before enrolling in the Research Seminar.
5. At least six quarters of enrollment in the major. Each candidate for the B.A. in History should declare the major by the Autumn Quarter of the third year of study or earlier, if possible.
6. One Directed Writing (299W) or Directed Research (299S) taken for 3-5 units and for a letter grade may be applied toward the thirteen courses required for the B.A. in History.
7. Capstone: The History department organizes a series of luncheon workshops in May, at which students present their research essays and honors theses.

Completion of the major requires planning. History majors should plan to meet with their faculty advisers twice yearly, once in the Autumn and once in the Winter or Spring quarters. These meetings should take place within the first three weeks of the quarter, before the add/drop deadline.

The department also encourages students to acquire proficiency in foreign languages and study at one of Stanford's overseas programs. Such studies are not only valuable in themselves; they can provide an opportunity for independent research and a foundation for honors essays and graduate study.

Advanced Placement credits do not fulfill any major requirements.

For further information on History courses' satisfaction of major requirements, see http://history.stanford.edu/courses.

WRITING IN THE MAJOR (WIM) REQUIREMENT

History's Writing in the Major requirement is satisfied by completing HISTORY 209S, Research Seminar for Majors.

This course may be taken in either the junior or senior year, but not before completing the sources and methods seminar requirement. Students write a 20-25 page research essay. Original re-

search and revision are important parts of the research essay. Students must conduct substantial research in the libraries and must submit at least two drafts (a rough draft and a final draft) of the essay. Any student wishing to write an honors thesis must take HISTORY 209S, Research Seminar for Majors, in the junior year and use it to begin work on the thesis; this work can take the place of a research essay.

HISTORY 209S fulfills the WIM requirement only. It does not fulfill geographical requirements or small group course requirements.

Students select their research topics based on the general topic of each quarter's offering.

- HISTORY 209S. Research Seminar for Majors
  - Autumn: History and the Arts: Europe since 1600
  - Winter: American Identities and Comparative Colonialism
  - Spring: China to 1000 CE, Early Modern Topics, and State and Nation since 1650

HONORS PROGRAM

For a limited number of majors, the department offers a special program leading to Departmental Honors in History. Students accepted for this program, in additional to fulfilling the general requirements stated above, begin work on an essay in Spring Quarter of the junior year and complete the essay by mid-May of the senior year. In addition to HISTORY 299H, The Junior Honors Colloquium, students must enroll in 11-15 units of Senior Research in the senior year, to be distributed as best fits their specific project. For students in the Honors program, Senior Research units (299A, B, C) are taken in addition to the thirteen required courses in History.

To enter this program, the student must be accepted by a member of the department who agrees to advise the research and writing of the essay, and must complete the Junior Honors Colloquium (299H) offered in Winter Quarter. An exception to the latter requirement may be made for those studying overseas Winter Quarter of the junior year, but such students should consult with the director of the honors program, if possible, prior to going overseas. Students who study abroad for the entire junior year and want to write an honors thesis should plan to take the Research Seminar for Majors in the first quarter following completion of the study abroad program. Under exceptional circumstances, students are admitted to the program in Autumn Quarter of the senior year. Such students must not enroll in any HISTORY 299A,B,C, Senior Research I,II,III units until HISTORY 209S, Research Seminar for Majors, has been completed.

In considering an applicant for such a project, the adviser and director of the honors program take into account general preparation in the field of the project and expect a GPA of at least 3.3 (B+) in the student's previous work in History and in the University. Students completing the thesis with a grade of 'B+' or higher are eligible for Departmental Honors in History. To enter the Honors program, apply at the Department of History office.

Outstanding Honors essays may be considered for the University's Robert M. Golden Medals, as well as for departmental James Birdsall Weter prizes.

Honors Program Requirements—To graduate with Departmental Honors in History, students must: (1) complete HISTORY 299H in the junior year; (2) maintain a 3.3 GPA in History courses and throughout the University during the final 5 quarters of enrollment/thesis preparation: (3) select both a primary thesis adviser (who is a member of the Stanford History faculty) and a secondary adviser (who is a Stanford University faculty member) no later than Autumn quarter of the senior year ; (4) submit on May 16, 2011 by noon a 65-120 page honors thesis including bibliography that receives a grade of 'B+' or better; (5) enroll in the 11-15 units of Senior Research as specified below; and (6) participate in mandatory Honors Program activities throughout senior year (including, but not limited to, writing workshops and the annual Honors Day oral presentations) as specified in the Honors Program Handbook.

HISTORY 299A,B,C do not fulfill any history major requirements other than Honors, but the units do count towards the 180 required for B.A. degree conferral.

Required Courses—

To be taken in the junior year:

- HISTORY 299H. Junior Honors Colloquium
- HISTORY 209S. Research Seminar for Majors

An exception (for HISTORY 299H) may be made for those studying overseas Winter Quarter of the junior year, but such students should consult with the Director of the Honors Program prior to going overseas.

To be taken in the senior year:

- HISTORY 299A. Senior Research I (5 units)
- HISTORY 299B. Senior Research II (5 units)
- HISTORY 299C. Senior Research III (1-5 units)

OVERSEAS STUDIES OR STUDY ABROAD

Courses offered by Stanford's Bing Overseas Studies Program and appearing on the History department's cognate course list automatically receive credit towards the major or minor in History. Course work completed in non-Stanford Study Abroad programs is evaluated for major/minor credit by designated History department faculty on a case-by-case basis. Students in non-Stanford Study Abroad programs are advised to take classes with reading and writing components comparable to History department course loads.

HISTORY FIELDS OF STUDY OR DEGREE OPTIONS

The Department of History offers five tracks to the B.A. in History. These tracks are not declared on Axess. The tracks are:

- General History
- History, Literature, and the Arts
- History of Science and Medicine
- History and the Law
- Public History/Public Service

The General History track emphasizes breadth of study among historical areas and periods as well as concentration in one selected field. The four tracks with interdisciplinary emphasis (History, Literature and the Arts, History of Science and Medicine, History and the Law, and Public History/Public Service) combine the study of history with the methods and approaches of other disciplines, and involve substantial course work outside of History.

GENERAL HISTORY TRACK

In addition to completing the requirements for all History majors, the student in the General History track is required to satisfy breadth and concentration requirements.

1. Breadth Requirements: to ensure chronological and geographical breadth, at least two courses must be completed in a premodern chronological period and in each of three geographical fields: Field I (Africa, Asia, and Middle East); Field II (the Americas); and Field III (Europe, including Western Europe, Eastern Europe, and Russia). Courses fulfilling the premodern chronological period (Field IV) may also count for Fields I-III. For 2010-2011, these courses are as follows:
   1. *Field I: Africa/Asia/Middle East*
      - HISTORY 43S. Indian Ocean History, 1100-1945
      - HISTORY 45S. Colonial Anthropologists and the Production of Knowledge about Africa
      - HISTORY 48Q. South Africa: Contested Transitions
      - HISTORY 82N. Modern Islamic Movements
      - HISTORY 92S. Cultural Identity in Ancient and Medieval China
      - HISTORY 135. History of European Law, Medieval to Contemporary
      - HISTORY 145B. Africa in the 20th-Century
      - HISTORY 147. History of South Africa
      - HISTORY 181B. Formation of the Contemporary Middle East

- HISTORY 182C. From Prophet to Empire: The Making of the Muslim Middle East, 600-1500
- HISTORY 183. Modern Iran
- HISTORY 187D. Zionism and Its Critics
- HISTORY 191C. Early Imperial China
- HISTORY 193. Late Imperial China
- HISTORY 194B. Japan in the Age of the Samurai
- HISTORY 195. Modern Korean History
- HISTORY 195C. Modern Japanese History
- HISTORY 196. The Idea of India
- HISTORY 197. Southeast Asia from Antiquity to the Modern Era
- HISTORY 198. The History of Modern China
- HISTORY 224B. Modern Afghanistan
- HISTORY 248S. African Societies and Colonial States
- HISTORY 282. The United States and the Middle East since 1945
- HISTORY 284. The Ottoman Turks in Comparative Perspective: The Inner Life of a Eurasian Empire
- HISTORY 287D. Tel Aviv: Site, Symbol, City
- HISTORY 287G. Jews in Colonial North Africa
- HISTORY 287S. Middle East History
- HISTORY 288. Palestine and the Arab-Israeli Conflict
- HISTORY 291D. Colonialism and Collaboration in East Asia
- HISTORY 292. The Korean War: Origins, Outbreak, and Aftermath
- HISTORY 292D. Japan in Asia, Asia in Japan
- HISTORY 292F. Traditional Korea
- HISTORY 293. Law and Society in Late Imperial China

1. *Field II: The Americas*
   - HISTORY 36N: Gay Autobiography
   - HISTORY 51S. Popular Violence in 19th-Century American Culture and Society
   - HISTORY 53S. Rebellion and Revolution in American History: From the Stamp Act to the Civil War
   - HISTORY 58N. Thomas Jefferson and his World
   - HISTORY 58S. Perceptions of Failure in 19th-Century America: Indians, Degenerates, and Debtors
   - HISTORY 60S. International Social Movements in the U.S. from World War I to World War II
   - HISTORY 61S. California Politics since the 1960s
   - HISTORY 62N. The Atomic Bomb in Policy and History
   - HISTORY 62S. The Politics, Culture and Ecology of Food in American History
   - HISTORY 107. Introduction to Feminist Studies
   - HISTORY 130A. The Rise of Scientific Medicine
   - HISTORY 150A. Colonial and Revolutionary America
   - HISTORY 150B. 19th Century America
   - HISTORY 150C. The United States in the 20th Century
   - HISTORY 158B. History of Education in the United States
   - HISTORY 158C. History of Higher Education in the U.S.
   - HISTORY 161. Women in Modern America
   - HISTORY 164C. From Freedom to Freedom Now! African American History, 1865-1965
   - HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
   - HISTORY 166B. Immigration in 20th-Century America: Ethnicity, Race, Nation
   - HISTORY 170. Colonial Latin America
   - HISTORY 201. Introduction to Public History in the United States, 19th Century to the Present
   - HISTORY 243J. Climate Change in the West: A History of the Future
   - HISTORY 251C. The American Enlightenment
   - HISTORY 251G. Topics in Constitutional History
   - HISTORY 258. Topics in the History of Sexuality: Sexual Violence
   - HISTORY 258D. School: What Is It Good For?
   - HISTORY 260. California's Majority Minority Cities
   - HISTORY 278A. Political Economy of Property Rights
2. *Field III: Europe, Eastern Europe, and Russia*
   - HISTORY 11N. The Roman Empire: Its Grandeur and Fall
   - HISTORY 17S. Princesses, Politicians, and Patronesses: Identities of Early Modern Noble Women
   - HISTORY 20Q. Russia in the Early Modern Imagination
   - HISTORY 30S. Travel, Adventure, Blood, and Espionage: The British Cultural Imagination in Afghanistan, 1813-1907
   - HISTORY 31Q: British History Revealed by the Arts of the Twentieth Century
   - HISTORY 32S. Gender and European Imperial Crisis through Media: 1880-2000
   - HISTORY 35N. Industrial Revolution: The History, Ethics, and Consequences of Modern Economic Development
   - HISTORY 36N. Gay Autobiography
   - HISTORY 37S. Youth in Modern Europe, 1762-1968
   - HISTORY 102. The History of the International System
   - HISTORY 110B. Early Modern Europe
   - HISTORY 110C. Introduction to Modern Europe
   - HISTORY 110D. Europe in the High and Late Middle Ages, 1000-1500
   - HISTORY 125. 20th-Century Eastern Europe
   - HISTORY 131. Science, Technology and Art: The Worlds of Leonardo da Vinci
   - HISTORY 132A. Enlightenment and the Arts
   - HISTORY 133B. Revolutionary England: The Stuart Age
   - HISTORY 135. History of European Law
   - HISTORY 137. The Holocaust
   - HISTORY 138A. Germany and the World Wars, 1870-1990
   - HISTORY 139. Modern Britain and the Empire
   - HISTORY 185B. Jews in the Modern World
   - HISTORY 186D. Jews, Citizenship, and Europe's Others
   - HISTORY 204E. Origins of Totalitarianism
   - HISTORY 224A. The Soviet Civilization
   - HISTORY 227. East European Women and War in the 20th Century
   - HISTORY 230D. Europe in the World: 1789 to the Present
   - HISTORY 230F. Self-Policing, Denunciation, and Surveillance in Modern Europe
   - HISTORY 231A. Charles Darwin and the Global 19th Century
   - HISTORY 231G. European Reformations
   - HISTORY 233. Reformation, Political Culture, and the Origins of the English Civil War
   - HISTORY 233C. Two British Revolutions
   - HISTORY 233F. Political Thought in Early Modern Britain
   - HISTORY 234. Enlightenment Seminar
   - HISTORY 234F. Science, Technology, and Empire
   - HISTORY 236A. Nations and Nationalism in East-Central Europe
   - HISTORY 236D. Cold War Europe
   - HISTORY 238K. Resistance and Collaboration in Hitler's Europe During World War II
   - HISTORY 239. Capital and Empire
   - HISTORY 242A. Technology and Society in the Modern World (1700 to Present)

- HISTORY 286E. Jews in France from the Dreyfus Affair to World War II
- HISTORY 287E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism
- HISTORY 287K. Gentlemen and Jews: History of the Jews of England

3. *Field IV: Pre-1700*
   - HISTORY 11N. The Roman Empire: Its Grandeur and Fall
   - HISTORY 17S. Princesses, Politicians, and Patronesses: Identities of Early Modern Noble Women
   - HISTORY 20Q. Russia in the Early Modern European Imagination
   - HISTORY 92S. Cultural Identity in Ancient and Medieval China
   - HISTORY 110B. Early Modern Europe
   - HISTORY 110D. Europe in the High and Late Middle Ages, 1000-1500
   - HISTORY 131. Science, Technology and Art: The Worlds of Leonardo da Vinci
   - HISTORY 132A. Enlightenment and the Arts
   - HISTORY 133B. Revolutionary England: The Stuart Age
   - HISTORY 135. History of European Law
   - HISTORY 170. Colonial Latin America
   - HISTORY 182C. From Prophet to Empire: The Making of the Modern Middle East, 600-1500
   - HISTORY 191C. Early Imperial China
   - HISTORY 193. Late Imperial China
   - HISTORY 194B. Japan in the Age of the Samurai
   - HISTORY 202C. Heretics to Headscarves
   - HISTORY 207C. The Global Early Modern
   - HISTORY 231G. European Reformations
   - HISTORY 233. Reformation, Political Culture, and the Origins of the English Civil War
   - HISTORY 233C. Two British Revolutions
   - HISTORY 233D. Strangers, Barbarians, and Infidels: Crosscultural Encounters in the Pre-Modern World
   - HISTORY 233F. Political Thought in Early Modern Britain
   - HISTORY 284. The Ottoman Turks in Comparative Perspective: The Inner Life of a Eurasian Empire
   - HISTORY 292F. Traditional Korea
   - IHUM 11A. Origins of the World: Europe and Latin America

2. Concentration: to develop some measure of expertise, students must complete four courses in a single area (including one undergraduate colloquium or research seminar). The proposed concentration must be approved by the major adviser; a proposal for a thematic concentration must be approved by both the adviser and the department's director of undergraduate studies. Areas of concentration are:
   - Africa
   - Asia
   - Eastern Europe and Russia
   - Europe before 1700
   - Europe since 1700
   - Jewish History
   - Latin America
   - Science and Technology
   - The United States
   - The Middle East
   - International History
   - Comparative Empires and Cultures
   - or a thematic subject treated comparatively, such as war and revolution, work, gender, family history, popular culture, or high culture.
3. Required course: HISTORY 102. The History of the International System is a required course for students who select the International History concentration. This course is offered in Spring quarter.

Certain Introduction to the Humanities (IHUM) courses taught by History faculty in a Winter-Spring sequence count toward the General History major. These are: IHUM 4A,B; 5A,B; 6A,B;11A,B

HISTORY TRACKS WITH INTERDISCIPLINARY EMPHASIS (HMIE)

These tracks are designed for students who are interested in other disciplines who want to focus on the historical aspects of the subject matter covered by that discipline, who want to understand how interdisciplinary approaches can deepen their understanding of history, or who are primarily interested in developing interdisciplinary approaches to historical scholarship by combining the careful attention to evidence and context that motivates historical research with the analytic and methodological tools of science and the humanities. In pursuing the above requirements for all History majors, students in HMIE are required to complete their thirteen courses for the major as follows:

Gateway Course (one course)—Students are required to take the appropriate gateway course for their interdisciplinary track. This course introduces students to the application of particular interdisciplinary methods to the study of history. See the section on each HMIE for the gateway course appropriate to that major track. (*Note:* The History and the Law track has no gateway course requirement.)

Methodological Cluster (three courses)—This cluster is designed to acquaint students with the ways in which interdisciplinary methods are employed in historical scholarship, by practicing historians and scholars in other disciplines whose work is historical. This program of study must provide methodological coherence and must be approved in advanced by the student's adviser. See the section on each HMIE for the appropriate historical methods courses. (*Note:* The History and the Law track requires four methodology courses.)

Geographic Cluster (four courses)—History is embedded in time and place. This cluster is designed to emphasize that the purpose of studying methodology is to more fully understand the history of a particular region of the world. Students select a particular geographic region, as specified in the History major, and complete four courses in that area.

Interdisciplinary Cluster (four courses)—These courses, taken outside the Department of History, acquaint students with the methods and approaches of another discipline appropriate for the interdisciplinary study of history. This program of study must provide methodological coherence and must be approved in advance by the student's adviser. See the section on each HMIE for appropriate interdisciplinary courses.

Research Seminar for Majors (HISTORY 209S)—Fulfills Writing in the Major Requirement.

HMIE tracks do not mandate the breadth or concentration requirements of the General History track. Introduction to the Humanities courses taught by History faculty may apply to HMIE tracks only insofar as their content is specifically appropriate to the particular methodological or geographic cluster.

HISTORY, LITERATURE, AND THE ARTS

The History, Literature, and the Arts (HLA) track is designed for the student who wishes to complement his or her work in History with study in literature, particularly in a foreign language. For the purposes of this major, literature is defined broadly, including art, drama, films and poetry, memoirs and autobiography, novels, as well as canonical works of philosophy and political science. It appeals to students who are interested in studying literature primarily in its historical context, or who want to focus on both the literature and history of a specific geographical area while also learning the language of that area.

Gateway Course—HISTORY 132A. Enlightenment and the Arts gives students a broad introduction to the study of literary texts in history. *Note:* The former gateway course, HISTORY 239E, History, Literature and the Arts in Great Britain, may be counted in lieu of 132A.

Methodological Cluster—This three-course cluster teaches students how historians, in particular, analyze literary texts as documentary sources. Students choose three courses from among the pre-approved HLA methodology curriculum. These courses need not be in the student's geographic concentration. For 2010-11, these courses are:

- HISTORY 6N. Utopia: History of Nowhere Land
- HISTORY 17S. Princesses, Politicians, and Patronesses: Identities of Early Modern Noble Women
- HISTORY 31Q. British History Revealed by the Arts of the 20th Century
- HISTORY 32S. Gender and European Imperial Crisis through Media: 1880-2000
- HISTORY 36N. Gay Autobiography
- HISTORY 37S. Youth in Modern Europe, 1762-1968
- HISTORY 95N. Mapping the World: Cartography and the Modern Imagination
- HISTORY 110C. Introduction to Modern Europe
- HISTORY 131. Science, Technology and Art: The Worlds of Leonardo da Vinci
- HISTORY 150A. Colonial and Revolutionary America
- HISTORY 191C. Early Imperial China*
- HISTORY 193. Late Imperial China*
- HISTORY 194B. Japan in the Age of the Samurai*
- HISTORY 196. The Idea of India*
- HISTORY 251C. The American Enlightenment
- HISTORY 292F. Traditional Korea

* Courses marked with an asterisk are non-Western lectures that students in the The History, Literature, and the Arts (HLA) track can use towards both a HLA methodology course and as the non-Western lecture requirement.

Geographical Cluster—Students select four History courses in one geographic area. These are: Europe, Britain and the countries of the former British Empire, Asia, North America, Latin America, the Middle East, or Africa. These four courses must be taken in addition to the three methodological courses required above.

Interdisciplinary Cluster—Four courses, taken outside the Department of History, must address the literature and arts, broadly defined, of the area chosen for the geographic concentration. The student's adviser must pre-approve all courses in this cluster; these courses may not be double-counted towards a minor or major other than History.

Research Seminar for Majors—HISTORY 209S; fulfills Writing in the Major requirement.

General Requirements—Like all History majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S, one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

HISTORY OF SCIENCE, AND MEDICINE

The History of Science, and Medicine (HS&M) track is a collaborative program of the Department of History and the Program in the History and Philosophy of Science. The major is designed for students interested in both sciences and humanities, and in the interactions between the two. It is also especially useful for students contemplating medical school, since it allows them to study the history of medicine, biology, and allied sciences in conjunction with fulfilling the pre-med science requirements.

Gateway Course (one course)—HISTORY 131. Science, Technology, and Art: The Worlds of Leonardo da Vinci (Winter Quarter)

Methodological Cluster (three courses)—These History courses focus on the history of science, technology, and medicine. For 2010-11, these courses are:

- HISTORY 35N. Industrial Revolution: The History, Ethics and Consequences of Modern Economic Development
- HISTORY 103. Human Society and Environmental Change
- HISTORY 234F. Science, Technology, and Empire
- HISTORY 243J. Climate Change in the West: A History of the Future
- AMSTUD 156H. History of Women and Medicine in the United States
- HPS 158. The Social History of Mental Illness
- HPS 220. Nineteenth Century Philosophy of Science

Geographical Cluster (four courses)—Students select four History courses in one geographic area. Examples include: Europe, Britain and the countries of the former British Empire, Asia, North America, Latin America, the Middle East, or Africa. These four courses must be taken in addition to the three methodological cluster courses. Courses in the history of science, technology, and medicine that have a geographic focus may be used to fulfill this requirement, but cannot be double-counted in the methodological cluster.

Interdisciplinary Cluster (four courses)—Students select four courses in scientific disciplines and/or in philosophy of science, anthropology of science, or sociology of science. These courses require faculty adviser pre-approval.

Research Seminar for Majors (HISTORY 209S)—Fulfills the Writing in the Major requirement.

General Requirements—Like all history majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S., one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

HISTORY AND LAW

The History and Law (HL) interdisciplinary track is for students who wish to explore the intersections between historical and legal studies. The HL curriculum focuses on the role of legal institutions, policies, and structures in various societies. HL track majors enroll in at least four History department courses that focus on issues of law in civil societies and four courses that provide a geographic concentration. In addition, students enroll in four courses outside History that provide disciplinary or interdisciplinary perspectives on the role of law in shaping societies and a Research Seminar for Majors.

Gateway Course—There is no gateway course for this track. Instead, students take an extra course in the Methodological cluster.

Methodological Cluster (four courses)—Students enroll in at least four History department courses, including courses outside History taught by faculty affiliated with the department, that focus on how law, policies, constitutions, and legal structures affect the development of various societies. (*Note:* The Methodological Cluster for this HIP contains one extra course since there is no Gateway course.)

For 2010-11, these courses are—

- HISTORY 108. Mass Violence in Modern History
- HISTORY 135. History of European Law
- HISTORY 196. The Idea of India
- HISTORY 202C. Heretics to Headscarves
- HISTORY 208S. The Politics of Retrospective Justice
- HISTORY 251G. Topics in Constitutional History
- HISTORY 258. Topics in the History of Sexuality: Sexual Violence

Geographical Cluster (four courses)—Students choose four History courses in one geographic area, such as the United States, Europe, Latin America, Asia, Middle East, or Africa.

Interdisciplinary Cluster (four courses)—Students may select from courses offered in the School of Law, School of Education, and others as appropriate. *Note:* Courses in the School of Law and School of Education require the permission of the instructor before undergraduate students can enroll, since these are graduate-level courses.

Research Seminar for Majors (HISTORY 209S)—Fulfills the Writing in the Major requirement.

General Requirements—Like all history majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S., one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

PUBLIC HISTORY/PUBLIC SERVICE

The Public History/Public Service (PH/PS) interdisciplinary history track is designed for students who wish to include in their course of studies the application of historical study in (1) public settings such as museums and heritage sites, national and state parks, public agencies, and private foundations, and (2) public service settings in non-profit organizations, public agencies, and educational institutions.

PH/PS majors enroll in a gateway course on public history and public service and in four History department courses that provide a geographic concentration as well as completing a two-course methodological requirement. In addition, students, in consultation with the PH/PS faculty coordinator, complete four courses from outside the History department drawn from the annual listing of service-learning courses provided by the Haas Center for Public Service; these courses provide interdisciplinary and methodological perspectives on public service. PH/PS majors must also complete an internship through a regularly offered service-learning course or through a summer internship or fellowship.

Gateway course (one course)—HISTORY 201, Introduction to Public History in the U.S., Nineteenth Century to the Present, provides grounding in the theory and practice of public service and exposure to the types of public history practiced in venues such as museums, historical sites, parks, and non-profit organizations, including local historical societies.

Geographical Cluster (four courses)—Students select four History courses in one geographic area, such as the United States, Europe, Latin America, Asia, Middle East, or Africa. The faculty coordinator must pre-approve all courses in this cluster.

Interdisciplinary Cluster (four courses)—Students select four courses from outside the History department drawn from the annual listing of service-learning and theory/practice courses provided by the Haas Center for Public Service. The faculty coordinator must pre-approve all courses in this cluster.

Examples of appropriate PH/PS interdisciplinary courses are:

- AMSTUD 221. Public and Professional Service: Theories and Ethical Practice of Public and Community
- ETHICSOC 144. Nongovernmental Organizations and Development in Poor Countries
- POLISCI 133. Ethics and Politics In Public Service
- POLISCI 141. Global Politics of Human Rights
- SOC 118. Social Movements and Collective Action
- SOC 137. Homelessness: Its Causes, Consequences, and Policy Solutions

Methodological Cluster (two courses)—Students must enroll in one Sources and Methods seminar course and one additional 200-level History course. The Writing in the Major (WIM) requirement must be completed in a Research Seminar for Majors.

- HISTORY 166B. Immigration in 20th-Century America: Ethnicity, Race, Nation
- HISTORY 260. California's Majority Minority Cities

Public Service/Service Learning Internship (one course)—Students must engage in at least a one quarter internship through a service learning course or through a full-time public service or public history summer internship or fellowship. This internship must be pre-approved by the faculty coordinator.

Students who complete a paid summer internship in lieu of one for academic credit have two options: they can complete an additional history course, or they can enroll in 3 units of HISTORY 299S with the faculty coordinator of the PH/PS track and write a 20-page research paper related to their internship work. This research paper is in addition to that required for the Research Seminar for Majors.)

Two History Department service-learning courses are offered in 2010-11:

- HISTORY 201. Introduction to Public History in the U.S., 19th Century to the Present (Autumn)
- HISTORY 260. California's Minority-Majority Cities (Spring)

If students elect to fulfill the internship requirement through a History Department service-learning course, they must enroll in an additional course in either the geographical cluster or the Interdisciplinary cluster in order to complete the 13 courses required for the major.

Research Seminar for Majors—HISTORY 209S; fulfills Writing in the Major requirement.

General Requirements—Like all history majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or US, one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

HISTORY SECONDARY TEACHER'S CREDENTIAL

Applicants for the Single Subject Teaching Credential (Secondary) in the social studies may obtain information regarding this program from the Credential Administrator, School of Education.

MINOR IN HISTORY

Students must declare the minor in History no later than Autumn Quarter of the senior year via Axess. Minor declarations are approved by the Department of History and confirmation is sent via email to the student.

Candidates for the minor in History must complete six courses, at least three of which must have a field or thematic focus. Students completing the minor may choose to concentrate in such fields as African, American, Asian, British, European (medieval, early modern, or modern), Russian and East European history, comparative empires and cultures, or such thematic topics as the history of gender, the family, religion, technology, or revolution. Students may also petition to have a concentration of their own design count toward the minor.

REQUIREMENTS

All six courses must be of at least 3 units each and must be taken for a letter grade. The student must maintain a grade point average (GPA) in History courses of 2.0 (C) or higher. Two of the six courses must be small-group in format (Stanford Introductory Seminars, Sources and Methods Seminars, departmental colloquia, and research seminars). History courses taken at Stanford overseas campuses may count toward the minor, but at least three of the six courses must be taken from Stanford History faculty.

Advanced Placement credits do not fulfill any minor requirements.

Optional Courses for the Minor—History courses taken at non-Stanford Study Abroad programs may count toward the minor (provided the History Department approves them), but at least three of the six courses must be taken from Stanford History faculty. One course from certain Introduction to the Humanities courses (IHUM 4A,B; 5A,B; and 11A,B) may count toward the six-course requirement, but not for the three-course field of concentration. One Directed Research (299S) course may count to-

ward the minor, if taken for 3-5 units and for a letter grade. A maximum of three transfer courses may be used toward the minor.

COTERMINAL B.A. AND M.A. PROGRAM IN HISTORY

The department each year admits a limited number of undergraduates for coterminal B.A. and M.A. degrees in History. Coterminal applications are accepted during Autumn Quarter for admission in Spring Quarter; check with the History office for the application deadline. Applicants are responsible for checking their compliance with University co-terminal requirements listed in the "Undergraduate Degrees and Programs" section of this bulletin.

ADMISSION

Applicants must meet the same general standards as those seeking admission to the M.A. program; they must submit a written statement of purpose, a transcript, GRE test scores, and three letters of recommendation, at least two of which should be from members of the Department of History faculty. To be competitive, coterminal applicants should have a 3.75 GPA in their undergraduate history major (or equivalent if they are entering without a History major.) The decision on admission rests with the department faculty upon recommendation by the Graduate Admissions Committee. Students must meet all requirements for both degrees. They must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 225 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three courses that fall within a single Ph.D. field.

The application filing deadline is December 7, 2010.

The coterminal B.A. and M.A. program is not declarable on Axess.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN HISTORY

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

The department requires the completion of nine courses (totaling not less than 45 units) of graduate work; seven courses of this work must be Department of History courses. Of the seven, one must be a seminar and four must be either graduate colloquia or graduate seminars. Directed reading may be counted for a maximum of 10 units. A candidate whose undergraduate training in history is deemed inadequate must complete nine courses of graduate work in the department. The department does not recognize for credit toward the M.A. degree any work that has not received the grade of 'A' or 'B.'

Terminal M.A. Program—Applicants who do not wish to continue beyond the M.A. degree are admitted to this program at the discretion of the faculty in individual fields (U.S., modern Europe, and so on). Students admitted may not apply to enter the Ph.D. program in History during the course of work for the M.A. degree.

M.A. in Teaching (History)—The department cooperates with the School of Education in offering the Master of Arts in Teaching degree. For the general requirements, see the "School of Education" section of this bulletin. For certain additional requirements made by the Department of History, contact the department office. Candidates must possess a teaching credential or relevant teaching experience.

ADMISSION

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details, see the Guide to Graduate Admission, available from Graduate Admissions, the Registrar's Office, 630 Serra Street, Suite 120, or at http://gradadmissions.stanford.edu.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal M.A. program, they are admitted with the expectation that they will be working toward the Ph.D. degree and may become candidates to receive the M.A. degree after completing three quarters of work.

The application filing deadline is December 7, 2010.

DOCTOR OF PHILOSOPHY IN HISTORY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

Students planning to work for the doctorate in history should be familiar with the general degree requirements of the University outlined in the "Graduate Degrees" section of this bulletin. Those interested in applying for admission to the M.A. and Ph.D. programs should contact the graduate program coordinator in the History department. Online applications are available in September of the year prior to intended enrollment. The application filing deadline is December 7, 2010. Applicants must file a report of their general scores on the Graduate Record Examination and submit a writing sample of 10-25 pages on a historical topic. Successful applicants for the M.A. and Ph.D. programs may enter only in Autumn Quarter.

Upon enrollment in the graduate program in History, the student has a member of the department designated as an adviser with whom to plan the Ph.D. program. Much of the first two years of graduate study is spent taking courses, and, from the outset, the student should be aware that the ultimate objective is not merely the completion of courses but preparation for general examinations and for writing a dissertation.

Admission to the Department of History in the graduate division does not establish any rights respecting candidacy for an advanced degree. At the end of the first year of graduate study, students are evaluated by the faculty and given a progress report. A decision as to whether the student is admitted to candidacy for the Ph.D. is normally made by the start of the student's third year.

After the completion of certain further requirements, students must apply for acceptance for candidacy for the doctorate in the graduate division of the University.

ADMISSION

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details, see http://gradadmissions.stanford.edu.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal M.A. program, they are admitted with the expectation that they will be working toward the Ph.D. degree and may become candidates to receive the M.A. degree after completing three quarters of work.

The application filing deadline is December 7, 2010.

DEGREE REQUIREMENTS

Required Courses—

- HISTORY 304. Approaches to History—for all first-year Ph.D. students
- HISTORY 305. Graduate Workshop in Teaching—for all first-year Ph.D. students
- HISTORY 351A,B,C,D,E,F. Core in American History—for first-year and second-year Ph.D students in American History
- HISTORY 313,314, Core in Medieval History—for Ph.D. students in Medieval History.

Other Graduate Core Colloquia required for Ph.D. students studying in fields other than the above are listed in the Department of History's Graduate Handbook.

University Oral Examinations—The student is expected to take

the University oral examination in the major concentration in the third graduate year.

Dissertation—The student must complete and submit a dissertation which is the result of independent work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.

Dissertation Committee—The reading committee consists of the principal dissertation adviser (first reader), and two additional members of the Department (second and third readers) agreed upon by the adviser and the student.

FINANCIAL SUPPORT

Students who are admitted with financial support are provided multiple years of support through fellowships, teaching and research assistantships, and tuition grants. Applicants should indicate on the admissions application whether they wish to be considered for such support. No separate application for financial aid is required.

U.S. citizens and permanent resident aliens who are interested in area language studies in East Asia, Africa, and the republics of the former Soviet Union may request a Foreign Language and Area Studies (FLAS) fellowship application from the FLAS coordinator of the respective programs offering the FLAS (CEAS, CAS, CREEES). The FLAS application deadlines are in January and February (CAS).

RESOURCES

The degree requirements section relates to formal requirements, but the success of a student's graduate program depends in large part on the quality of the guidance received from faculty and on the library resources available. Prospective graduate applicants are advised to study the list of History faculty and the courses this faculty offers. As to library resources, no detailed statement is possible in this bulletin, but areas in which library resources are unusually strong are described following.

The University Library maintains strong general collections in almost all fields of history. It has a very large microtext collection, including, for instance, all items listed in Charles Evans' American Bibliography, and in the Short-Title Catalogues of English publications, 1474-1700, and virtually complete microfilmed documents of the Department of State to 1906. It also has a number of valuable special collections including the Borel Collection on the History of California; many rare items on early American and early modern European history; the Brasch Collection on Sir Isaac Newton and scientific thought during his time; the Gimon Collection on French political economy, and other such materials.

The rich collection of the Hoover Institution on the causes, conduct, and results of WW I and WW II are being augmented for the post-1945 period. The materials include government documents, newspaper and serial files, and organization and party publications (especially the British and German Socialist parties). There are also important manuscript collections, including unpublished records of the Paris Peace Conference of 1919 and the Herbert Hoover archives, which contain the records of the Commission for Relief in Belgium, the American Relief Administration, the various technical commissions established at the close of WW I for reconstruction in Central and Eastern Europe, the personal papers of Herbert Hoover as United States Food Administrator, and other important personal papers. Other materials for the period since 1914 relate to revolutions and political ideologies of international importance; colonial and minority problems; propaganda and public opinion; military occupation; peace plans and movements; international relations; international organizations and administration including the publications of the United Nations, as well as principal international conferences. The Hoover Institution also possesses some of the richest collections available anywhere on the British labor movement; Eastern Europe, including the Soviet Union; East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of WW II); and Africa since 1860, especially French-speaking Africa, the former British colonies, and South Africa.

REQUIREMENTS

1. In consultation with the adviser, students select an area of study from the list below in which to concentrate their study and later take the University oral examination. The major concentrations are:
   - Europe, 300-1500
   - Europe, 1400-1800
   - Europe since 1700
   - Jewish History
   - Russia
   - Eastern Europe
   - Middle East and Central Asia
   - South Asia
   - East Asia before 1600
   - China since 1600
   - Japan since 1600
   - Africa
   - Britain and the British Empire since 1460
   - Latin America
   - The United States (including colonial America)
   - The History of Science, Medicine, and Technology
   - Transnational, International, and Global
2. The department seeks to provide a core colloquium in every major concentration. Students normally enroll in this colloquium during the first year of graduate study.
3. Students are required to take two research seminars, at least one in the major concentration. Normally, research seminars are taken in the first and second years.
4. Each student, in consultation with the adviser, defines a secondary concentration. This concentration should represent a total of four graduate courses or their equivalents, and it may be fulfilled by working in a historical concentration or an interdisciplinary concentration. The historical concentrations include:
   a. One of the concentrations listed above (other than the student's major concentration).
   b. One of the concentrations listed below, which falls largely outside the student's major concentration:
      - The Ancient Greek World
      - The Roman World
      - Europe, 300-1000
      - Europe, 1000-1400
      - Europe, 1400-1600
      - Europe, 1600-1789
      - Europe, 1700-1871
      - Europe since 1848
      - England, 450-1460
      - Britain and the British Empire, 1460-1714
      - Britain and the British Empire since 1714
      - Russia to 1800
      - Russia since 1800
      - Eastern Europe to 1800
      - Eastern Europe since 1800
      - Jewish History
      - Middle East and Central Asia to 1800
      - Middle East and Central Asia since 1800
      - Africa
      - South Asia
      - China before 1600
      - China since 1600
      - Japan before 1600
      - Japan since 1600
      - Latin America to 1825
      - Latin America since 1810
      - The United States (including Colonial America) to 1865
      - The United States since 1850
      - The History of Science, Medicine, and Technology

- Transnational, International, and Global

c. Work in a national history of sufficiently long time to span chronologically two or more major concentrations. For example, a student with Europe since 1700 as a major concentration may take France from 1000 to the present as a secondary concentration.
d. A comparative study of a substantial subject across countries or periods. The secondary concentration requirement may also be satisfied in an interdisciplinary concentration. Students plan these concentrations in consultation with their advisers. Interconcentrations require course work outside the Department of History which is related to the student's training as a historian. Interdisciplinary course work can either add to a student's technical competence or broaden his or her approach to the problems of the research concentration.

5. Each student, before conferral of the Ph.D., is required to satisfy the department's teaching requirement.
6. There is no University or department foreign language requirement for the Ph.D. degree. A reading knowledge of one or more foreign languages is required in concentrations where appropriate. The faculty in the major concentration prescribes the necessary languages. In no concentration is a student required to take examinations in more than two foreign languages. Certification of competence in commonly taught languages (that is, French, German, Italian, Portuguese, Russian, and Spanish) for candidates seeking to fulfill the language requirement in this fashion is done by the appropriate language department of the University. Certification of competence in other languages is determined in a manner decided on by faculty in the major concentration. In either case, certification of language competence must be accomplished before a student takes the University oral examination.
7. The student is expected to take the University oral examination in the major concentration in the third graduate year.
8. The student must complete and submit a dissertation which is the result of independent work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.

PH.D. IN HISTORY AND HUMANITIES

The department of History participated in the Graduate Program in Humanities leading to a Ph.D. degree in History and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

PH.D. MINOR IN HISTORY

Students pursuing a Ph.D. other than in History may apply for the Ph.D. Minor in History. Ph.D. students cannot pursue a minor in their own program. The minimum University requirement for a Ph.D. minor is 20 units of History course work at the graduate level (courses numbered 300 and above) at Stanford. All units should be in a single field. Units taken for the minor can be counted as part of the overall requirement for the Ph.D. of 135 units taken at Stanford. Courses used for a minor may not be used to meet the requirements for a master's degree.

Requirements—20 units of History course work at the graduate level (HISTORY 300-399W and 400-499X) at Stanford. All units should be in a single field.

Optional Courses for the Minor—A Ph.D. minor form outlining the program of study must be approved by the major and minor departments.

OVERSEAS STUDIES COURSES IN HISTORY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 67. China-Africa and Middle East Relations. 4 units, Li, Wang

BERLIN

- OSPBER 34. Science, Medicine, and Technology in Nazi Germany. 5 units, David Holloway

FLORENCE

- OSPFLOR 106V. Italy: From an Agrarian to a Post-industrial Society. 5 units, Giuseppe Mammarella, GER:DB:SocSci, EC:GlobalCom

MOSCOW

- OSPMOSC 78. Russian-American Relations: from the War of Independence to the War on Terror. 5 units, Edward A. Ivanian, GER:DB:SocSci
- OSPMOSC 80. Foundations of Russian Culture through the Visual. 3-5 units, Nancy Kollmann, GER:DB:Hum
- OSPMOSC 81. Six Centuries of Russian History through Architecture: Walking Tour. 2 units, Nancy Kollmann

OXFORD

- OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850. 4-5 units, Geoffrey Tyack, GER:DB:Hum

PARIS

- OSPPARIS 29. Colonization, Decolonization and Immigration: An Overview of French Global History in the 20th Century. 5 units, Choukri Hmed, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci

WINTER QUARTER

BERLIN

- OSPBER 26. Germany in Europe. 5 units, Philippe Buc

CAPETOWN

- OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa. 4 units, Christopher Saunders
- OSPCPTWN 38. Genocide: The African Experience. 4 units, Mohamed Adhikari, GER:DB:SocSci, EC:GlobCom

FLORENCE

- OSPFLOR 43. The Invention of the Book. 3-5 units, Reviel Netz, GER:DB:Hum
- OSPFLOR 45. Harmony: Ancient Science in the Italian Renaissance. 3-5 units, Reviel Netz, GER:DB:HUM
- OSPFLOR 49. The Cinema Goes to War: Fascism and World War II As Represented in Italian and European Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

OXFORD

- OSPOXFRD 92. Britain and the Second World War. 5 units, Geoffrey Tyack, GER:DB:Hum

PARIS

- OSPPARIS 81. France During the Second World War: Between History and Memory. 5 units, Fabrice Virgili, GER:DB:SocSci

SPRING QUARTER

CAPETOWN

- OSPCPTWN 52. The Ethics of Imperialism. 5 units, James P. Daughton, GER:DB:Hum
- OSPCPTWN 53. The South African Environment in Historical Context. 5 units, James P. Daughton

FLORENCE

- OSPFLOR 58. Space as History: Urban Change and Social Vision: Florence 1059 to the Present. 4 units, Filippo Rossi, Timothy Verdon, GER:DB:Hum

MADRID

- OSPMADRD 62. Spanish California: Historical Issues. 5 units, Sylvia Hilton

OXFORD

- OSPOXFRD 70. History of London. 4-5 units, Geoffrey Tyack, GER:DB:SocSci, EC:GlobCom

PARIS

- OSPPARIS 49. French Connections in America: the 18th and 19th Centuries. 5 units, Caroline Winterer, GER:DB:Hum

SANTIAGO

- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci

HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY

Co-chairs: Michael Friedman (Philosophy), Jessica Riskin (History)

Committee-in-Charge: Barton Bernstein (History), Paula Findlen (History), Michael Friedman (Philosophy), Helen Longino (Philosophy), Reviel Netz (Classics), Robert Proctor (History)

Program Committee: Paula Findlen (History), Michael Friedman (Philosophy), Helen Longino (Philosophy), Reviel Netz (Classics), Robert Proctor (History), Jessica Riskin (History), Londa Schiebinger (History, Clayman Institute for Gender Research)

Professors: Keith Baker (History), Barton Bernstein (History), Paula Findlen (History), Michael Friedman (Philosophy), David Holloway (History, Institute for International Studies, Political Science), David Kennedy (History), Reviel Netz (Classics), Robert Proctor (History), Londa Schiebinger (History, Clayman Institute for Gender Research), Richard White (History), Helen Longino (Philosophy)

Associate Professors: Jessica Riskin (History), Caroline Winterer (History)

Assistant Professors: Sarah Jain (Anthropology), Thomas Mullaney (History), Priya Satia (History), Fred Turner (Communication)

Professor (Research): Rega Wood (Philosophy)

Lecturers: Tom Ryckman (Philosophy), Margo Horn, John McCaskey

Other Affiliation: Henry Lowood (Stanford University Libraries)

Visiting Scholar: Adrienne Mayor (Classics)

Mail Code: 94305-2024

Email: rrogers@stanford.edu

Web Site: http://HPST.stanford.edu

Courses offered by the Program in History and Philosophy of Science and Technology are listed under the subject code HPS on the *Stanford Bulletin's* ExploreCourses web site.

The Program in History and Philosophy of Science and Technology (HPST) teaches students to examine the sciences, medicine and technology from myriad perspectives, conceptual, historical and social. The community of scholars includes core faculty and students in History and Philosophy and affiliated members in Classics, Anthropology, English, Political Science, Communication, and other disciplines. Together, they draw upon the multiple methods of their disciplines to study the development, functioning, applications, and social and cultural engagements of the sciences.

Stanford's Program in History and Philosophy of Science and Technology is a collaborative enterprise of the departments of History and Philosophy. Each department has its own undergraduate and graduate degree programs in this area, but these overlap and interact through the structure of requirements, advising, team-taught courses, an active graduate student community and a shared colloquium series.

The program's courses span from antiquity to the late 20th century, with emphasis on:

- ancient science
- Renaissance science
- the Scientific Revolution
- Enlightenment and transatlantic science
- history of medicine and the body
- history and philosophy of biology
- history and philosophy of modern physics
- history of the philosophy of science in the modern period
- gender, science, and technology

UNDERGRADUATE DEGREES

The Department of History offers an interdisciplinary track in History, Science, and Medicine. The Department of Philosophy offers a degree field in History and Philosophy of Science.

GRADUATE DEGREES

Graduate students in the Program in History and Philosophy of Science and Technology can pursue a Ph.D. either in History, through its Ph.D. field in History of Science, Medicine, and Technology, or in Philosophy, through its Ph.D. field in Philosophy of Science. Students completing the requirements of the HPST program graduate with a diploma stating their concentration in HPST.

COURSES

The following courses may be used to fulfill optional course requirements.

INTRODUCTORY

- HPS/PHIL 60. Introduction to Philosophy of Science
- PHIL 16N. Values and Objectivity
- PHIL 15N. Freedom, Community, and Morality
- CLASSGEN 133.Invention of Science
- CLASSGEN 16. Archimedes and His Science

SCIENCE IN HISTORY

This sequence is designed to introduce students to the history of Science from antiquity to the 20th century. Students are advised to take most or all of this sequence as a core foundation.

- CLASSGEN 22N. Technologies of Civilization: Writing, Number, and Money
- HISTORY 31/STS 125/225. Science, Technology, and Art: The Worlds of Leonardo
- HISTORY 40/140. World HIstory of Science
- HISTORY 41A/141A. The Emergence of Modern Medicine
- HISTORY 44N. The History of Women and Gender in Science, Medicine, and Engineering
- OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought

MEDICINE IN HISTORY

This sequence is designed to introduce students to the history of medicine from antiquity to the 20th century. Students are advised to take most or all of this sequence as a core foundation.

- AMSTUD 156. History of Women and Medicine in the United States
- HISTORY 243G/343G. Tobacco and Health in World History

PHILOSOPHICAL PERSPECTIVES ON SCIENCE, MEDICINE, AND TECHNOLOGY

This sequence is designed to introduce students to the philosophy of science. Students are advised to take HPS 60 above as a starting point, and combine a number of the electives listed below in conjunction with courses in the other concentrations that address their specific interests.

- FEMST 166/PHIL 184F/284F. Feminist Theories of Knowledge
- HPS 220. Nineteenth-Century Philosophy of Science
- PHIL 107/207. Plato and Heraclitus
- PHIL 115/215. Problems in Medieval Philosophy
- PHIL 163/263. Significant Figures in Philosophy of Science
- PHIL 164/264. Central Topics in the Philosophy of Science: Theory and Evidence
- PHIL 165C/265C. Philosophy of Physics: Probability and Relativity
- PHIL 167A/267A. Philosophy of Biology
- PHIL 167B/267B. Philosophy, Biology, and Behavior
- PHIL 167C/267C. Associative Theories of Mind and Brain
- PHIL 224. Kant's Philosophy of Physical Science
- PHIL 224A. Math in Kant's Philosophy
- PHIL 348. Evolution of Signals
- PHIL 360. Core Seminar in Philosophy of Science
- PHIL 365. Seminar in Philosophy of Science: Time
- OSPOXFRD 26. Spirit, Mind, Brain:Evolving Understanding in Neurology/Neuroscience

ADVANCED

HISTORICAL PERSPECTIVES ON SCIENCE

The following courses focus on specific episodes in or approaches to the history of science.

- HPS 154. The History of Scientific Methods, Pythagoras to Popper
- FRENGEN 295. Science, Technology, and Society in Europe and the U.S.: Ethical Debates and Controversies
- HISTORY 142/342. Darwin in History of Life
- HISTORY 208A/308A. Science and the Law in History
- HISTORY 231A/331A. Charles Darwin and the Global 19th Century
- HISTORY 232F/332F. The Scientific Revolution
- HISTORY 234F/334F. Science, Technology, and Empire
- HISTORY 241F/341F. History of the Modern Fact
- HISTORY 241G/341G/STS 134/234. History of the Senses
- HISTORY 241S. Science and Culture Wars
- HISTORY 242A/342A. Technology and Society in the Modern World

CONTEMPORARY PERSPECTIVES ON SCIENCE, MEDICINE, AND TECHNOLOGY

The following courses focus on contemporary cultural and social science approaches to science, technology, and medicine.

- HPS 199. Directed Reading
- HPS 299. Graduate Individual Work
- ANTHRO 180. Science, Technology, and Gender
- HISTORY 144/344. Gender in Science, Medicine, and Engineering
- HISTORY 242G. Representing the World: Maps, Statistics, and Photography
- HISTORY 243C/343C. 18th-Century Colonial Science and Medicine
- HISTORY 243S/443A. Human Origins: History, Evidence, and Controversy
- HISTORY 244C/444C. The History of the Body in Science, Medicine, and Culture
- HUMBIO 175. Healthcare as Seen through Medical History, Literature, and the Arts

OVERSEAS STUDIES COURSES IN HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

WINTER QUARTER

FLORENCE

- OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought. 5 units, Paolo Galluzzi, GER:DB:Hum

HUMAN BIOLOGY

Emeriti: (Professors) Clifford Barnett (Anthropological Sciences), Luigi Cavalli-Sforza (Genetics), Christos Constantinou (Urology), Carl Djerassi (Chemistry), Sanford Dornbusch (Sociology), Stanley Falkow (Microbiology/Immunology), Albert H. Hastorf (Psychology), Dale Kaiser (Biochemistry), Herant Katchadourian (Human Biology), Donald Kennedy (Biology), Carol Winograd (Medicine), Shirley Feldman *(Associate Director)*

Director: Carol Boggs (Biology)

Associate Director: Katherine Preston

Professors: Laurence Baker (Health Research & Policy), Lisa Curran (Anthropology), William H. Durham (Anthropology), Heidi Feldman (Neonatology), Russell D. Fernald (Biology), Paul Fisher (Neurology and Neurological Sciences, Pediatrics), Uta Francke (Genetics), Margaret Fuller (Developmental Biology), Lawrence H. Goulder (Economics), H. Craig Heller (Biology), Richard Klein (Biology and Anthropology), Tanya Luhrmann (Anthropology), Michael Marmor (Ophthalmology), Gordon Matheson (Orthopedic Surgery), Roeland Nusse (Developmental Biology), Amado Padilla (Education), Thomas Rando (Neurology), Natalie Rasgon (Psychiatry and Behavioral Sciences), Thomas Robinson (Pediatrics), Robert Sapolsky (Biology, Neurology and Neurological Sciences), Matthew Scott (Developmental Biology), William Talbot (Developmental Biology), Lucy Tompkins (Infectious Diseases), Shripad Tuljapurkar (Biology), Irving Weissman (Pathology), Jeffrey Wine (Psychology), Paul Wise (Pediatrics), Arthur P. Wolf (Anthropological Sciences)

Associate Professors: Firdaus Dhabhar (Psychiatry and Behavioral Sciences), Anne Fernald (Psychology), James Fox (Anthropology), Brenda Golianu (Anesthesia), James Jones (Anthropology), Jelena Obradovic (Education), John Rick (Anthropology), Randall Stafford (Medicine)

Assistant Professors: Melissa Brown (Anthropology), Daniel Garza (Orthopedic Surgery, Emergency Medicine), Norman G. Miller (Medicine),

Professors (Research): David Katzenstein (Medicine), Marcia Stefanick (Medicine)

Associate Professors (Research): Christopher Gardner (Medicine), David Lyons (Psychiatry and Behavioral Sciences)

Professors (Teaching): Carol Boggs (Biology), Ellen Porzig (Developmental Biology)
Associate Professors (Teaching): Donald Barr (Pediatrics), Catherine Heaney (Psychology, Medicine), David Magnus (Pediatrics), Eunice Rodriguez (Pediatrics), Robert Siegel (Microbiology and Immunology)
Clinical Professor: Laraine Zappert (Psychiatry and Behavioral Sciences)
Clinical Associate Professor: Mary Therese Jacobson (Obstetrics and Gynecology),
Clinical Assistant Professor: Rita Popat (Epidemiology)
Other Teaching Faculty and Staff: William Abrams, Maya Adam-Seef, Wesley F. Alles (Medicine), Judy Chu, Gerda Endemann (Biology), Anne Firth-Murray, Anne Friedlander, Renu Heller (Biology), Camillan Huang, Donald Light, Lisa Medoff, Katherine Preston, Lynn Rothschild, Merritt Ruhlen, Daniel Salkeld (Anthropology), Darvin Scott Smith (Microbiology and Immunology), James Truncer (Anthropology), Beatriz Piedad Urdinola (Latin American Studies), Katherine E. Williams (Psychiatry and Behavioral Sciences), Jennifer Wolf (Education), Nathan Wolfe, Larry Zaroff (Biomedical Ethics)
Course Associates: Kimberly Basurto, Jolene Kokroko, Sophie Lambert, Cooper Lloyd, Heather Roberts, Dane Saksa, Tanya Widmer, Lauren Wood
Honors Chair: Katherine Preston
Program Offices: Building 20
Mail Code: 94305-2160
Phone: (650) 725-0336
Email: cacciari@stanford.edu (Student Services)
Web Site: http://humbio.stanford.edu

Courses offered by the Program in Human Biology are listed under the subject code HUMBIO on the *Stanford Bulletin's* ExploreCourses web site.

The program offers a Bachelor of Arts in Human Biology, as well as a minor and an honors program.

MISSION OF THE UNDERGRADUATE PROGRAM IN HUMAN BIOLOGY

The mission of the undergraduate program in Human Biology is to provide students with an interdisciplinary approach to understanding human beings from biological, behavioral, social, and cultural perspectives. Courses in the major allow students to see connections and parallels with other fields as they learn to formulate and evaluate health, environmental, and other public policies issues that influence human welfare. The program prepares majors to pursue advanced training in professional or graduate programs.

To achieve these goals, all students complete a 30-unit core sequence, normally in the sophomore year, that provides the foundation for the major. Also during the sophomore year, students consult with student advisers to choose a faculty adviser and complete the declaration process. Together they plan a road map of course work designed to help each student focus on an area of interest within Human Biology. Early planning and subsequent refining of an individualized course of study, in consultation with student and faculty advisers, is a strength and requirement of the program. The curriculum draws on faculty from across the University. To complete a B.A. in Human Biology, students must take courses from within the program and from other University departments. Most Human Biology majors go on to advanced training in professional schools, or graduate programs in the behavioral, natural, and social sciences, including coterminal master's degree programs in other University departments. Additional information about the major may be obtained from the program's offices or at http://humbio.stanford.edu.

LEARNING OUTCOMES

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Human Biology. Students are expected to demonstrate:

1. ability to acquire and synthesize scientific information from a variety of sources.
2. ability to apply analytical tools to evaluate policy.
3. ability to interpret knowledge in meaningful and appropriate ways as they draw conclusions about the significance of their findings.
4. ability to communicate their scientific ideas clearly and persuasively.

STUDENT ADVISERS

Human Biology has an advising program comprising faculty and student advisers. Before declaring Human Biology as the undergraduate major, each student must meet with one of six student advisers who assist in developing a coherent study plan based on an individualized area of concentration, and the selection of foundation, concentration, and upper-division courses. The student advisers also assist students in selecting an appropriate faculty adviser and a suitable internship for their area of concentration and career goals. Student advisers offer drop-in services during scheduled office hours every weekday and some evenings. The student advisers also sponsor events including the Internship Faire, Beyond HumBio, and declaration workshops. To maintain high standards of advising that respond to the needs of individual students, student advisers meet weekly with the program's faculty advising chairs and the student services coordinator to review the program's policies and specific student inquiries and petitions concerning the program.

BACHELOR OF ARTS IN HUMAN BIOLOGY

DECLARING THE MAJOR

A prospective major must consult with the student and faculty advisers to obtain detailed information about the program and guidance in the development of an individual course of study.

At the time the major is declared, the student must submit a written statement (3-5 pages) of academic and long-term goals and the proposed list of courses satisfying the requirements for the major. The proposal is then reviewed by the student advisers who help identify an appropriate faculty adviser. Final approval of the proposed course of study rests with the faculty adviser.

It is important to declare early, preferably in early spring as soon as students have passed both Autumn and Winter Quarter core courses (2A,B, 3A,B). The University requires students to declare a major by the end of Spring Quarter of the sophomore year. Under special circumstances students may declare as late as Autumn Quarter of the junior year. Petitions to declare late require additional documentation and are less likely to be approved.

Students who plan to pursue graduate work should be aware of the admission requirements of the schools to which they intend to apply. Early planning is advisable to guarantee completion of major and graduate school requirements.

REQUIREMENTS

The B.A. in Human Biology (HUMBIO) requires a minimum of 87 units in the major divided among four levels of courses:

1. *Fundamental Program*: at least 38 units, to include
   a. Human Biology Core (30 units)
      - The Human Biology Core refers to HUMBIO 2A and 2B, 3A and 3B, and 4A and 4B. See "Human Biology Core" below for more information.
   b. Statistics (4-5 units)
      - Statistics may be chosen from courses such as STATS 60 or 141, PSYCH 10, SOC 181B, and BIO 141. For questions about other statistics courses that might fulfill this requirement, see the program office. The core and statistics courses must be taken for a letter grade by majors.
   c. Internship (HUMBIO 197, 4 units)
      - The internship requirement, a mentored non-classroom project, is graded satisfactory/no credit only.

2. *Foundation Courses*: 20-unit minimum. Total units vary, depending on the focus of study chosen by the student for the area of concentration. They may include introductory-level courses from across the University and lab courses. The minimum grade requirement for foundation courses is 'C-.'
3. *Area of Concentration*: a minimum of five courses totaling at least 20 units. This in-depth area of study enables the student to focus on educational and post-baccalaureate goals. Courses are non-introductory, theory-based, and are usually numbered over 100. Three or more departments must be represented in the concentration. Each course must be taken for a minimum of 3 units. The area of concentration is individually designed by the student in consultation with the student advisers and faculty adviser. Final approval of the concentration rests with the student advisers and faculty adviser. All area of concentration courses must be taken for a letter grade. The minimum grade requirement for area of concentration courses is 'C-'. The area of concentration generally has an emphasis in one, and sometimes more than one, of the following eight areas:

Area 1: Environment and Environmental Policy
- Environment
- Environmental Policy
- Culture/Demography/Human Ecology

Area 2: Health and Health Policy
- Health Policy
- Public Health
- International Health

Area 3: Human Performance

Area 4: Human Development
- Biological Development
- Psychological Development
- Education

Area 5: Biomedical Science
- Genetics
- Molecular Biology
- Human Physiology
- Infectious Diseases

Area 6: Brain and Behavior

Area 7: Ethics and Medical Humanities

Area 8: Evolution

A non-exclusive list of possible courses for each emphasis is available at the student advisers' office or at http://www.stanford.edu/dept/humbio/cgi-bin/?q=node/474.

4. *Upper-Division Courses:* students must take three Human Biology upper-division courses numbered 100 to 189. These courses should be used to explore subjects outside the area of concentration. One upper-division course may be taken satisfactory/no credit. Each course must be taken for a minimum of 3 units. All non-laboratory advanced HUMBIO courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement. A list of Human Biology cognate courses can be found at http://www.stanford.edu/dept/humbio/cgi-bin/?q=node/1382.

HUMAN BIOLOGY CORE

Required core sequences (HUMBIO 2A,B, 3A,B, and 4A,B) introduce the biological and social sciences, and most importantly, relationships between the two. Classes meet throughout the academic year. Students must register concurrently for the A and B series and take the core in sequence. Students should initiate the core in Autumn Quarter of the sophomore year. Freshmen are not permitted to enroll. Majors must earn a minimum letter grade of 'C-' in core courses. The Human Biology core consists of the following courses:

- HUMBIO 2A. Genetics, Evolution, and Ecology
- HUMBIO 2B. Culture, Evolution, and Society
- HUMBIO 3A. Cell and Developmental Biology
- HUMBIO 3B. Behavior, Health, and Development
- HUMBIO 4A. The Human Organism
- HUMBIO 4B. Environmental and Health Policy Analysis

HONORS PROGRAM

The honors program in Human Biology provides qualified majors the opportunity to work closely with faculty on an individual research project, culminating in an honors thesis. Students may begin honors research from a number of starting points including topics introduced in the core or upper-division courses; independent interests stemming from an internship experience; or collaborating with faculty from the natural, social, or behavioral sciences.

Students may apply to the honors program if they have completed the Human Biology core with a minimum GPA of 3.0, have an overall Stanford grade point average (GPA) of 3.2, and meet other requirements detailed in the honors handbook. Interested students should consult the Human Biology Honors Handbook at https://stanford.edu/dept/humbio/cgi-bin/?q=node/1385 and meet with the Human Biology Associate Director or student services officer.

Most honors projects involve a total of 10-15 units of course work in HUMBIO 193 and 194.

Admission to the honors program is by submission of an intention to undertake honors research in early February, followed by the application in early March of the junior year. Students planning to undertake honors begin research or preparation as early as completion of the sophomore year.

The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Honors students then present summaries of their research at the Human Biology Honors Poster Symposium in May.

Human Biology also holds a Summer Honors College just prior to Autumn Quarter each year for students who have applied to the honors program. Students apply to Summer Honors College in April of the junior year. For applications, contact the program office.

MINOR IN HUMAN BIOLOGY

A minor in Human Biology provides an introductory background to the relationship between the biological and social aspects of humanity's origin, development, and prospects. Many of the major problems facing human civilization today involve both biological and social aspects. Scientific approaches to these problems are essential, but they must be broadly conceived, integrating what is known of the biological with an understanding of the social and cultural setting in which they exist. Students with a minor in Human Biology are expected to develop a strong background in the integration between the biological and social aspects of human beings.

Students declaring a minor in Human Biology must do so no later than two quarters prior to their intended quarter of degree conferral (for example, a student must declare a minor before the end of Autumn Quarter to graduate the following Spring Quarter).

To minor in Human Biology, students must take the Human Biology Core (HUMBIO 2A, 2B, 3A, 3B, 4A, and 4B) and one additional upper-division course (for example, any HUMBIO course numbered 100-189). The student must earn a minimum letter grade of 'C-'. Courses that count towards the fulfillment of major requirements may not be counted towards the minor.

STOREY HOUSE

Storey House, 544 Lasuen Mall, is an undergraduate resident theme house for Human Biology, devoted to developing an intellectual community among Human Biology majors at Stanford, and allowing faculty and students to become acquainted and share their Human Biology interests and research. Its goals are to foster intellectual discussion in the residential lives of the students living in Storey House, mentoring relationships between upperclassmen and core students in the house, and stimulating events for all Human Biology majors facilitated by academic theme associates. Assignment is made through the regular undergraduate housing draw.

OVERSEAS STUDIES COURSES IN HUMAN BIOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

AUSTRALIA

- OSPAUSTL 10. Coral Reef Ecosystems. 3 units, Kevin Arrigo, Simon Dunn, Selina Ward, GER:DB:EngrAppSci
- OSPAUSTL 20. Coastal Resource Management. 3 units, Ron Johnstone, GER:DB:EngrAppSci
- OSPAUSTL 30. Coastal Forest Ecosystems. 3 units, Claire Baker, Norman Duke, GER:DB:EngrAppSci

FLORENCE

- OSPFLOR 38. Water Resources Engineering in Italy: An Historical Perspective. 4-5 units, Leonard Ortolano

PARIS

- OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time. 4-5 units, Jean-Marie Fessler

WINTER QUARTER

MADRID

- OSPMADRD 32. Health Care Systems Design: Spain, Europe, and the United States. 4 units, Laurence Baker
- OSPMADRD 72. Issues in Bioethics Across Cultures. 5 units, Pablo de Lora del Toro

PARIS

- OSPPARIS 53. The Shape of Things to Come: the Evolution of Science and Society. 4 units, Jill Helms

SANTIAGO

- OSPSANTG 27. Humans and the Environment: the Great Transition. 3-5 units, Shripad Tuljapurkar

SPRING QUARTER

MADRID

- OSPMADRD 57. Health Care: A Contrastive Analysis between Spain and the U.S. 5 units, Pablo de Lora del Toro, GER:DB:SocSci

IBERIAN AND LATIN AMERICAN CULTURES

Emeriti: (Professors) Bernard Gicovate, Mary Pratt, Sylvia Wynter; *(Professor, Teaching)* María-Paz Haro
Director: Jorge Ruffinelli
Chair of Graduate Studies: Michael P. Predmore
Chair of Undergraduate Studies: Héctor Hoyos
Minors Coordinator: Marília Librandi Rocha
Professors: Michael P. Predmore, Joan Ramon Resina, Jorge Ruffinelli, Yvonne Yarbro-Bejarano
Associate Professor: Vincent Barletta
Assistant Professors: Héctor M. Hoyos, Marília Librandi Rocha, Lisa Surwillo (on leave)
Courtesy Professors: John Felstiner, Roland Greene, Hans U. Gumbrecht, Ramón Saldívar
Courtesy Associate Professors: James A. Fox, Paula Moya
Visiting Professors: Ángel Castiñeira Fernández, Xosé Manoel Núñez Seixas (Winter)
Visiting Lecturers: Ximena Briceño, Caridad Kenna
Mellon Fellow: Seth Kimmel
Director of Iberian Studies Program: Joan Ramon Resina
Spanish Language Program Coordinator: Alice Miano
Portuguese Language Program Coordinator: Lyris Wiedemann
Catalan Language Program Coordinator: Joan Molitoris
Department Offices: Building 260, Room 128
Mail Code: 94305-2014
Phone: (650) 723-4977
Email: ilac@stanford.edu
Web Site: http://ilac.stanford.edu

Courses offered by the Department of Iberian and Latin American Cultures, formerly the Department of Spanish and Portuguese, are listed under the subject code ILAC on the *Stanford Bulletin's* ExploreCourses web site. For courses in Catalan, Portuguese, and Spanish language instruction with the subject codes CATLANG, PORTLANG and SPANLANG, see the "Language Center" section of this bulletin.

The Department of Iberian and Latin American Cultures offers courses focused on the languages, literatures, and cultures of the Iberian Peninsula, Latin America, and Latina/o populations in the United States. To achieve its goal of training students as experts in the cultures of the Iberian Peninsula and Latin America, the department balances an emphasis on literary studies with philosophical, historical, and social approaches to cultural issues.

The department's faculty includes scholars of modern and contemporary Spanish literature and cinema, contemporary Latin American literature and cinema, medieval and contemporary Catalan literature and culture, Aljamiado and medieval Spanish literature, early modern Portuguese literature, modern and contemporary Brazilian literature, and Chicana/o culture and literature. In general, the department's courses are characterized by an intercultural and interdisciplinary focus that combines the study of literature with wide ranging intellectual concerns.

The department nurtures relationships with other departments and programs at Stanford in areas such as anthropology, philosophy, history, Mediterranean studies, medieval and Renaissance studies, European and Latin American politics, feminist studies, Chicana/o studies, and film studies.

The department is committed to three main educational goals:

1. to provide students with a contextualized knowledge of the literatures and cultures of the Iberian Peninsula from the medieval period to the present, of the Spanish and Portuguese speaking countries of Latin America, and of the Spanish-speaking communities of the United States.
2. to prepare undergraduates for advanced study in those areas and/or in a range of professional fields.
3. to provide doctoral students with advanced training as research scholars and teachers in preparation for careers as university professors or in related roles.

In addition, the department, through the Iberian Studies Program, regularly hosts visiting faculty including the Ginebre Serra Visiting Chair in Catalan Studies, the Eusko Ikaskuntza Visiting Professor in Basque Culture, and the Consello de Cultura Galega Visiting Professor.

The department awards B.A., M.A., and Ph.D. degrees in Iberian and Latin American Cultures to eligible candidates, as well as undergraduate minors in Spanish and Portuguese and a Ph.D. minor in Spanish.

Courses for Heritage Language Speakers—The Language Center offers a series of second- and third-year courses designed for students who grew up in homes where Spanish is spoken and who wish to develop their existing linguistic strengths. See the "Language Center" section of this bulletin for these courses.

MISSION OF THE UNDERGRADUATE PROGRAM IN IBERIAN AND LATIN AMERICAN CULTURES

The mission of the undergraduate program in Iberian and Latin American Cultures is to expose students to a variety of perspectives in languages, literatures, and cultures of the Iberian Peninsula, Latin America, and Latina/o populations in the United States. The program balances an emphasis on literary studies with a diverse set of approaches to cultural and social issues. Courses in the program provide students with a contextualized knowledge of the literatures and cultures of the Iberian Peninsula from the medieval period to the present; the Spanish and Portuguese speaking countries of Latin America; and the Spanish-speaking communities of the United States. Students in the major are prepared for advanced study in these areas and for a range of professional fields.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.
2. critical thinking skills using course's primary source materials.
3. facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. analytical writing skills and close reading skills.
5. expository oral skills.

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, see the "School of Education" section of this bulletin and the credentials administrator, School of Education.

GRADUATE PROGRAMS IN IBERIAN AND LATIN AMERICAN CULTURES

University requirements for the M.A. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

COTERMINAL B.A. AND M.A.

The requirements for the coterminal M.A. are the same as those outlined below for the M.A. No course can count for both the B.A. and M.A. degrees. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

BACHELOR OF ARTS IN IBERIAN AND LATIN AMERICAN CULTURES

The major in Iberian and Latin American Cultures (ILAC) requires 60 units of course work. Courses must be taken for a letter grade and a maximum of 20 units of course work from abroad may be applied towards the major. At the discretion of the Chair of Undergraduate Studies, up to 10 units of course work from outside the department, clearly related to the study of literature and culture in the areas and traditions taught by the department, may be counted towards the degree. The core courses (requirements 1, 2, 3 and 4 below) may not be taken abroad. Exceptional cases for any of these requirements must be referred to the Chair of Undergraduate Studies who, in consultation with the department Director, makes a final decision.

PREREQUISITES

Students planning to declare the major must have completed the second-year sequence of Spanish language courses through SPANLANG 13, or equivalent. SPANLANG 101 is recommended.

How to Declare a Major—Students interested in declaring an ILAC major should see the Chair of Undergraduate Studies.

Double Majors—The major in ILAC is designed to combine with a second major in another field and with study abroad. Students may not count the same courses to fulfill requirements in both majors.

GENERAL COURSE REQUIREMENTS

1. 5 Writing in the Major (WIM) units are required, and these are prerequisite for every course in the major; concurrent enrollment is allowed.
   a. ILAC 120. Introduction to Literary and Scholarly Research (3-5 units)
   b. ILAC 159. *Don Quijote* (3-5 units)
2. Core courses in literature. Students are required to take:
   a. ILAC 157. Medieval and Early Modern Iberian Literatures
   b. ILAC 136. Modern Iberian Literatures
   c. ILAC 161. Modern Latin American Literature
3. Core course in culture, history, and civilization. Choose at least one:
   a. ILAC 130. Cultural Perspectives in Iberia
   b. ILAC 131. Cultural Perspectives in Latin America
4. A senior seminar, ILAC 278 or 278A. Topics vary. Two options are offered each year.
5. Up to three language courses in Spanish, Portuguese, or Catalan (SPAN/PORT/CATLANG), including SPANLANG 102, may count toward the major.
6. Additional 100- or 200-level ILAC literature courses above 100 to complete the required 60 units. One course above 100 and one core course, or consent of the instructor, are prerequisites for 200-level courses. For all ILAC courses taught in Spanish, students must have completed SPANLANG 102 or have tested above this level through the Language Center. When choosing courses, students are encouraged to consult the Chair of Undergraduate Studies who makes recommendations about a course of study related to the student's academic interests. IHUM courses taught at least partially by a faculty member of the department may count towards these electives.

HONORS PROGRAM

ILAC majors with a grade point average (GPA) of 3.3 or better in major courses may apply to the honors program in Spring Quarter of the junior year. Students should submit an application for the honors program and a proposal outline and may enroll for 2 units of ILAC 189B for the drafting or revision of the thesis proposal and preliminary research.

Honors students are encouraged to participate in the honors college coordinated by the Division of Literatures, Cultures, and Languages and offered at the end of the summer before the senior year. In Autumn Quarter of the senior year, students must enroll in DLCL 189, a 5-unit seminar that focuses on researching and writing the honors thesis. Students then enroll for 5 units of credit in ILAC 189A while composing the thesis during Winter Quarter.

Each honors student must write a substantial honors essay under the direction of a faculty member who serves as adviser, and the completed thesis must be submitted by the end of Winter Quarter. Students who do not enroll in an ILAC 189B course in the junior year may enroll in ILAC 189B in Spring Quarter of the senior year while revising the thesis, if approved by the thesis adviser.

A total of 10-12 units are awarded for completion of honors course work, independent study, and the finished thesis. Students should consult their undergraduate advisers for additional information on the honors program.

MINORS IN SPANISH AND PORTUGUESE

The minors in Spanish and Portuguese are for students who want to combine acquisition of linguistic competence with the study of the literature, thought, culture, or language systems of the

Spanish- or Portuguese-speaking worlds. The minors in Spanish and Portuguese require 30 units of course work taken for a letter grade. Up to 5 units of course work outside the department, up to 10 units of relevant course work taken abroad, and up to 10 units of second-year and above Spanish or Portuguese language courses may count toward these minors with the approval of the minors coordinator. To declare either of these minors or for more information, see the minors coordinator or the student affairs officer in the Division of Literatures, Cultures, and Languages.

MINOR IN SPANISH

Requirements—

1. A 100- or 200-level course in Iberian literature
2. A 100- or 200-level course in Latin American literature
3. Any additional 100- or 200-level courses in literature and culture to complete 30 units. IHUM courses with a Hispanophone component taught at least partially by a faculty member of the department may count toward these electives.

MINOR IN PORTUGUESE

Requirements—

1. A 100- or 200-level course in Iberian literature with a Lusophone component
2. A 100- or 200-level course in Latin American literature with a Lusophone component
3. Any additional 100- or 200-level courses in literature and culture to complete 30 units. IHUM courses with a Lusophone component taught at least partially by a faculty member of the department may count toward these electives.

MINOR IN LITERATURE AND MINOR IN MODERN LANGUAGES

The Division of Literatures, Cultures, and Languages offers two undergraduate minor programs: the minor in Literature and the minor in Modern Languages. These minors draw on literature and language courses offered in this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about these minors and their requirements.

STUDY ABROAD PROGRAMS IN IBERIAN AND LATIN AMERICAN CULTURES

All majors are encouraged to study abroad. To transfer credits from non-Stanford programs abroad, consult the Student Services Center. Depending on course selections, up to 20 units of course work taken abroad may be applied toward the major in ILAC and 10 units toward the minor in Spanish or Portuguese. Students planning to study abroad, or returning from study programs, are encouraged to consult with the Chair of Undergraduate Studies to coordinate the course work from abroad with their degree program.

The department and Bechtel International Center maintain information on study abroad programs. Stanford supports the options listed below and credits course work taken in academically sound programs. Students considering different options are encouraged to speak with the Director of the department or the Chair of Undergraduate Studies.

STANFORD IN SANTIAGO, CHILE AND MADRID OR BARCELONA, SPAIN

The Bing Overseas Studies Programs in Santiago, Chile and Madrid, Spain require one year of college-level Spanish (SPANLANG 3). Course work is primarily in Spanish. Information is available in the "Overseas Studies" section of this bulletin or at http://bosp.stanford.edu. Internships and research opportunities may be arranged for students staying for two quarters.

For ILAC majors with an interest in Iberian Studies, the department recommends study in Barcelona through CASB, a consortium of U.S. universities of which Stanford is a participating member. This program combines courses at the program's center with open access to courses at three Barcelona universities: Universitat Popeu Fabra, University of Barcelona, and Autonomous University of Barcelona. Visiting faculty from Brown, Chicago, Stanford, and Northwestern complement the offerings of these three major universities. Admission is highly competitive. Other programs are also recognized by the department, and students are encouraged to discuss their interests with the Director of the department or with the Chair of Undergraduate Studies.

BRAZIL AND PORTUGAL

The University maintains a relationship with the Universidade Estadual do Rio de Janeiro in Brazil at the graduate level. Students interested in study in Brazil should contact Professor Marília Librandi Rocha. Students interested in study in Portugal should contact Professor Vincent Barletta.

MASTER OF ARTS IN IBERIAN AND LATIN AMERICAN CULTURES

This terminal M.A. degree program is for students who do not intend to continue their studies through the Ph.D. degree. Students in this program may not apply concurrently for entrance to the Ph.D. program. Students must complete a minimum of 45 graduate-level units, 36 of which must be taken at Stanford. All 45 units must have a letter grade of 'B' or above.

The requirements for the M.A. are:

1. A 200-level or above course in literary or cultural theory
2. Two 200-level or above courses in Latin American (including Brazilian) or Latino/Chicano literature and culture
3. Two 200-level or above courses in Iberian literature and culture
4. One 300-level course in Iberian literature and culture and one in Latin American (including Brazilian) or Latino / Chicano literature and culture
5. At least one 300-level graduate seminar offered in the department each quarter.
6. Knowledge of Portuguese or Catalan equivalent to one year of university study for students concentrating in Spanish, or Spanish or Catalan for students concentrating in Portuguese.

Independent study courses (ILAC 299, 399) and crosslisted courses originating outside the department may not be used to fulfill requirements except by consent of the Chair of Graduate Studies.

In addition, students may take approved courses in related fields such as classics, comparative literature, education, history of art, linguistics, modern thought, and philosophy.

DOCTOR OF PHILOSOPHY IN IBERIAN AND LATIN AMERICAN CULTURES

The requirements of the Ph.D. in Iberian and Latin American Cultures (ILAC) are:

1. 135 units of graduate-level course work with a grade point average (GPA) of 3.0 or above. All candidates for the Ph.D. degree are expected to fulfill all requirements for the M.A. during their first year in the program. Units completed for the M.A. degree at another institution (up to 45 units) can be counted toward the Ph.D. Independent study courses (ILAC 299, 399) and crosslisted courses originating outside the department may not be used to fulfill requirements except by consent of the Chair of Graduate Studies in consultation with the student's graduate adviser. Students must be enrolled in at least one 300-level graduate seminar offered through the department each quarter before advancing to TGR status.
2. Knowledge of Catalan, Portuguese, and Spanish equivalent to one year of university study must be demonstrated before students take the comprehensive examination. In addition, Ph.D. students must have superior proficiency in one of these languages upon admission to the program.
3. The qualifying paper, the comprehensive examination, and the University oral examination, as described below
4. Teaching of five courses in the department
5. Completion of a dissertation

For residency and candidacy requirements, see the "Graduate Degrees" section of this bulletin. For further information, consult the department's *Graduate Student Handbook*.

In preparation for teaching, Ph.D. candidates are required to take DLCL 201 in the first year.

In consultation with the adviser, students choose one major field of study from the following:

1. Medieval and Early Modern Iberian Literature and Culture
2. Modern Iberian Literature and Culture
3. Modern Latin American Literature and Culture (includes Brazil)
4. U.S. Latino/Chicana/o Literature and Culture

In addition, candidates choose two secondary areas of study outside the major field from any of the above.

At least four courses must be taken in the major field of study. At least two courses must be taken in each secondary area.

In addition to the department's course offerings, students may take relevant courses with the approval of their adviser in other departments and programs, such as courses in Comparative Literature, Feminist Studies, History, Linguistics, or Modern Thought and Literature. It is also possible to complete a minor in another department with approval of the adviser. Not more than 20 units may be taken outside the department. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.

After the first year of study, the student's progress is evaluated by the faculty to determine whether continuation to the Ph.D. is recommended and whether there are particular areas where improvement is needed. For this evaluation, students submit a research paper, called the qualifying paper. The qualifying paper should be written in Catalan, English, Portuguese, or Spanish (students must write the paper in a language other than their first language), of no more than 6,000 words, including notes and bibliography, and following current MLA Style. A digital copy of the qualifying paper must be submitted to the department administrator by October 1 of the second year. For more details consult the *Graduate Student Handbook*.

If approval of the qualifying paper is granted, the student should file a formal application for candidacy no later than the end of the second year, as prescribed by the University. Course requirements are usually completed by the third year of study. A written comprehensive examination on the major field and secondary areas is then taken. The examination is based on a list of readings, selected in consultation with the adviser, which integrates major and secondary topics in both Iberian and Latin American or Latino/Chicano Studies. The comprehensive examination must take place in its entirety during the same quarter (usually during the first quarter of the fourth year of graduate study), but not during dead week or finals week. The comprehensive examination consists of three components:

1. A written exam in the major field of study. This exam lasts four hours. Students are given four questions, and they must answer two. Students may write in Catalan, English, Portuguese, or Spanish.

2. A written examination in each of the minor fields of study. These exams last two hours each. For each exam, students are given two questions, and they must answer one. Students may write in Catalan, English, Portuguese, or Spanish.

3. An oral examination. This exam is presented to the Doctoral Dissertation Reading Committee and lasts no more than two hours. It may be conducted in Catalan, English, Portuguese, and /or Spanish depending on the committee, and is based on the student's reading list and written examinations.

The written exams may be taken all on one day or on two consecutive days. The oral examination must take place between two and three weeks after the written examinations. For further details, consult the *Graduate Student Handbook*.

Following the comprehensive examination, students should find a topic requiring extensive original research and request that a member of the department serve as dissertation adviser. The student must complete the Reading Committee form and request that the chair approve a committee to supervise the dissertation. The committee may advise extra preparation within or outside the department, and time should be allowed for such work. The University oral examination usually takes place one or two quarters after the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the committee (20 to 25 pages), and may be taken in English, Spanish, Portuguese, or Catalan, depending on the committee.

The dissertation must be submitted to the reading committee at least eight weeks before the University filing deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Ph.D. dissertations must be completed and approved within five years from the date of admission to candidacy. Candidates taking more than five years must apply for reinstatement of candidacy and may not expect financial support.

PH.D. IN SPANISH AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Spanish and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL student affairs officer at (650) 724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

PH.D. MINOR IN IBERIAN AND LATIN AMERICAN CULTURES

For a minor in Spanish. the student must complete 25 units, with a grade point average (GPA) of 3.0 or above, selected from courses numbered 200 or higher.

Students in the Ph.D. program in ILAC who choose a minor in another department should consult with advisers in that department.

IBERIAN AND LATIN AMERICAN CULTURES COURSE CATALOG NUMBERING SYSTEM

WIM indicates that the course satisfies the Writing in the Major requirements.

Students interested in literary studies should also consult course listings in the departments of East Asian Languages and Cultures, Classics, Comparative Literature, English, French and Italian, German Studies, and Slavic Languages and Literatures, in the Program in Modern Thought and Literature, and in the Division of Literatures, Cultures, and Languages.

OVERVIEW

1. Stanford Introductory Seminars, freshman and sophomore preference (suffix of N or Q)
2. Courses in Literature and Culture (100-399)
   a. Undergraduate Courses (100-199)
   b. Courses for Advanced Undergraduates and Graduates (200-299)
      Iberian Literature (200-239)
      Latin American Literature, including Brazil (240-279)
      Latino/Chicano Literature (280-298)
      Individual Work (299)
3. Graduate Seminars (300-399)
      Iberian Literature (300-339)
      Latin American and Brazilian Literature (340-379)
      Chicano Literature (380-398)

Individual Work (399)
Dissertation Research (802)

Courses bearing the suffix 'E' are taught in English and do not assume competence in another language. All other courses require some knowledge of Spanish or Portuguese, and may be given in those languages or bilingually.

OVERSEAS STUDIES COURSES IN IBERIAN AND LATIN AMERICAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

MADRID

- OSPMADRD 37. Madrid in Film. 3-5 units, Jorge Ruffinelli. GER:DB:Hum
- OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World. 4-5 units, Santiago Tejerina-Canal, GER:DB:Hum

SANTIAGO

- OSPSANTG 14. Women Writers of Latin America in the 20th Century. 4-5 units, Sergio Missana, GER:DB:Hum, EC:Gender
- OSPSANTG 66. Latin American Current Affairs. 3-5 units, Héctor Hoyos
- OSPSANTG 67. 21st Century Chilean Literature. 3-5 units, Héctor Hoyos, GER:DB:Hum
- OSPSANTG 104X. Modernization and Culture in Latin America. 5 units, Bernardo Subercaseaux, GER:DB:SocSci, EC:GlobalCom

WINTER QUARTER

MADRID

- OSPMADRD 41. Dissidence and Continuity: Spanish Theater 1907 to the Present. 4-5 units, Santiago Tejerina-Canal, GER:DB:Hum
- OSPMADRD 45. Women in Art: Case Study in the Madrid Museums. 4 units, Julia Doménech López, GER:DB:Hum, EC:Gender

SANTIAGO

- OSPSANTG 14. Women Writers in Latin America in the 20th Century. 4-5 units, Sergio Missana, GER:DB:Hum, EC: Gender
- OSPSANTG 118X. Artistic Expression in Latin America. 5 units, César Albornoz, GER:DB:SocSci, EC:GlobalCom

SPRING QUARTER

MADRID

- OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almodóvar. 4-5 units, Santiago Tejerina-Canal

SANTIAGO

- OSPSANTG 10. Borges and Argentina. 4-5 units, Sergio Missana, GER:DB:Hum

INDIVIDUALLY DESIGNED MAJORS AND INDIVIDUALLY DESIGNED HONORS PROGRAM IN HUMANITIES

The Individually Designed Major (IDM) is overseen by the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. (See the "Individually Designed Majors in Engineering" section of this bulletin for information about the IDM in Engineering.)

The IDM is intended for exceptional undergraduates interested in pursuing an area of study that, by virtue of its focus and intellectual content, cannot be accommodated by existing departmental or programmatic majors. Students must have a minimum GPA of 3.5 and the IDM cannot be a student's secondary major. IDM curricula are designed by students with the assistance of three faculty members of their choice; all advisers must be members of the Academic Council.

Students must submit a written proposal detailing their course of study. It is recommended that students considering an IDM meet with staff in the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences prior to writing the proposal. Programs must meet the following requirements:

1. A minimum of 75 units, with all courses at or above the 100 level.
2. A maximum of 5 units on a credit/no credit basis.
3. A maximum of 8 units in practical or direct reading, the results of which work must be presented in an academic paper for these units to count.
4. A core sequence in the department of one of the advisers.
5. A WIM course in the department of one of the advisers.
6. None of the units may count towards another major, minor, or other special program.

The proposed major must not be achievable through a major or combination of majors already offered by another degree-granting department or program. IDM students are required to complete a capstone requirement in the form of an honors project.

Each proposal should begin with a statement describing the proposed major. In the statement, the student should make clear the motivation for and goal of the major. The statement should specify how the courses to be taken relate to the major's goals. A proposed title for the major should be included.

The proposal statement should be followed by a four-year study plan that identifies the courses to be taken each quarter. The proposal should include a completed IDM Proposal Application form that has been signed by three faculty member advisers who certify that they endorse the major as described in the proposal and that they agree to serve as the student's permanent advisers. The proposal must be accompanied by a statement from the primary adviser giving an appraisal of the academic value and viability of the proposed major.

Any changes to a previously endorsed major must be endorsed by the adviser and approved by the Associate Dean of Graduate and Undergraduate Studies. A request by a student to make changes in her or his approved curriculum must be made sufficiently far in advance so that, should the request be denied, adequate time remains to complete the original, approved curriculum.

The application deadline for IDM proposals is the fifth week of Spring Quarter of the sophomore year. Applications are reviewed only once a year by an IDM Curriculum Committee in H&S. Information about proposal procedures and the procedure for an honors project is available at the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. Proposals should be submitted to the Associate Dean for Graduate and Undergraduate Studies in the School of Humanities and Sciences.

INDIVIDUALLY DESIGNED HONORS PROGRAM IN HUMANITIES

The Individually Designed Honors Program (IDHP) in Humanities is overseen by the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. This program is available to exceptional students who wish to complete an honors thesis in the Humanities and to have the notation "Honors in Humanities" recorded on their diplomas and transcripts in addition to their primary degree. The requirements for the IDHP are as follows:

1. A minimum GPA of 3.5 for acceptance. The 3.5 GPA must be maintained throughout the course of the student's Stanford undergraduate career.
2. Students must select two advisers for the honors thesis who are members of the Academic Council, at least one of whom is not from the student's major department. Both faculty members must be from humanities and arts departments.
3. Students majoring in a humanities or arts department must complete 25 additional units in the humanities and arts, chosen from areas outside of the major department. Areas of concentration include arts, literature, history, and philosophy. Courses must be chosen in consultation with the student's advisers, and a potential list of such courses submitted with the proposal.
4. Students majoring in a non-humanities and arts department must complete the equivalent of a minor in one humanities and arts department, and an additional 10 units in another. Winter-Spring IHUM courses may be used to satisfy part of this requirement. Courses must be chosen in consultation with the student's advisers, and a potential list of such courses submitted with the proposal.
5. Students must complete a capstone, majors seminar, or honors seminar in a humanities and arts department.
6. The honors thesis may be taken for a minimum of 5 units up to a maximum of 10 units. These units must be in addition to the requirements of 3 or 4 and 5 above. The student should determine the size and scope of the thesis in consultation with his or her two advisers.
7. Students should consult with the Associate Dean for Graduate and Undergraduate Studies in the School of Humanities and Sciences before submitting a proposal.
8. All proposals must be submitted no later than the third week of Autumn Quarter in the student's junior year, and preferably by Spring Quarter of the sophomore year. The H&S Curriculum Committee in the Humanities and Arts reviews and approves all proposals.

INTERDISCIPLINARY STUDIES IN HUMANITIES

Director: Gregory Freidin
Program Coordinator: Alice Staveley
Program Offices: Building 460, Room 216
Mail Code: 94305-2022
Phone: (650) 723-3413
Email: monica.moore@stanford.edu
Web Site: http://ish.stanford.edu

The Program in Interdisciplinary Studies in Humanities is not accepting new students; it will provide courses and advising for students already enrolled. The University remains committed to broad-based undergraduate education in the humanities; a successor program is under discussion by the faculty of the Division of Literatures, Cultures, and Languages. For updates on this status, see the program web site: http://ish.stanford.edu.

Undergraduates interested in the broad-based humanities honors degree should consult the Associate Dean for Graduate and Undergraduate Studies in the School of Humanities and Sciences for the Individually Designed Honors Program in Humanities.

The Graduate Program in Humanities is not accepting new students; it will provide courses and advising for students already enrolled. The University remains committed to broad-based graduate education in the humanities; the courses, colloquium, and symposium will continue to be offered, and a successor program is under discussion by the faculty of the Division of Literatures, Cultures, and Languages. For updates on this status, see the program web site: http://ish.stanford.edu/programs/graduate.

Courses for undergraduates and graduate students already enrolled in the program are listed under the subject code HUMNTIES on the *Stanford Bulletin's* ExploreCourses web site, as well as the program web site at http://ish.stanford.edu/courses.

DIVISION OF INTERNATIONAL, COMPARATIVE AND AREA STUDIES

Director: Andrew Walder
Advisory Committee: Shahzad Bashir (Religious Studies), Richard Roberts (History), Kenneth Schultz (Political Science), Kathryn Stoner-Weiss (Freeman Spogli Institute for International Studies), Andrew Walder (Sociology), Kären E. Wigen (History)
Directors' Committee: Keith Baker (History), Shazhad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), Robert Crews (History), Rodolfo Dirzo (Biology), Amir Eshel (German Studies), Charlotte Fonrobert (Religious Studies), Thomas Blom Hansen (Anthropology), Paul Harrison (Religious Studies), Abbas Milani (Hoover Institution), Richard Roberts (History), Kenneth Schultz (Political Science), Vered Shemtov (Language Center), Kathryn Stoner-Weiss (Freeman Spogli Institute for International Studies), Andrew Walder (Sociology), Kären E. Wigen (History)
Division Office: Encina Hall West, second floor
Mail Code: 94305-6045
Web Site: http://ica.stanford.edu

The Division of International, Comparative and Area Studies (ICA) supports research and teaching in the cultures and societies of the world, and studies the problems facing developing societies as they seek to end their poverty and social and economic inequalities. ICA promotes new centers of teaching excellence in traditional areas of historical and cultural concerns, as well as promoting interdisciplinary activities related to developing new ideas for dealing with fundamental issues of justice, equality, and growth within nation states, cultures, and regions.

The Division of International, Comparative and Area Studies is comprised of research centers, degree granting programs, and religion and cultural centers: Center for African Studies*; Center for East Asian Studies*; The Europe Center; Center for Latin American Studies* ; Center for Russian, East European and Eurasian Studies*; Center for South Asia; Ford Dorsey Program in International Policy Studies*; France-Stanford Center for Interdisciplinary Studies; Hamid and Christina Moghadam Program in Iranian Studies; Mediterranean Studies Forum; Program in International Relations*; Robert H. N. Ho Family Foundation Center for Buddhist Studies at Stanford University; Sohaib and Sara Abbasi Program in Islamic Studies; and the Taube Center for Jewish Studies*.

Degree granting programs are denoted with an asterisk (*); the Taube Center for Jewish Studies oversees an Individually Designed Major.

CENTER FOR AFRICAN STUDIES

Director: Richard Roberts
Office: Encina Hall West, second floor
Web Site: http://africanstudies.stanford.edu

The Center for African Studies (CAS) is an interdisciplinary research program. CAS offers an undergraduate minor and certifi-

cate, and a Master of Arts (M.A.) degree. For further information, see the “African Studies” section of this bulletin.

CENTER FOR EAST ASIAN STUDIES

Director: Kären E. Wigen
Office: Encina Commons
Web Site: http://ceas.stanford.edu

The Center for East Asian Studies (CEAS) seeks to increase interdisciplinary communication among faculty, students, and outside scholars whose research, teaching, or study focuses on East Asia. CEAS offers a master’s degree program. It sponsors programs that enhance public knowledge and access to the University’s East Asia resources.

For further information, see the “East Asian Studies” section of this bulletin.

THE EUROPE CENTER

Director: Amir Eshel
Office: Encina East 106
Web Site: http://europeanstudies.stanford.edu

The Europe Center is a multidisciplinary institute committed to the examination of European society, culture, politics, diplomacy, and security.

CENTER FOR LATIN AMERICAN STUDIES

Director: Rodolfo Dirzo
Office: Bolivar House
Web Site: http://las.stanford.edu

The Center for Latin American Studies at Stanford University (CLAS) offers academic programs for students, coordinates academic conferences and lectures, and fosters interdisciplinary research for students and faculty through fellowships and funding opportunities. The Center offers an undergraduate minor, an interdisciplinary honors program for undergraduates, and a master’s degree.

For further information, see the "Center for Latin American Studies" section of this bulletin.

CENTER FOR RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

Director: Robert Crews
Office: Encina Hall West, second floor
Web Site: http://creees.stanford.edu

The Center for Russian, East European and Eurasian Studies (CREEES) offers an undergraduate minor and a one-year master’s program in interdisciplinary area studies.

For further information, see the “Center for Russian, East European and Eurasian Studies” section of this bulletin.

CENTER FOR SOUTH ASIA

Director: Thomas Blom Hansen
Office: Encina Hall West, second floor
Web Site: http://southasia.stanford.edu

The Center for South Asia (CSA) serves to coordinate and develop Stanford’s resources for the study of South Asia across all the disciplines in the School of Humanities and Sciences. It works closely with departments and other units of the University to increase faculty strength, support research, enhance the curriculum, build the library collection, and sponsor programs and events.

FORD DORSEY PROGRAM IN INTERNATIONAL POLICY STUDIES

Director: Kathryn Stoner-Weiss
Office: Encina Hall West, second floor
Web Site: http://ips.stanford.edu

The Ford Dorsey Program in International Policy Studies (IPS) is a two-year master’s program that seeks to train the next generation of policy analysts to solve key global problems.

For further information, see the "International Policy Studie" section of this bulletin.

FRANCE-STANFORD CENTER FOR INTERDISCIPLINARY STUDIES

Director: Keith Baker
Office: Building 260, room 105
Web Site: http://francestanford.stanford.edu

The France-Stanford Center for Interdisciplinary Studies, founded in partnership with the French Ministry of Foreign Affairs, aims to bridge the disciplines of the humanities, social sciences, sciences, engineering, business, and law, addressing historical and contemporary issues of significance for France and the United States. The Center brings together Stanford faculty and students and academics in France to advance collaborative research and foster interdisciplinary inquiry. Its programs include conferences, support for collaborative research projects, internships, exchanges, lectures, and seminars.

HAMID AND CHRISTINA MOGHADAM PROGRAM IN IRANIAN STUDIES

Director: Abbas Milani
Office: Encina Hall West, second floor
Web Site: http://iranian-studies.stanford.edu

The Hamid and Christina Moghadam Program in Iranian Studies at Stanford fosters the interdisciplinary study of Iran as a civilization, one of the oldest in the world. The program combines pedagogy, policy analysis, and research on all aspects of Iran’s past, present, and future. The program organizes lectures and student research conferences on Iran.

MEDITERRANEAN STUDIES FORUM

Director: Aron Rodrigue
Office: Encina Hall West, second floor
Web Site: http://mediterraneanstudies.stanford.edu

The Mediterranean Studies Forum encourages scholars to explore the interplay among societies, cultures, and communities around the Mediterranean Basin from the Middle Ages to the present. Its focus is on all aspects of co-existence and conflict that have marked these encounters in the empires, port cities, nation states, and transregional and transnational social, religious, cultural, and economic contexts of North Africa, the Levant, the Balkans, and Southern Europe. It is also interested in the relations of the Mediterranean with other regions and areas of the world. The central goal of the forum is to contribute to interfield and interdisciplinary dialogue among scholars of these areas through lectures, colloquia, workshops, conferences, and publications.

PROGRAM IN INTERNATIONAL RELATIONS

Director: Kenneth Schultz
Office: Encina Hall West, second floor
Web Site: http://internationalrelations.stanford.edu

International Relations (IR) is an interdisciplinary undergraduate major focusing on changing political, economic, and cultural relations within the international system in the modern era.

For further information, see the “International Relations” section of this bulletin.

ROBERT H. N. HO FAMILY FOUNDATION CENTER FOR BUDDHIST STUDIES AT STANFORD UNIVERSITY

Directors: Carl Bielefeldt, Paul Harrison
Office: Bulding 70, Room 71E
Web Site: http://hcbss.stanford.edu

The Robert H. N. Ho Family Foundation Center for Buddhist Studies at Stanford University (HCBSS) serves to coordinate, support, and develop the University’s resources for Buddhist Studies

in scholarly research, academic communication, teaching, and public outreach. The Center supports individual and team research projects for faculty, students, and visiting fellows. It houses a reference collection and reading room and sponsors lectures, conferences, symposia, workshops, and seminars. The Center works closely with the Department of Religious Studies, the Buddhism in the Modern World Program, and the Group in Buddhist Studies at UC Berkeley.

SOHAIB AND SARA ABBASI PROGRAM IN ISLAMIC STUDIES

Director: Shazhad Bashir
Office: Encina Hall West, second floor
Web Site: http://islamicstudies.stanford.edu

The mission of the Sohaib and Sara Abbasi Program in Islamic Studies is to serve as a forum for interdisciplinary research and teaching in Islamic studies, complemented by seminars, colloquia and public lectures. The program seeks to illuminate Islamic history from its beginnings to the 21st century, the religion of Islam in its many aspects, and the diversity of Muslim cultures and societies, past and present, not only in the Middle East but also including South and Southeast Asia, Africa, Europe, and America. In addition to geographical breadth, the program promotes the use of scholarly resources from both the humanities and the social sciences. Participating faculty and students bring perspectives and methods from academic fields including anthropology, art, economics, history, international relations, languages, law, literature, philosophy, political science, and religious studies.

TAUBE CENTER FOR JEWISH STUDIES

Directors: Charlotte Fonrobert, Vered Shemtov
Office: Building 360, Room 362G
Web Site: http://jewishstudies.stanford.edu

The interdisciplinary Taube Center for Jewish Studies coordinates and promotes the study of all aspects of Jewish life. The center offers an undergraduate minor and an interdisciplinary major coordinated by the Humanities and Sciences dean's office.

For further information, see the "Jewish Studies" section of this bulletin.

INTERNATIONAL POLICY STUDIES

Director: Kathryn Stoner-Weiss (Freeman Spogli Institute for International Studies)
Executive Committee Co-chairs: Coit D. Blacker (Freeman Spogli Institute for International Studies), Andrew Walder (Sociology)
Executive Committee: Larry Diamond (Hoover Institution), Nicholas C. Hope (Stanford Institute for Economic Policy Research), Jenny Martinez (Law), Norman Naimark (History), Rosamond Naylor (Freeman Spogli Institute for International Studies), Bruce Owen (Public Policy), Julie Parsonnet (Medicine), Frank Wolak (Economics)
Lecturers: Chonira Aturupane, Alexander Betts, Thomas Fingar, Erica Gould, Ward Hanson, Anja Manuel, Eric Morris, Joe Nation
Affiliated Faculty: Mike Armacost (Freeman Spogli Institute for International Studies), Jonathan Bendor (Business), Paul Brest (Law), Jeremy Bulow (Economics), Gordon Chang (History), John Cogan (Hoover Institution), Joshua Cohen (Political Science), Martha Crenshaw (Freeman Spogli Institute for International Studies), Larry Diamond (Hoover Institution), Lynn Eden (Sociology), Walter P. Falcon (Freeman Spogli Institute for International Studies), James Fearon (Political Science), Lawrence Goulder (Economics), Stephen H. Haber (Political Science), Deborah Hensler (Law), David J. Holloway (History, Political Science), Simon Jackman (Political Science), Seema Jayachandran (Economics), Timothy Josling (Freeman Spogli Institute for International Studies), Terry Karl (Political Science), Daniel P. Kessler (Business), Stephen D. Krasner (Political Science), Gail Lapidus (Freeman Spogli Institute for International Studies), Claire Lim (Graduate School of Business), Susanna Loeb (Education), Michael McFaul (Political Science, on leave), Ronald I. McKinnon (Economics), Norman Naimark (History), Rosamond Naylor (Freeman Spogli Institute for International Studies), Jean Oi (Political Science), William Perry (Management Science and Engineering), Rob Reich (Political Science), Douglas Rivers (Political Science), Richard Roberts (History), Lee Ross (Psychology), Scott D. Sagan (Political Science), Stephen J. Stedman (Freeman Spogli Institute for International Studies),Peter Stone (Political Science), Jeff Strnad (Law), Michael Tomz (Political Science), Andrew Walder (Sociology), Allen Weiner (Law), Jeremy Weinstein (Political Science)
Program Office: Encina Hall West, Second Floor
Mail Code: 94305-6045
Phone: (650) 725-9155
Web Site: http://ips.stanford.edu

Courses offered by the Ford Dorsey Program in International Policy Studies are listed under the subject code IPS on the *Stanford Bulletin's* ExploreCourses web site.

The Ford Dorsey Program in International Policy Studies (IPS) is an analytical interdisciplinary program focusing on international policy analysis. Its goal is to provide students with exposure to issues they will face in international business and public policy, and to develop the skills and knowledge to address those issues. The program allows students to specialize in: democracy, development, and the rule of law; energy, environment, and natural resources; global health; global justice; international negotiation and conflict management; international political economy; or international security and cooperation.

University requirements for the M.A. degree are described in the "Graduate Degrees" section of this bulletin.

ADMISSION

IPS is designed for students who have an undergraduate background in economics and political science. To enroll in the program, students must have completed prerequisite courses in calculus-based statistics, microeconomics, macroeconomics, international trade and international finance. Stanford courses satisfying these requirements are ECON 51, 52, 102A or POLISCI 150A, and ECON 165 and 166.

To apply or for information on graduate admission, see http://gradadmissions.stanford.edu.

Applicants from schools other than Stanford or applicants from Stanford who did not apply in their senior year should submit a graduate admission application including:

- a statement setting forth relevant personal, academic, and career plans and goals
- official transcripts
- three letters of recommendation
- Graduate Record Examination (GRE) scores
- a writing sample of at least eight double-spaced pages
- resume or curriculum vitae
- TOEFL scores are required of applicants for whom English is not their first language or who did not attend an undergraduate institution where English is the language of instruction.

Applicants are expected to have a B.A. or B.S. degree from an accredited school.

Applications for admission in Autumn Quarter must be filed with supporting credentials by January 11, 2011.

COTERMINAL PROGRAM

Undergraduates at Stanford may apply for admission to the coterminal master's program in IPS when they have earned a minimum of 120 units toward graduation, including AP and transfer credit, and no later than the quarter prior to the expected comple-

tion of their undergraduate degree. The coterminal application requires the following supporting materials:

- two letters of recommendation from University faculty
- a writing sample of at least eight double-spaced pages
- a statement of relevant personal, academic, and career plans and goals.

Applications must be filed together with supporting materials by January 11, 2011.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

JOINT DEGREE PROGRAM

Students may also choose to pursue a joint J.D./M.A. in IPS degree. The joint degree program supplements the strengths of the Law School with training through IPS. Prospective students interested in the joint J.D./M.A. in IPS program may apply concurrently to both the Stanford Law School and the IPS program. This means that two separate application forms are required and applicants must submit LSAT scores to the Law School and GRE scores to the IPS program.

Students already enrolled at Stanford Law School may apply to the joint J.D./M.A. in IPS program by no later than the end of the second year of Law School. The IPS program will make rolling admissions decisions based on the student's original application materials (GRE scores are not required in addition to LSAT scores in this case). Submission of the following is required for consideration:

- IPS Joint Degree Application Form (available from the IPS web site)
- Law School Joint Degree Petition (available from the Law School Registrar's Office)
- Graduate Program Authorization Petition (submitted via Axess)
- Enrollment Agreement for Students with Multiple Programs (available for download on the University Registrar's forms page)

For further information, see the "Joint Degree Programs" section of this bulletin and the University Registrar's site.

MASTER OF ARTS IN INTERNATIONAL POLICY STUDIES

DEGREE REQUIREMENTS

To receive the M.A. degree in International Policy Studies, students must complete the courses listed below. These requirements entail a minimum of 24 units of policy skills courses, a 10-unit practicum or master's thesis, a 5-unit writing and rhetoric seminar, a 5-unit course in international economics, a 1-unit colloquium, a 3-unit course in international relations theory, and a total of six courses at a minimum of 24 units from the concentration curriculum. Only students with two or more years of relevant policy work experience may petition to write a master's thesis instead of taking the practicum. To obtain the M.A. degree in IPS, students must complete a minimum of 72 units over two years.

The IPS program has the following prerequisites:

- ECON 51
- ECON 52
- ECON 102A *or* POLISCI 150A
- ECON 165
- ECON 166

COURSE REQUIREMENTS

Core Courses—

1. IPS 300. Issues in International Policy Studies Colloquium (1 unit)
2. IPS 201. Managing Global Complexity (3 units)

Policy Skills Courses—

1. IPS 205A. Foundations of Statistical Inference (4 units) *and* IPS 205B. Econometrics (4 units)
   or POLISCI 350A. Political Methodology I (5 units) *and* POLISCI 350B. Political Methodology II (5 units).
2. IPS 206A. Politics and Collective Action (4 units)
   or IPS 208. Justice (4 units)
   or POLISCI 336. Global Justice (5 units)
3. IPS 221. International Organizations and Institutions (5 units)
   or POLISCI 317. International Organizations (5 units)
   or POLISCI 364. Theories of Political Institutions (4 units)
   or SOC 260. Formal Organizations (5 units)
   or SOC 268. Global Organizations: Managing Diversity (5 units)
4. IPS 207A. Judgment and Decision Making (4 units)
   or IPS 207B. Public Policy and Social Psychology: Implications and Applications (4 units)
5. Those concentrating in international political economy must choose one of the following:
   - IPS 204A. Microeconomics (4 units)
   - IPS 204B. Cost-Benefit Analysis and Evaluation (4 units)

   Those not concentrating in international political economy must choose one of the following:
   - IPS 204A. Microeconomics (4 units)
   - IPS 204B. Cost-Benefit Analysis and Evaluation (4 units); *must petition and have strong microeconomic background*
   - IPS 202 (5 units) or IPS 203 (5 units); take whichever course is not taken for the international economics requirement

Writing and Rhetoric Seminar—One of the following (5 units):

- IPS 210. The Politics of International Humanitarianism
- IPS 211. The Transition from War to Peace: Peacebuilding Strategies
- IPS 213. International Mediation and Civil Wars
- IPS 221A. Globalization and Its Discontents: An Introduction to International Political Economy
- IPS 314S. Decision Making in U.S. Foreign Policy

International Economics Seminar—One of the following (5 units):

- IPS 202. Topics in International Macroeconomics
- IPS 203. Issues in International Economics

Practicum or Thesis—One of the following (10 units):

- IPS 209. Practicum
- IPS 209A. Master's Thesis. The student must petition and receive program director approval to take this course.

Area of Concentration Curriculum—Students are required to choose one area of concentration from the list below and complete a total of six courses within the concentration at a minimum of 24 total units. Each area of concentration has a gateway course, which must be taken during the first year and prior to enrolling in subsequent courses. Additionally, each area of concentration has a list of approved courses (see list below).

- Democracy, Development, and Rule of Law
  Gateway course: IPS 230. Democracy, Development, and Rule of Law (5 units)
- Energy, Environment, and Natural Resources
  Gateway course: CEE 207A. Energy Resources (4-5 units)
- Global Health
  Gateway course: MED 262. Economics of Health Improvement in Developing Countries (5 units)
- Global Justice
  Gateway course: POLISCI 336. Global Justice (5 units)
- International Negotiation and Conflict Management
  Gateway course: IPS 250. International Conflict: Management and Resolution (3 units)
- International Political Economy
  Gateway course: IPS 202. Topics in International Macroeconomics (5 units) and IPS 203. Issues in

International Economics (5 units); one course counts towards international economics requirement
- International Security and Cooperation
  Gateway course: IPS 241. International Security in a Changing World (5 units)

Language Requirement—Proficiency in a foreign language is required and may be demonstrated by completion of three years of university-level course work in a foreign language or by passing an oral and written proficiency examination prior to graduation. International students who speak English as a second language already meet this requirement.

Grade Requirements—All courses to be counted toward the degree, except IPS 300, must be taken for a letter grade. Overall GPA of 3.0 must be maintained.

Additional Academic Requirements—

1. Students are not required to repeat a course that duplicates material they have already mastered. Students, may, by petition and approval, substitute a different course for a core requirement whose material would be duplicative. This flexibility does not reduce the unit requirements for the M.A. degree.
2. All graduate degree candidates must submit a Master's Degree Program Proposal to the International Policy Studies office by the end of Autumn Quarter; this document must be on file in order to apply to graduate.

Financial Aid—Limited fellowship support is available for graduate students entering the IPS program.

COGNATE COURSES

The courses listed below fulfill elective requirements within the various areas of concentration. Not all courses are applicable for every area of concentration. Additional relevant courses may be offered. For course descriptions, see ExploreCourses.

- ANTHRO 109/209. Archaeology: World Cultural Heritage
- ANTHRO 277. Environmental Change and Emerging Infectious Diseases (same as HUMBIO 114)
- ANTHRO 336. Anthropology of Rights
- ANTHRO 356. The Anthropology of Development
- BIO 180/280. Fundamentals of Sustainable Agriculture (same as EARTHSYS 280)
- BIO 247. Controlling Climate Change in the 21st Century (same as EARTHSYS 247, HUMBIO 116)
- BIOMEDIN 432. Analysis of Costs, Risks, and Benefits of Health Care (same as MGTECON 332, HRP 392)
- CEE 242A. Creating Sustainable Development
- CEE 265A. Sustainable Water Resources Development
- CEE 265C. Water Resources Management
- CEE 265D. Water and Sanitation in Developing Countries
- CEE 275A. Law and Science of California Coastal Policy (same as EARTHSYS 275)
- COMM 336G. Democracy, Justice, and Deliberation
- COMM 338. Democratic Theory: Normative and Empirical Issues
- COMM 344. Democracy, Press, and Public Opinion
- ECON 106. World Food Economy
- ECON 127. Economics of Health Improvement in Developing Countries (same as MED 262)
- ECON 214. Development Economics I
- ECON 216. Development Economics II
- ECON 265. International Economics I
- ECON 266. International Economics II
- GES 253. Petroleum Geology and Exploration
- HISTORY 102. The History of the International System
- HISTORY 227/327. East European Women and War in the 20th Century
- HISTORY 257/347. The Politics and Ethics of Modern Science and Technology (same as STS 221)
- HISTORY 304G. War, Culture, and Society in the Modern Age
- HISTORY 326G. Civilians and War in Modern Europe
- HISTORY 378A. The Logic of Authoritarian Government, Ancient and Modern
- HISTORY 391E. Maps, Borders, and Conflict in East Asia
- HRP 207. Introduction to Concepts and Methods in Health Services and Policy Research I
- HRP 208. Introduction to Concepts and Methods in Health Services and Policy Research II
- HRP 212. Crosscultural Medicine
- HRP 231. Epidemiology of Infectious Diseases
- HUMBIO 122S. Social Class, Race, Ethnicity, Health (same as SOC 141A)
- HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges
- INTNLREL 140C. The U.S., U.N. Peacekeeping, and Humanitarian War
- LAW 330. International Human Rights
- LAW 336. International Jurisprudence
- LAW 338. Land Use
- LAW 407. International Deal Making: Legal and Business Aspects
- LAW 605. International Environmental Law: Climate Change
- MED 242. Physicians and Human Rights
- MGTECON 331. Political Economy of Health Care in the United States (same as HRP 391, PUBLPOL 231)
- MS&E 243. Energy and Environmental Policy Analysis (same as IPER 243)
- MS&E 248. Economics of Natural Resources
- MS&E 294. Climate Policy Analysis
- PHIL 176/276. Political Philosophy: The Social Contract Tradition
- POLISCI 110B. Strategy, War, and Politics
- POLISCI 110D/110Y. War and Peace in American Foreign Policy
- POLISCI 113F. The United Nations and Global Governance
- POLISCI 116. History of Nuclear Weapons (same as HISTORY 103E)
- POLISCI 134. Democracy and the Communication of Consent (same as COMM 236)
- POLISCI 215. Explaining Ethnic Violence
- POLISCI 216E/316. International History and International Relations Theory (same as HISTORY 202/306E)
- POLISCI 218. U.S. Relations in Iran
- POLISCI 221. Tolerance and Democracy
- POLISCI 223S. The Imperial Temptation: U.S. Foreign Policy in a Unipolar World
- POLISCI 231S. Contemporary Theories of Justice
- POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
- POLISCI 336. Justice (same as PHIL 271)
- POLISCI 348R. Workshop: China Social Science (same as SOC 368W)
- POLISCI 440B. Political Economy of Development (same as HISTORY 378E)
- PSYCH 215. Mind, Culture, and Society
- SOC 141/241. Controversies about Inequality
- SOC 210. Politics and Society
- SOC 218. Social Movements and Collective Action
- SOC 240. Introduction to Social Stratification
- SOC 247A. Comparative Ethnic Conflict
- SOC 314. Economic Sociology
- SOC 345. Seminar in Comparative Race and Ethnic Relations
- STS 210. Ethics, Science, and Technology

INTERNATIONAL RELATIONS

Director: Kenneth Schultz (Political Science)

Faculty Committee: Kyle Bagwell (Economics), Larry J. Diamond (Freeman Spogli Institute for International Studies), Zephyr Frank (History), Judith L. Goldstein (Political Science), Stephen H. Haber (Political Science), Rosamond Naylor (Freeman Spogli Institute for International Studies), Michael Tomz (Political Science)

Affiliated Faculty: David Abernethy (Political Science, emeritus), Barton Bernstein (History, emeritus), Gordon Chang (History), Larry J. Diamond (Hoover Institution), Peter Duus (History, emeritus), Amir Eshel (German Studies), James Fearon (Political Science), Zephyr Frank (History), Lawrence H. Goulder (Economics), David J. Holloway (History, Political Science), Terry L. Karl (Political Science), David M. Kennedy (History, emeritus), Stephen D. Krasner (Political Science), Gail Lapidus (Freeman Spogli Institute for International Studies, emerita), Philip Lipscy (Political Science) , Beatriz Magaloni (Political Science), Mark I. Mancall (History, emeritus), Robert McGinn (Management Science and Engineering), Norman Naimark (History), Rosamond Naylor (Freeman Spogli Institute for International Studies), Jean C. Oi (Political Science), Daniel I. Okimoto (Political Science, emeritus), William J. Perry (Freeman Spogli Institute for International Studies, Management Science and Engineering), Richard Roberts (History), Jonathan Rodden (Political Science), Scott Sagan (Political Science), Debra M. Satz (Philosophy), Andrew Walder (Sociology), Amir Weiner (History), Jeremy Weinstein (Political Science)

Other Affiliation: Jasmina Bojic (International Relations), Christophe Crombez (Freeman Spogli Institute for International Studies), Rafiq Dossani (Freeman Spogli Institute for International Studies), Gili S. Drori (International Relations), John Dunlop (Hoover Institution), Katherine Jolluck (History), Anjini Kochar (Stanford Institute for Economic Policy Research), Martin W. Lewis (History), Pawel Lutomski (International Relations), Alice Lyman Miller (Hoover Institution), Thomas O'Keefe (International Relations), Bertrand Patenaude (Hoover Institution), Armin Rosencranz, Miriam Abu Sharkh (CDDRL), Stephen Stedman (Political Science), Richard Steinberg (International Comparative and Area Studies), Kathryn Stoner-Weiss (Freeman Spogli Institute for International Studies)

Program Office: Encina Hall West, Room 216

Mail Code: 94305-6045

Phone: (650) 725-0715

Web Site: http://internationalrelations.stanford.edu

Courses offered by the Program in International Relations are listed under the subject code INTNLREL on the *Stanford Bulletin's* ExploreCourses web site.

International Relations (IR) is an interdisciplinary undergraduate major focusing on the changing political, economic, and cultural relations within the international system in the modern era. The program explores how global, regional, and domestic factors influence relations among world actors. Students are equipped with the skills and knowledge necessary to analyze choices and challenges that arise in this arena. IR majors pursue a study in world politics that includes courses in political science, economics, history, and languages, focusing on issues such as international security, international political economy, political and economic development, and democratization. Students must spend at least one quarter overseas and show two-year proficiency in a foreign language.

International Relations offers an undergraduate Bachelor of Arts program, an honors program, and a minor in International Relations.

MISSION OF THE UNDERGRADUATE PROGRAM IN INTERNATIONAL RELATIONS

The undergraduate program in International Relations provides an interdisciplinary approach to the study of the changing political, economic, and cultural relations within the international system of the modern era. Students in the program explore how global, regional, and domestic factors influence relations among world actors. The program equips students with the skills and knowledge necessary to analyze choices and challenges that arise in this arena. IR majors pursue study in world politics, including courses in political science, economics, history, and language, focusing on issues such as international security, political economy, economic development, and democratization. Students must spend at least one quarter overseas. The major prepares students for careers in government and the corporate sector, and for admission into graduate programs in law, business, economics, and political science.

LEARNING OUTCOMES

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in International Relations. Students are expected to demonstrate:

1. understanding of core knowledge within International Relations.
2. ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
3. ability to write clearly and persuasively, communicating ideas clearly.
4. ability to evaluate theory and critique research within the discipline.

COTERMINAL PROGRAMS IN RELATED FIELDS

It is possible for students majoring in International Relations to work simultaneously for a coterminal master's degree in a number of related fields. Coterminal students should consult advisers in both departments or programs to ensure that they fulfill the degree requirements in both fields. For information on the M.A. program in International Policy Studies, see the "International Policy Studies" section in this bulletin. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

BACHELOR OF ARTS IN INTERNATIONAL RELATIONS

The International Relations major must be declared no earlier than the beginning of sophomore year and no later than the end of the second quarter of the junior year. Students must submit an acceptable proposal to the director of the program and declare IR on Axess. Students completing a double major, or fulfilling International Relations as a secondary major, are also required to file a proposal by the end of the second quarter of the junior year.

Requirements for the major (70 units) are as follows; IR core courses are listed in items 1-5:

1. POLISCI 1
2. POLISCI 110A *or* 110B *or* 110C *or* 110D *or* HISTORY 158
3. ECON (10 units), two of these five courses: ECON 1A, 1B, 50, 51, 52
4. Two additional upper-division courses with strong economic components from the IR approved course offerings lists
5. At least one of the following skills classes: ECON 102A, POLISCI 150A, STATS 60
6. Complete either a functional specialization or an area specialization (see below for descriptions of specializations). Courses

that are used in the core area (1-5 above) cannot also be counted for the specialization.
7. At least one course must be an upper-division seminar or colloquium.
8. At least one writing intensive course designated as Writing in the Major (WIM) for International Relations.
9. No more than 20 units can be lower-division courses.
10. A minimum grade of 'C' is required for courses to count towards major requirements.
11. Completion of one quarter study overseas either through the Stanford Overseas Studies Program or an approved non-Stanford program; non-Stanford programs must be pre-approved by the IR program before the student enrolls in the program.
12. Proficiency in a foreign language through two years of course work (second-year, third-quarter) or a proficiency exam.

FUNCTIONAL SPECIALIZATION

The three functional specializations are:
1. Comparative Political and Historical Analysis (CPHA)
2. Comparative Culture and Society (CCAS)
3. Comparative and International Political Economy (CIPE)

Students must complete a total of seven courses (35 units) for their functional specialization. Four courses must be from the student's functional area (CPHA, CCAS, CIPE); two courses from a second track; and the final course from the third track (4-2-1). Functional specializations are not declared on Axess.

The following courses are approved for each functional specialization. Updated lists are made available every quarter on the web and they are also available in the International Relations office.

COMPARATIVE POLITICAL AND HISTORICAL ANALYSIS (CPHA)

INTNLREL 114D. Democracy, Development, and the Rule of Law
INTNLREL 116. Politics of Divided Korea
INTNLREL 120.Terrorism and Security in Israel
INTNLREL 125. Japanese Postwar Politics
INTNLREL 131. Globalization and Organizations
INTNREL 136R. Introduction to GLobal Justice
INTNLREL 140A. International Law and International Relations
INTNLREL 140B. Theories of International Law
INTNLREL 163. History and Geography of Contemporary Global Issues
INTNLREL 170. Energy and the Climate
COMM 177K. Specialized Writing and Reporting - Human RIghts Reporting
EASTASN 189K. Politics of Divided Korea
HISTORY 102. The History of the International System (WIM)
HISTORY 120C. 20th-Century Russian and Soviet History
HISTORY 123. Reform and Revolution in Modern Russia, 1856-2008
HISTORY 125. 20th-Century Eastern Europe
HISTORY 137/337. The Holocaust
HISTORY 145B. Africa in the 20th Century
HISTORY 150C. The United States in the Twentieth Century
HISTORY 158. The United States Since 1945
HISTORY 181B. The Middle East in the 20th Century
HISTORY 195. Modern Korean History
HISTORY 195C. Modern Japanese History
HISTORY 197. Southeast Asia: From Antiquity to the Modern Era
HISTORY 198. The History of Modern China
HISTORY 202/306E. International History and International Relations
HISTORY 224/324. Violence, Islam, and the State in Central Asia
HISTORY 224A/324A. Modern Russia, Iran, and Afghanistan
HISTORY 228/328. Circles of Hell: Poland in World War II
HISTORY 252/355. Decision Making in International Crises: The A-Bomb, the Korean War, and the Cuban Missile Crisis
HISTORY 256/356. U.S.-China Relations: From the Opium War to Tiananmen
IPS 210. The Politics of International Humanitarian Action
IPS 211. The Transition from War to Peace: Peacebuilding Strategies
IPS 219. The Role of Intelligence in U.S. Foreign Policy
IPS 220. The US, Europe and the World
IPS 243. Missile Defense
MS&E 93Q. Nuclear Weapons, Terrorism and Energy
MS&E 193/193W/293. Technology and National Security
POLISCI 110B. Strategy, War, and Politics
POLISCI 110D/110Y. War and Peace in American Foreign Policy
POLISCI 111D. British Politics
POLISCI 113F. The United Nations and Global Governance
POLISCI 114S. International Security in a Changing World
POLISCI 116. History of Nuclear Weapons (Same as HISTORY 103E)
POLISCI 140L. China in World Politics
POLISCI 144T. Democracies and Dictatorships
POLISCI 147. Comparative Democratic Development
POLISCI 147S. Comparative Democratic Politics
POLISCI 148/348. Chinese Politics: The Transformation and the Era of Reform
POLISCI 149S. Islam and the West
POLISCI 149T. Middle Eastern Politics
POLISCI 210C. Globalizations and Discontents
POLISCI 212. Managing Global Complexity (Same as IPS 201)
POLISCI 217. International Organizations
POLISCI 218. U.S. Relations in Iran
POLISCI 245R. Politics in Modern Iran
POLISCI 248. Mexican Politics
POLISCI 248S. Latin American Politics
POLISCI 346S. The Logic of Authoritarian Government, Ancient and Modern
SOC 167A/267A. Asia-Pacific Transformation

COMPARATIVE CULTURE AND SOCIETY (CCAS)

INTNLREL 114D. Democracy, Development, and the Rule of Law
INTNLREL 141A. Camera as a Witness
INTNLREL 161A. Global Human Geography: Asia and Africa
INTNLREL 161B. Global Human Geography: Europe and Americas
INTNREL 165A. Global Governance and Human Rights
INTNLREL 166. Russia and Islam
AFRICAST 111/211. Education for All? The Global and Local in Public Policy Making in Africa
AFRICAST 107. Community Restructuring and Development in South Africa
CASA 77/277. Japanese Society and Culture
EASTASN 118. History, Memory and Citizenship in East Asia
ECON 143. Ethics in Economics Policy
EDUC 136/306D. World, Societal, and Educational Change: Comparative Perspectives
HISTORY 185B. Jews in the Modern World
HISTORY 221B. The Woman Question in Modern Russia
HISTORY 227/327. East European Women and War in the 20th Century
HISTORY 245E/347E. Health and Society in Africa
HISTORY 248S/448A. African Societies and Colonial States
HISTORY 295J. Chinese Women's History
IPS 210. The Politics of International Humanitarian Action
IPS 221B. Citizenship and Immigration
JAPANGEN 51/251. Japanese Business Culture
PHIL 171/271. Justice (Same as ETHICSOC 171, IPS 208, POLISCI 136S, PUBLPOL 207)
POLISCI 141. The Global Politics of Human Rights
POLISCI 149S. Islam and the West
POLISCI 215. Explaining Ethnic Violence
SOC 110/210. Politics and Society
SOC 111/211. State and Society in Korea
SOC 117A/217A. China Under Mao

STS 110. Ethics and Public Policy (Same as MS&E 197, PUBLPOL 103B)

COMPARATIVE AND INTERNATIONAL POLITICAL ECONOMY (CIPE)

INTNLREL 114D. Democracy, Development, and the Rule of Law
INTNLREL 115. Development Issues in South Asia
INTNLREL 117. Varieties of Capitalism in East Asia: Politics and Economic Reforms
INTNLREL 118. The Political Economy of Modern Iran
INTNLREL 122A. The Political Economy of the European Union
INTNLREL 130. Science, Technology, and Development
INTNLREL 133. Introduction to Comparative and International Political Economy
INTNLREL 143. Nongovernmental Organizations and Development in Poor Countries
INTNLREL 147. The Political Economy of the Southern Cone of South America
INTNLREL 148. Economic Integration of the Americas
INTNLREL 149. The Economics and Political Economy of the Multilateral Trade System
BIO 147/247. Controlling Climate Change in the Twenty-First Century
EASTASN 183C. Doing Business in China
EASTASN 185C/285C. Economic Development of Greater China: Past, Present, and Future
ECON 106. World Food Economy
ECON 111. Money and Banking
ECON 113. Technology and Economic Change
ECON 115. European Economic History
ECON 117. Economic History and Modernization of the Islamic Middle East
ECON 118. Development Economics
ECON 120. Socialist Economies in Transition
ECON 122. Economic Development of Latin America
ECON 124. Contemporary Japanese Economy
ECON 126. Economics of Health and Medical Care (Same as BIOMEDIN 156/256)
ECON 150. Economic Policy Analysis (Same as PUBLPOL 104)
ECON 155. Environmental Economics and Policy (Same as EARTHSYS 112)
ECON 162. Monetary Economics
ECON 165. International Trade and Finance
ECON 166. International Trade
ECON 167. European Monetary and Economic Integration
ECON 169/269. International Financial Markets and Monetary Institutions
HISTORY 279/379. Latin American Development: Economy and Society, 1800-2000
HUMBIO 129. Critical Issues in International Women's Health
HUMBIO 129S. International Health
IPS 222. Economic Development
POLISCI 110A. Sovereignty and Globalization
POLISCI 110C/110X. America and the World Economy (110C fulfills WIM)
POLISCI 140. Political Economy of Development
POLISCI 211. Political Economy of East Asia
POLISCI 213R. Political Economy of Financial Crisis
POLISCI 216. Law, Economics, and Politics of International Trade (Same as LAW 306)
POLISCI 242S. Politics of Welfare State Expansion and Reform
POLISCI 247R. Politics and Economics in Democracies (WIM)

1- and 2-unit options

INTNLREL 191. International Relations Journal

INDEPENDENT STUDY/HONORS

INTNLREL 197. Directed Reading in International Relations—open only to declared International Relations majors.
INTNLREL 198. Senior Thesis—open only to declared International Relations majors with approved senior thesis proposals.
INTNLREL 199. Honors Research: Democracy, Development, and the Rule of Law in Developing Countries
INTNLREL 200A. International Relations Honors Field Research
INTNLREL 200B. International Relations Honors Seminar

AREA SPECIALIZATION

The area specializations are: Africa, Europe, Latin America, and Russia/East Europe. Students must complete a total of seven courses (35 units) with five courses directly related to their area specialization. Three of these five courses must be in one of the three tracks (CPHA, CCAS, CIPE), one course in a second track, and the final course in the third track. The ten remaining units must be fulfilled by comparative or further area course work.

Students must also demonstrate proficiency in a language, other than English, commonly spoken in the area chosen, by completing two years of language study or by passing a second-year, third-quarter proficiency exam.

Check the IR office for updated information about the area specialization requirements. Area specializations are not declared on Axess.

HONORS PROGRAM

The International Relations honors program offers qualified students the opportunity to conduct a major independent research project under faculty guidance. Such a project requires a high degree of initiative and dedication, significant amounts of time and energy, and demonstrated skills in research and writing.

In their junior year, students should consult with prospective honors advisers, choose the courses that provide academic background in their areas of inquiry, and demonstrate an ability to conduct independent research. Students can select from the IR honors option or the CDDRL (Center on Democracy, Development, and the Rule of Law) option which focuses on issues of democracy, development, and the rule of law; for information on the CDDRL, see http://cddrl.stanford.edu.

Students should submit their honors thesis proposal late in Winter Quarter of the junior year; check with IR office for the exact deadline.

Prerequisites for participation include a 3.5 grade point average (GPA), a strong overall academic record, good academic standing, successful experience in writing a research paper, and submission of an acceptable thesis proposal. Students are required to enroll in INTNLREL 200A, International Relations Honors Field Research, in Spring Quarter of their junior year and consider participating in Honors College. CDDRL option students should enroll in INTNLREL 199, Honors Research: Democracy, Development, and the Rule of Law in Developing Countries. In their senior year, honors students must enroll in INTNLREL 200B in Autumn Quarter and in research units each quarter with their faculty adviser. Honors students present a formal defense of their theses in mid-May. Students must receive at least a grade of 'B+' in order to graduate with honors in International Relations.

MINOR IN INTERNATIONAL RELATIONS

A minor in International Relations is intended to provide an interdisciplinary background allowing a deeper understanding of contemporary international issues. Declaration of the minor must take place no later than the end of the second quarter of the junior year. To declare, complete the application for a minor on Axess.

Students complete the minor by taking seven unduplicated courses (35 units) from the IR curriculum, including the following:

1. POLISCI 1
2. Two of these five courses: POLISCI 110A,B,C,D, or HISTORY 158
3. Four courses from one of the three major tracks (CPHA, CCAS, CIPE), or four courses relating to the same geographic region (Africa, Europe, Latin America, and Russia/East Europe).

OVERSEAS STUDIES COURSES IN INTERNATIONAL RELATIONS

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 24. China's Economic Development. 5 units, Scott Rozelle, GER:DB:SocSci
- OSPBEIJ 42. Chinese Media Studies. 4 units, Kun Li, GER:DB:SocSci
- OSPBEIJ 66. Essentials of China's Criminal Justice System. 5 units, Shizhou Wang, GER:DB:SocSci, EC:GlobalCom
- OSPBEIJ 67. China-Africa and Middle East Relations. 4 units, Anshan Li, Suolao Wang

BERLIN

- OSPBER 34. Science, Medicine, and Technology in Nazi Germany. 3-5 units, David Holloway
- OSPBER 115X. German Economy: Past and Present. 4-5 units, Ingo Klein, GER:DB:SocSci, EC:GlobalCom

FLORENCE

- OSPFLOR 35. European Economic and Monetary Integration. 5 units, Pompeo Della Posta, GER:DB:SocSci, EC:GlobalCom
- OSPFLOR 106V. Italy: From an Agrarian to a Post-industrial Society. 5 units, Giuseppe Mammarella, GER:DB:SocSci, EC:GlobalCom

MADRID

- OSPMADRD 54. Contemporary Spanish Economy and the European Union. 5 units, Miguel Buñuel, GER:DB:SocSci
- OSPMADRD 61. Society and Cultural Change: The Case of Spain. 5 units, Antonio Muñoz

MOSCOW

- OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia. 5 units, Vladimir Mau, Vadim Novikov, GER:DB:SocSci, EC:GlobalCom
- OSPMOSC 72. Space, Politics and Modernty in Russia. 5 units, Sergei Medvedev, GER:DB:SocSci, EC:GlobalCom
- OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration. 5 units, Maxim Bratersky, Sergey Kortunov, GER:DB:SocSci, EC:GlobalCom
- OSPMOSC 78. Russian-American Relations: From the War of Independence to the War on Terror. 5 units, Edward A. Ivanian, GER:DB:SocSci

OXFORD

- OSPOXFRD 35. Modern UK and European Government and Politics. 4-5 units, Giovanni Cappocia, GER:DB:SocSci
- OSPOXFRD 45. British Economic Policy Since World War II. 5 units, James Forder, GER:DB:SocSci

PARIS

- OSPPARIS 29. Colonization, Decolonization and Immigration: An Overview of French Global History in the 20th Century. 5 units, Choukri Hmed, GER:DB:SocSci, EC:GlobalCom
- OSPPARIS 32. Understanding French Politics. 4-5 units, Patrick Chamorel, GER:DB:SocSci
- OSPPARIS 124X. Building the European Economy: Economic Policies and the Challenges Ahead. 5 units, Jacques Le Cacheux, GER:DB:SocSci
- OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S.—a Comparison. 4-5 units, Jean-Marie Fessler, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci
- OSPSANTG 104X. Modernization and Culture in Latin America. 5 units, Bernardo Subercaseaux, GER:DB:SocSci, EC:GlobalCom
- OSPSANTG 130X. The Chilean Economy in Comparative Perspective. 5 units, Cristóbal Aninat, GER:DB:SocSci
- OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective. 5 units, Sergio Micco, GER:DB:SocSci

WINTER QUARTER

BERLIN

- OSPBER 15. Shifting Alliances? The European Union and the US. 4-5 units, Uli Brückner, GER:DB:SocSci, EC:GlobalCom
- OSPBER 26. Germany in Europe. 5 units, Philippe Buc
- OSPBER 62. Shades of Green: Environmental Policy in Germany and the U.S. in Historical Perspective. 5 units, Sylke Tempel, GER:DB:SocSci
- OSPBER 161X. The German Economy in the Age of Globalization. 4-5 units, Ingo Klein, GER:DB:SocSci, EC:GlobalCom

CAPETOWN

- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan
- OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa. 4 units, Chris Saunders
- OSPCPTWN 38. Genocide: The African Experience. 3 units, Mohamed Adhikari

FLORENCE

- OSPFLOR 49. The Cinema Goes to War: Fascism and World War II As Represented in Italian and European Cinema. 5 units, Ermelinda Campani, GER:DB:Hum
- OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon. 5 units, Khaled Fouad Allam, GER:DB:SocSci, EC:GlobalCom

MADRID

- OSPMADRD 42. A European Model of Democracy: The Case of Spain. 5 units, Francisco Javier Bobillo de la Peña, GER:DB:SocSci
- OSPMADRD 72. Issues in Bioethics Across Cultures. 5 units, Pablo de Lora del Toro

OXFORD

- OSPOXFRD 13. Politics and Economics of the Euro Zone. 5 units, Judith Goldstein, GER:DB:SocSci
- OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics and Economics. 4-5 units, Robert McMahon, GER:DB:SocSci
- OSPOXFRD 92. Britain in the Second World War. 5 units, Geoffrey Tyack
- OSPOXFRD 117W. Gender and Social Change in Modern Britain. 4-5 units, Amanda Palmer, GER:DB:SocSci, EC:GlobalCom

PARIS

- OSPPARIS 57. Human Rights in Comparative Perspective. 4-5 units,Laurie Boussaguet, GER:DB:SocSci, EC:GlobalCom

- OSPPARIS 81. France During the Second World War: Between History and Memory. 5 units, Fabrice Virgili, GER:DB:SocSci
- OSPPARIS 91. Globalization and its Effect on France and the European Union. 5 units, Eloi Laurent, Jacques Le Cacheux, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 129X. Latin America in the International System. 4-5 units, Claudio Fuentes, GER:DB:SocSci
- OSPSANTG 130X. The Chilean Economy in Comparative Perspective. 5 units, Cristóbal Aninat, GER:DB:SocSci

SPRING QUARTER

BEIJING

- OSPBEIJ 19. Population and Society in East Asia. 4 units, Yun Zhou, GER:DB:SocSci, EC:GlobalCom
- OSPBEIJ 41. Chinese Society and Business Culture. 4 units, Bobai Li, GER:DB:SocSci, EC:GlobalCom
- OSPBEIJ 46. Introduction to Chinese Economy. 5 units, Dong Chen, GER:DB:SocSci, EC:GlobalCom

BERLIN

- OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU. 4-5 units, Uli Brückner, GER:DB:SocSci, EC:GlobalCom
- OSPBER 174. Sports, Culture and Gender in Comparative Perspective. 5 units, Wolf-D. Junghanns, GER:DB:SocSci, EC:Gender

CAPETOWN

- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan
- OSPCPTWN 40. Education in the Post-Apartheid City. 4 units, Aslam Fataar
- OSPCPTWN 44.Negotiating Home, Citizenship and the South African City. 4 units, Sophie Oldfield, GER:DB:SocSci, EC:GlobalCom
- OSPCPTWN 52. The Ethics of Imperialism. 5 units, James Daughton, GER:DB:Hum

FLORENCE

- OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the "New" European Union. 5 units, Leonardo Morlino, GER:DB:SocSci, EC:GlobalCom

KYOTO

- OSPKYOTO 60. Japan in World War II: Experience and Memory. 5 units, Peter Duus, Andras Horvat
- OSPKYOTO 215X. Political Economy of Japan. 4-5 units, Toshihiko Hayashi, GER:DB:SocSci

MADRID

- OSPMADRD 57. Health Care: A Contrastive Analysis between Spain and the U.S. 5 units, Pablo de Lora del Toro, GER:DB:SocSci

OXFORD

- OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective. 4-5 units, Robert McMahon, GER:DB:SocSci

PARIS

- OSPPARIS 33. The Economics of Climate Change: Policies in Theory and in Practice in the EU and the US. 5 units, Christian de Perthuis, Benoit Leguet, GER:DB:SocSci, EC:GlobalCom
- OSPPARIS 122X. Challenges of Integration in the European Union. 4-5 units, Sylvie Strudel, GER:DB:SocSci

SANTIAGO

- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci
- OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century. 5 units, Gerrman Correa, GER:DB:SocSci
- OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies. 5 units, Oscar Munoz, GER:DB:SocSci
- OSPSANTG 141X. Politics and Culture in Chile. 5 units, Bernardo Subercaseaux, GER:DB:Hum, EC:GlobalCom

JEWISH STUDIES

Directors: Charlotte Elisheva Fonrobert, Vered Karti Shemtov
Academic Advisory Committee: Zachary Baker (Stanford University Libraries), Joel Beinin (History), Jonathan Berger (Music), Arnold Eisen (Religious Studies, emeritus), Amir Eshel (German Studies), John Felstiner (English, emeritus), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Avner Greif (Economics), Katherine Jolluck (History), Mark Mancall (History, emeritus), Norman Naimark (History), Reviel Netz (Classics), Jack Rakove (History), Aron Rodrigue (History), Gabriella Safran (Slavic Languages and Literatures), Vered Shemtov (African and Middle Eastern Languages and Literatures), Peter Stansky (History, emeritus), Amir Weiner (History), Steven Weitzman (Religious Studies), Sam Wineburg (Education), Steven Zipperstein (History), Writer in Residence: Maya Arad
Offices: Building 360, Room 362H
Mail Code: 94305-2190
Phone: (650) 725-2789
Email: jewish.studies@stanford.edu
Web Site: http://jewishstudies.stanford.edu

The Taube Center for Jewish Studies investigates all aspects of Jewish culture in history, religion, literature, language and education from biblical times to the present. Courses are offered on the undergraduate and graduate levels in a program complemented by a full range of guest lectures, conferences, and symposia. The Center annually sponsors the Donald and Robin Kennedy Undergraduate Award for the best undergraduate essay on any theme in Jewish Studies, and the Dr. Bernard Kaufman Undergraduate Research Award in Jewish Studies to an undergraduate engaged in research on Jews in modernity.

Graduate students enroll in the program through the departments of English, History, Comparative Literature, Religious Studies, or the School of Education, and must meet the requirements of those departments.

UNDERGRADUATE PROGRAMS IN JEWISH STUDIES

The center does not offer an undergraduate program in Jewish Studies. However, the Individually Designed Major in Jewish Studies permits interested students to focus their attention on the broad field of Jewish Studies and, at the same time, to expand their knowledge of one or another related fields.

INDIVIDUALLY DESIGNED MAJOR IN JEWISH STUDIES

The Individually Designed Major in Jewish Studies permits interested students to focus their attention on the broad field of Jewish Studies and, at the same time, to expand their knowledge of one or another related fields.

Each major should complete at least 75 units, all in courses at or above the 100 level (or their equivalent). A maximum of 15 of these 75 units may be taken on a credit/no credit basis. A maximum of 5 of these 75 units may be taken in individual study or directed reading.

Students must present evidence that demonstrates their ability to do independent work and have at least three full quarters of undergraduate work remaining at Stanford after the date on which the proposal is approved by the committee. Each major must obtain sponsorship from three faculty members, one of whom is the student's primary adviser, and from one of the Directors of the Taube Center for Jewish Studies.

The application deadline for IDM proposals is the fifth week of Spring Quarter of the sophomore year. Applications are reviewed only once a year.

Details about the written procedures and documents necessary for application for an individually designed major in Jewish Studies can be obtained at the Taube Center for Jewish Studies, Bldg. 360, Main Quad, (650) 725-2789. See also the "Individually Design Majors in Humanities and Sciences" section of this bulletin.

REQUIREMENTS

The faculty members in Jewish Studies have designed the following structure for the individually designed major:

HISTORY AND SOCIETY:

Students must take one course in each of the three periods: biblical and ancient, medieval and modern, and contemporary	20 units

RELIGION:

Biblical, rabbinic, medieval, modern	20 units

LITERATURE:

Hebrew, Holocaust, American Jewish, Yiddish, German Jewish, Russian Jewish	15 units

HEBREW LANGUAGE (SECOND YEAR OR BEYOND):

Students who demonstrate by examination that they have completed the equivalent of at least two years of university-level modern Hebrew may apply the 12 units required in this category to more work in another category, with the approval of their primary adviser	12 units

ANCILLARY COURSES:

Ancient history, medieval history, modern European history, history of philosophy, Islam, Christianity	8-10 units
Total number of units required	75-77 units

Students planning an Individually Designed Major in Jewish Studies are also urged to write an honors thesis. Students interested in declaring an Individually Designed Major in Jewish Studies should discuss this with their adviser(s) when discussing the major itself. Up to 10 honors thesis units may be included in the major.

No course proposed for the major may be counted as fulfilling more than one required category in the proposed major. Transfer credits from other universities must be approved by the appropriate Stanford authorities.

COURSES

Students interested in pursuing an Individually Designed Major in Jewish Studies are advised to consult the following list of courses in preparing their program.

- JEWISHST 102/AMELANG 127. Land and Literature
- JEWISHST 101A/AMELANG 128A. Beginning Hebrew, First Quarter
- JEWISHST 101BAMELANG 128B. Beginning Hebrew, Second Quarter
- JEWISHST 101C/AMELANG 128C. Beginning Hebrew, Third Quarter
- JEWISHST 102A/AMELANG 129A. Intermediate Hebrew, First Quarter
- JEWISHST 102B/AMELANG 129B. Intermediate Hebrew, Second Quarter
- JEWISHST 102C/AMELANG 129C. Intermediate Hebrew, Third Quarter
- JEWISHST 103A/AMELANG 130A. Advanced Hebrew, First Quarter
- JEWISHST 104A/AMELANG 140A. Beginning Yiddish, First Quarter
- JEWISHST 104B/AMELANG 140B. Beginning Yiddish, Second Quarter
- JEWISHST 104C/AMELANG 140C. Beginning Yiddish, Third Quarter
- JEWISHST 107A/AMELANG 170A. Biblical Hebrew, First Quarter
- JEWISHST 107B/AMELANG 170B. Biblical Hebrew, Second Quarter
- JEWISHST 107C/AMELANG 170C. Biblical Hebrew, Third Quarter
- JEWISHST 140/COMPLIT 140. Introduction to Hebrew Literature
- JEWISHST 346/COMPLIT 346. Modern Hebrew Literature: Prose
- JEWISHST 150A/ENGLISH 140A. Creative Resistance and the Holocaust
- JEWISHST 153C/ENGLISH 183C/AMSTUD 183C. Feminism and American Literature
- JEWISHST 250G/ENGLISH 260G/AMSTUD 260G. Century's End: Race, Gender, and Ethnicity at the Turn of the Century
- JEWISHST 183,283/HISTORY 137,337. The Holocaust
- JEWISHST 185/HISTORY 185B. Jews in the Modern World
- JEWISHST 186D/HISTORY186D. Jews, Citizenship, and Europe's Others
- JEWISHST 187D/HISTORY 187D. Zionism and Its Critics
- JEWISHST 182C/POLISCI 224H/HISTORY 202C. Heretics to Headscarves
- JEWISHST 285F/HISTORY 285F. Jewish Women in History, Religion, and Literature, 17th Century to the Present
- JEWISHST 286E,386 E/HISTORY 286E,386E. Jews in France from the Dreyfus Affair to World War II
- JEWISHST 287S,481/HISTORY 287S,481. Research Seminar on the Modern Middle East
- JEWISHST 287D,387D/HISTORY 287D,387D. Tel-Aviv: Site, Symbol, City
- JEWISHST 287E,387E/HISTORY 287E,387E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism
- JEWISHST 287G,387G/HISTORY 287G,387G. Jews in Colonial North Africa
- JEWISHST 287K,387K/HISTORY 287K,387K. Gentlemen and Jews: History of the Jews of England
- JEWISHST 288,388/HISTORY 288,388. Palestine and the Arab-Israeli Conflict
- JEWISHST 486A/HISTORY 486A. Graduate Research Seminar in Jewish History
- JEWISHST 15N/RELIGST 15N. Travels Through the Afterlife
- JEWISHST 16SI/RELIGST 16SI. Religion and Spirituality: LGBT Perspectives
- JEWISHST 95/RELIGST 95. How to Read the Bible
- JEWISHST 120/RELIGST 130. Genesis and Gender: Male and Female in Judaism, Christianity, and Islam
- JEWISHST 221C,321C/RELIGST 221C,321C. Aramaic Jewish Texts
- JEWISHST 226B,326B/RELIGST 226B,326B/ Judaism and Christianity in the Mediterranean World; Contact, Competition, and Conflict
- JEWISHST 226C,326C/RELIGST 226C,326C. Mystics and Merrymakers: Innovations in Modern Judaism

- JEWISHST 225,325/RELIGST 265,365. Research Methods and Resources in Jewish Studies
- JEWISHST 228,328/RELIGST 282,382. King Solomon and the Search for Wisdom

MINOR IN JEWISH STUDIES

The Jewish Studies minor is open to students in any department who wish to enrich their studies through acquiring knowledge in Jewish history, thought, religion, literature, and society. Students must complete their declaration of the minor no later than the last day of the quarter three quarters before degree conferral. For example, a student graduating in Spring Quarter must declare the minor no later than the last day of Autumn quarter of the same year.

Students must complete six courses for a maximum of 36 units toward the minor. Courses of study should be discussed and approved by a Jewish Studies faculty member in the departments of English, History, Religious Studies, or the Division of Literatures, Cultures, and Languages, and by the center directors. In addition to suggested introductory courses, students are also encouraged to take courses in the Hebrew language as part of their Jewish studies minor, and are granted credit toward the minor for up to 5 units of language study. Any variations on the minor requirements must be approved in advance by one of the directors of the center.

Courses credited toward the minor must be distributed as follows:

1. Three introductory courses at the 100 level or below in the fields of history, religious studies, literature, or Hebrew language (for a maximum of 5 units) or one of the designated introductory courses offered through the Program in Comparative Studies in Race and Ethnicity.
2. Two courses at the 100 level or above from two of three areas of concentration (history, religious studies, or literature).

One seminar or undergraduate colloquium at the 200 level or above in one area of concentration (history, religious studies, or literature). No course credited toward the Jewish Studies minor may be double counted toward major requirements.

LANGUAGE CENTER

Director: Elizabeth Bernhardt
Associate Director: Joan Molitoris
Assistant Director: Patricia de Castries

African and Middle Eastern Languages
Senior Lecturers: Khalil Barhoum (Coordinator, and Minor Adviser: Arabic Language and Literature), Vered Shemtov (Jewish Language and Literature)
Lecturers: Salem Aweiss, Estee Greif, Jon Levitow, Catherine Mapunda (Fulbright Scholar), Khalid Obeid, Gallia Porat, Merchades Method Rutechura, Ramzi Salti, Galen Sibanda

Catalan Language
Lecturers: Joan Molitoris (Associate Director, Language Center, Coordinator), Robert Casas Roige

Chinese Language
Coordinator: Chao Fen Sun (Professor, Asian Languages and Cultures)
Lecturers: Marina Chung, Michelle DiBello, Sik Lee Dennig, Nina Lin, Yu-hwa Liao Rozelle, Huazhi Wang, Hong Zeng, Qiong Zhang, Youping Zhang, Xiaofang Zhou, Qi Zhu

English for Foreign Students
Director and Senior Lecturer: Philip Hubbard
Lecturers: Robyn Brinks Lockwood, Carole Mawson, Andrea Kevech, Andrew Oman, Kenneth Romeo, Constance Rylance, Seth Streichler

French Language
Lecturers: Jane Dozer-Rabedeau, Heather Howard (Coordinator), Miranda Kershaw, Marie Lasnier, Fanny-Elisabeth Rollet

German Language
Lecturer: Paul Nissler (Coordinator)
Senior Lecturers: William E. Petig, Kathryn Strachota

Italian Language
Lecturers: Marta Baldocchi, Anna Cellinese (Coordinator), Alessandra McCarty, Giovanni Tempesta

Japanese Language
Coordinator: Yoshiko Matsumoto (Associate Professor, Asian Languages and Cultures)
Senior Lecturer: Kazuko M. Busbin
Lecturers: Hisayo O. Lipton, Momoyo K. Lowdermilk, Emiko Yasumoto Magnani, Kiyomi Nakamura, Momoe Saito Fu

Korean Language
Lecturers: Hee-Sun Kim (Coordinator), Sun Young Kim (Fulbright Scholar)

Portuguese Language
Senior Lecturer: Lyris Wiedemann (Coordinator)
Lecturer: Karen Sotelino

Slavic Language
Senior Lecturer: Rima Greenhill
Lecturer: Eugenia Khassina (Coordinator)

Spanish Language
Senior Lecturer: Irene Corso
Lecturers: Vivian Brates, Loreto Catoira, Citlalli del Carpio, Alice Miano (Coordinator), Joan Molitoris (Associate Director, Language Center), Paul Nissler, Carimer Ortiz Cuevas, Veronika Reinhold, Kara Sanchez, Cintia Santana, Ana M. Sierra, María Cristina Urruela, Hae-Joon Won

Special Language Program
Lecturers: Sneha Desai, Sharlene Gotico (Fulbright Scholar), Cathy Haas, Eva Prionas (Coordinator, Modern Greek Language and Literature), Pooja Sancheti (Fulbright Scholar)

Tibetan Language Program
Lecturer and Coordinator: Robert W. Clark

Language Center Offices: Building 30
Mail Code: 94305-2015
Department Phone: (650) 725-9222
Email: patricia@stanford.edu
Web Site: http://language.stanford.edu

Courses offered by the Language Center are listed under the following subject codes on the *Stanford Bulletin's* ExploreCourses web site: AMELANG (African and Middle Eastern Languages and Literatures), CATLANG (Catalan Language), CHINLANG (Chinese Language), EFSLANG (English for Foreign Students), FRENLANG (French Language), GERLANG (German Language), ITALLANG (Italian Language), JAPANLNG (Japanese Language), KORLANG (Korean Language), PORTLANG (Portuguese Language), SLAVLANG (Slavic Language), SPANLANG (Spanish Language), SPECLANG (Special Language), and TIBETLNG (Tibetan Language).

The Stanford Language Center oversees all language instruction at Stanford. The center's charge is to guarantee that Stanford language programs are of the highest quality; to develop and administer achievement and proficiency tests needed to implement the language requirement; to provide technical assistance and support to the graduate students, lecturers, and faculty who deliver Stanford's language instruction; and to take leadership in research and development efforts in language learning. The Language Center is a unit within the Division of Literatures, Cultures, and Languages.

The African and Middle Eastern Languages and Literatures Program (AME) offers classes in Arabic, Hebrew, Swahili, and African languages not regularly taught at Stanford. Based on current funding and student requests, the courses planned for 2010-11 are listed below. Additional languages may still be offered upon request, provided funding is available. Requests for the 2011-12 academic year should be made by Spring Quarter of this year to the AME program office by email to khalil@stanford.edu. All beginning-level, three-unit courses are offered on a S/NC basis only. Intermediate-level and four-unit courses are offered with a grading option. Beginning and intermediate each refer to an academic year's sequence of language study. Most three-unit language

courses are offered for a two-year, three quarter sequence: 'A' suffix courses are taught Autumn; 'B' suffix courses are taught Winter; 'C' suffix courses are taught Spring. Those who have taken courses in the relevant language at another institution, or have previous knowledge of the language, can request to be tested. Tests are comprised of two parts, written and oral. Students must display first-year proficiency in the requested language to fulfill the requirement. Testing is guaranteed only for languages currently offered. Students planning to take a test must contact the AME program no later than the Spring Quarter of their sophomore year. To submit a request for language testing or to request that a language be taught, and for further information on the program, see http://stanford.edu/dept/lc/MEL. Language courses may not be repeated for credit and must be taken in sequence.

PROFICIENCY IN FOREIGN LANGUAGE NOTATION

A student who demonstrates levels of achievement equivalent to those expected at the end of the third quarter of the third year of study in a language may be awarded the notation "proficiency in" that language on the official transcript. For further information and details on applying for a Proficiency Notation, see http://language.stanford.edu.

In order for a student to have the proficiency notation appear on the official transcript, the student must:

1. Inform the Language Center at least two quarters prior to graduation that he/she is requesting such a notation.
2. Schedule an Oral Proficiency Interview (OPI) through the Language Center. Since this is a formal proficiency interview, at least two quarters of lead time are essential for scheduling this interview. The interview will be conducted by a certified OPI tester.
3. Upon completion of the oral component, schedule a Writing Proficiency Test (WPT) through the Language Center. As an official writing assessment, it must take place no later than one quarter prior to graduation and as soon as possible after the Oral Proficiency Interview. The WPT is administered on campus and rated by a certified WPT rater.
4. Receive an official rating of 'Advanced Low' on the Foreign Service Institute/American Council on the Teaching of Foreign Languages (FSI/ACTFL) scale of oral and writing proficiency, except in the non-cognate languages which require an 'Intermediate High' rating.

MINOR IN MIDDLE EASTERN LANGUAGES, LITERATURES, AND CULTURES

The undergraduate minor in Middle Eastern Languages, Literatures, and Cultures has been designed to give students majoring in other departments an opportunity to gain a substantial introduction to Middle Eastern and African languages, and to the cultures and civilizations of the Middle East and Africa. Contact the minors adviser before declaring at khalil@stanford.edu.

Students declaring a minor must do so no later than the last day of the fourth quarter before degree conferral. For example, students graduating in June (Spring Quarter) must declare the minor no later than the last day of Spring Quarter of their junior year. If a student is not able to meet this deadline, he or she may petition the Language Center director and request a revised declaration date, which may be granted at the director's discretion.

The requirements for a minor in Middle Eastern Languages, Literatures, and Cultures are:

1. Completion of six courses in either the Cultural Studies Track or the Language Studies Track.
2. Courses for the minor must be taken for a letter grade unless only offered for faculty-elected satisfactory/no credit.
3. All courses must be completed with a letter grade of 'C' or better.
4. Courses may not overlap with those taken for a major course of study.
5. Relevant courses taken to fulfill a GER may count toward fulfilling both minor and GER requirements.
6. Students pursuing the Cultural Studies Track must complete the prerequisite of beginning level in the respective language, or demonstrate an equivalent competence.

Cultural Studies Track—Requirements are:

1. Completion of the language prerequisite at the beginning level, or a demonstrated equivalent competence.
2. In the case of Arabic, completion of six non-language courses, including three from the AME program.
3. In the case of Hebrew and African languages, completion of six non-language related courses. Consult minor adviser for course options.
4. Course work from GER courses may be used to fulfill the unit requirements for the minor.

Language Track—Requirements are:

1. Completion of prerequisite language study at the beginning level, or a demonstrated equivalent competence.
2. Completion of one year of language study at the intermediate level.
3. Completion of three related non-language courses, including one of the AMELANG 30-36 series in the case of Arabic. Consult the minor adviser for course options.

or

1. Completion of prerequisite language study at the advanced level in Arabic, Hebrew, or an African language, for the equivalent of three years of language study.
2. Completion of one African and Middle Eastern literature and culture course relevant to the language studied in the case of Arabic or Hebrew; or, in the case of African languages, completion of one non-language African Studies course relevant to the language studied. Consult the minor adviser (khalil@stanford.edu) for course options.

MINOR IN LITERATURE

An undergraduate minor in Literature is offered through the Division of Literatures, Cultures, and Languages and includes courses offered through the Language Center. Students should consult the "Division of Literatures, Cultures, and Languages" section of this bulletin for further details about the minor and its requirements.

MINOR IN MODERN LANGUAGES

An undergraduate minor in Modern Languages is offered through the Division of Literatures, Cultures, and Languages and includes courses offered through the Language Center. Students should consult the "Division of Literatures, Cultures, and Languages" section of this bulletin for further details about the minor and its requirements.

SPECIAL LANGUAGE PROGRAM

The Special Language Program (SLP) offers foreign languages not otherwise taught at Stanford. Based on current funding and student requests, the courses planned for 2010-11 are listed in the "Explore Courses" section of this Bulletin under the Special Languages (SPECLANG) Program; however, not every course listed is taught. Additional languages may still be offered upon request, provided funding is available. Requests for the 2011-12 academic year should be made by Spring Quarter of this year at the Special Language Program office (eprionas@stanford.edu).

All beginning-level 3-unit courses are offered on a satisfactory/no credit basis only. Intermediate-level and 4-unit courses are offered with a grading option. Beginning and intermediate each refer to an academic year's sequence of language study. Most 3-unit language courses are offered for a two-year, three quarter sequence:

'A' suffix courses are typically taught Autumn.

'B' suffix courses are typically taught Winter.

'C' suffix courses are typically taught Spring.

Beginning, intermediate, and advanced courses are 3 units except modern Greek, Hindi, and ASL. In some circumstances, a beginning or intermediate course may be offered in alternate years.

For more information, see http://www.stanford.edu/dept/SLP. Language courses may not be repeated for credit, and must be taken in sequence.

FULFILLING THE LANGUAGE REQUIREMENT

Students who have already taken courses in the relevant language at another institution, or who have previous knowledge of the language, can request to be tested. Tests are comprised of written and oral parts. A student must display first-year level proficiency in the requested language in order to fulfill the requirement. Testing is guaranteed only for these languages currently offered. Students planning to take a test must contact the Special Language Program no later than the Spring Quarter of sophomore year. To submit a request for language testing, or to request a language, apply via the web at http://www.stanford.edu/dept/SLP.

BEGINNING-LEVEL, FIRST-YEAR COURSES

Beginning-level, first-year language courses require no previous knowledge of the language. The beginning-level sequence emphasizes development of the full range of language skills -- reading, listening comprehension, the use of grammatical structures, and oral and written communication -- through a variety of learning themes. Individual, small group, interactive work and multimedia-based activities reinforce language skills and provide the platform for adapting the curriculum to specific student learning goals. Cultural awareness is a strong component of the curriculum.

INTERMEDIATE-LEVEL, SECOND-YEAR COURSES

Intermediate-level, second-year language courses require completion of the beginning sequence, or consent of instructor. The intermediate-level sequence focuses on continuous mastery and development of learning skills that help students to converse accurately and more fluently, incorporate more advanced grammatical structures in their oral and written work, use idiomatic expressions in the right context, and write simple compositions. Curricular objectives and enhanced understanding of the culture are built into the courses through a multimodal approach.

ADVANCED-LEVEL, THIRD-YEAR COURSES

Advanced-level, third-year language courses require completion of the intermediate-year sequence and consent of the program coordinator. The advanced-level sequence focuses on accurate understanding and use of structures through authentic texts and multimedia materials, and readings from various genres. Individual learning goals and student proficiency are taken into account to provide a learning environment that helps students become more autonomous learners.

AFRICAN AND MIDDLE EASTERN LANGUAGES AND LITERATURES PROGRAM

The African and Middle Eastern Languages and Literatures Program offers classes in Arabic, Hebrew, Swahili, and African languages not regularly taught at Stanford. Based on current funding and student requests, the courses planned for 2009-10 are listed below. Additional languages may still be offered upon request, provided funding is available. Requests for the 2010-11 academic year should be made by Spring Quarter of this year at the AME program office, email: khalil@stanford.edu.

All beginning-level, three-unit courses are offered on a S/NC basis only. Intermediate-level and four-unit courses are offered with a grading option. Beginning and intermediate each refer to an academic year's sequence of language study. Most three-unit language courses are offered for a two-year, three quarter sequence:

All 'A' suffix courses are taught Autumn.

All 'B' suffix courses are taught Winter.

All 'C' suffix courses are taught Spring.

All beginning, intermediate, and advanced courses are 3 units except Arabic, Hebrew, and Swahili. In some circumstances, a beginning or intermediate course may be offered in alternate years.

FULFILLING THE LANGUAGE REQUIREMENT

Students can fulfill the language requirement by taking an African or Middle Eastern language. At least 12 units are needed to complete the requirement. Normally, the requirement is completed after the first quarter of intermediate-level language. In the case of African or Middle Eastern languages taught only at the beginning level, students may petition the Language Center to fulfill the requirement by taking a directed reading course in the fourth quarter. Contact patricia@stanford.edu for more information.

BEGINNING-LEVEL, FIRST-YEAR COURSES

Beginning-level, first-year language courses require no previous knowledge of the language. The beginning-level sequence emphasizes development of the full range of language skills, reading, listening comprehension, the use of grammatical structures, and oral and written communication, through a variety of learning themes. Individual, small group, interactive work and multimedia-based activities reinforce language skills and provide the platform for adapting the curriculum to specific student learning goals. Cultural awareness is a strong component of the curriculum.

INTERMEDIATE-LEVEL, SECOND-YEAR COURSES

Intermediate-level, second-year language courses require completion of the beginning sequence, or consent of instructor. The intermediate-level sequence focuses on continuous mastery and development of learning skills that help students to converse accurately and more fluently, incorporate more advanced grammatical structures in their oral and written work, use idiomatic expressions in the right context, and write simple compositions. Curricular objectives and enhanced understanding of the culture are built into the courses through a multimodal approach.

ADVANCED-LEVEL, THIRD-YEAR COURSES

Advanced-level, third-year language courses require completion of the intermediate-year sequence and consent of the program coordinator. The advanced-level sequence focuses on accurate understanding and use of structures through authentic texts and multimedia materials, and readings from various genres. Individual learning goals and student proficiency are taken into account to provide a learning environment that helps students become more autonomous learners.

OVERSEAS STUDIES COURSES IN THE LANGUAGE CENTER

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 1C. First-Year Modern Chinese. 5 units, Yan Wang, Xiaoya Zhu
- OSPBEIJ 6C. Beginning Conversational Chinese. 2 units, Staff
- OSPBEIJ 21C. Second-Year Modern Chinese. 5 units, Li Chen
- OSPBEIJ 101C. Third-Year Modern Chinese. 5 units, Xiaoya Zhu
- OSPBEIJ 211C. Advanced Modern Chinese. 5 units, Yan Wang

BERLIN
- OSPBER 1Z. Accelerated German 1st and 2nd Quarter. 8 units, Jari Splettstoesser, Jochen Wohlfeil
- OSPBER 21B. Intermediate German. 5 units, Sylvia Kloetzer
- OSPBER 100B. Berlin Heute. 2 units, Dubravka Friesel
- OSPBER 101B. Advanced German. 5 units, Maria Biege

FLORENCE
- OSPFLOR 21F. Accelerated Second Year Italian, Part A. 5 units, Fiorenza Quercioli
- OSPFLOR 22F. Accelerated Second-Year Italian, Part B. 5 units, Fiorenza Quercioli
- OSPFLOR 31F. Advanced Oral Communication: Italian. 3 units, Fiorenza Quercioli

MADRID
- OSPMADRD 12M. Accelerated Second-Year Spanish I. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 13M. Accelerated Second-Year Spanish II. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 102M. Composition and Writing Workshop for Students in Madrid. 3-5 units, Maria Teresa Camblor Portilla

MOSCOW
- OSPMOSC 10M. Intensive First-Year Russian. 9 units, Liza Kurganova
- OSPMOSC 51M. Second Year Russian I. 5 units, Tatyana Boldyreva
- OSPMOSC 111M. Third Year Russian I. 5 units, Galina Filatova
- OSPMOSC 177M. Fourth Year Russian I. 5 units, Staff

PARIS
- OSPPARIS 22P. Intermediate French I. 4 units, Pauline Reychman
- OSPPARIS 23P. Intermediate French II. 4 units, Florence Mercier
- OSPPARIS 124P. Advanced French I. 4 units, Patrick Guedon

SANTIAGO
- OSPSANTG 12S. Accelerated Second-Year Spanish I. 5 units, Mabel Abad
- OSPSANTG 13S. Accelerated Second-Year Spanish II. 5 units, Mabel Abad
- OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago. 3-5 units, Andres Bobbert

WINTER QUARTER

BERLIN
- OSPBER 1Z. Accelerated German 1st and 2nd Quarter. 8 units, Jari Splettstoesser, Jochen Wohlfeil
- OSPBER 21B. Intermediate German. 5 units, Sylvia Kloetzer
- OSPBER 100B. Berlin Heute. 2 units, Dubravka Friesel
- OSPBER 101B. Advanced German. 5 units, Maria Biege

FLORENCE
- OSPFLOR 21F. Accelerated Second Year Italian, Part A. 5 units, Fiorenza Quercioli
- OSPFLOR 22F. Accelerated Second-Year Italian, Part B. 5 units, Fiorenza Quercioli
- OSPFLOR 31F. Advanced Oral Communication: Italian. 3 units, Fiorenza Quercioli

MADRID
- OSPMADRD 12M. Accelerated Second-Year Spanish I. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 13M. Accelerated Second-Year Spanish II. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 102M. Composition and Writing Workshop for Students in Madrid. 3-5 units, Maria Teresa Camblor Portilla

PARIS
- OSPPARIS 22P. Intermediate French I. 4 units, Florence Mercier
- OSPPARIS 23P. Intermediate French II. 4 units, Elizabeth Molkou
- OSPPARIS 125P. Advanced French II. 4 units, Marie-Christine Ricci

SANTIAGO
- OSPSANTG 12S. Accelerated Second-Year Spanish I. 5 units, Mabel Abad
- OSPSANTG 13S. Accelerated Second-Year Spanish II. 5 units, Mabel Abad
- OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago. 3-5 units, Staff

SPRING QUARTER

BEIJING
- OSPBEIJ 3C. First-Year Modern Chinese. 5 units, Li Chen
- OSPBEIJ 23C. Second-Year Modern Chinese. 5 units, Xiaoya Zhu
- OSPBEIJ 103C. Third-Year Modern Chinese. 5 units, Yan Wang

BERLIN
- OSPBER 2Z. Accelerated German 2nd and 3rd Quarters. 8 units, Jochen Wohlfeil
- OSPBER 21B. Intermediate German. 5 units, Sylvia Kloetzer
- OSPBER 100B. Berlin Heute. 2 units, Dubravka Friesel
- OSPBER 101B. Advanced German. 5 units, Maria Biege

FLORENCE
- OSPFLOR 21F. Accelerated Second Year Italian, Part A. 5 units, Fiorenza Quercioli
- OSPFLOR 22F. Accelerated Second-Year Italian, Part B. 5 units, Fiorenza Quercioli
- OSPFLOR 31F. Advanced Oral Communication: Italian. 3 units, Fiorenza Quercioli

KYOTO
- OSPKYOTO 9K. First Year Japanese Language, Culture, Communication B. 5 units, Staff
- OSPKYOTO 17K. Second Year Japanese Language, Culture, Communication B, First Quarter. 5 units, Staff
- OSPKYOTO 19K. Second Year Japanese Language, Culture, Communication B, Third Quarter. 5 units, Staff
- OSPKYOTO 129K. Third Year Japanese Language, Culture, Communication B. 5 units, Staff
- OSPKYOTO 211K. Advanced Japanese. 5 units, Staff

MADRID
- OSPMADRD 12M. Accelerated Second-Year Spanish I. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 13M. Accelerated Second-Year Spanish II. 5 units, Maria Teresa Camblor Portilla
- OSPMADRD 102M. Composition and Writing Workshop for Students in Madrid. 3-5 units, Maria Teresa Camblor Portilla

PARIS
- OSPPARIS 22P. Intermediate French I. 4 units, Pauline Reychman
- OSPPARIS 23P. Intermediate French II. 4 units, Sonia Gourevitch
- OSPPARIS 125P. Advanced French II. 4 units, Elizabeth Molkou

SANTIAGO

- OSPSANTG 12S. Accelerated Second-Year Spanish I. 5 units, Mabel Abad
- OSPSANTG 13S. Accelerated Second-Year Spanish II. 5 units, Mabel Abad
- OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago. 3-5 units, Andres Bobbert

LATIN AMERICAN STUDIES

Director of the Center: Rodolfo Dirzo
Associate Director: Megan Gorman
Tinker Visiting Professors: Ricardo Mar, Paulo Mendes, José Santos, Paulo Suárez, Beatriz Urdinola
Affiliated Faculty and Staff:
Anthropology: Clifford Barnett (emeritus), George Collier (emeritus), Lisa Curran, Carolyn Duffey, William Durham, James Fox, Dominique Irvine, John Rick, Ian Robertson
Art and Art History: Barbaro Martinez-Ruiz
Biology: Gretchen Daily, Rodolfo Dirzo, Harold Mooney, Peter Vitousek, Virginia Walbot
Carnegie Institution for Science: Gregory Asner
Comparative Literature: Roland Greene, Hans Ulrich Gumbrecht, José David Saldívar
Dance: Susan Cashion (emerita)
Earth Sciences, School of: Pamela Matson
Economics: Roger Noll (emeritus)
Education, School of: Martin Carnoy, Amado Padilla, Guadalupe Valdés
Engineering, School of: Jenna Davis, Adrian Lew, Bruce Lusignan (emeritus), Leonard Ortolano
English: Ramón Saldívar (also Comparative Literature)
Freeman Spogli Institute for International Studies: Rosamond Naylor, David Victor
History: Zephyr Frank, Stephen Haber, Tamar Herzog
Hoover Institute: William Ratliff
Human Biology: Anne Firth Murray
Iberian and Latin American Cultures: Héctor Hoyos, Marília Librandi Rocha, Michael Predmore, Joan Ramon Resina, Jorge Ruffinelli, Lisa Surwillo, Yvonne Yarbro-Bejarano
International Relations: Thomas O'Keefe
Language Center: José Carlos Fajardo, Caridad Kenna, Alice Miano, Otilia Perales, Ana Sierra, Lyris Wiedemann
Law, School of: Jonathan Greenberg, Thomas Heller (emeritus)
Linguistics: John Rickford
Medicine, School of: Victor Froelicher, Evaleen Jones, Samuel LeBaron, Grant Miller, Julie Parsonnet, Paul Wise
Political Science: Terry Karl, Beatriz Magaloni, Robert Packenham (emeritus), Gary Segura, Michael Tomz
Religious Studies: Thomas Sheehan
Sociology: Alex Inkeles (emeritus), Tomás Jiménez, Michael Rosenfeld
Stanford University Libraries: Adán Griego, Sergio Stone, Robert Trujillo
Center Offices: Bolívar House, 582 Alvarado Row
Mail Code: 94305-8545
Department Phone: (650) 723-4444
Email: latinamerica@stanford.edu
Web Site: http://las.stanford.edu

Courses offered by the Interdisciplinary Program in Latin American Studies are listed under the subject code LATINAM on the *Stanford Bulletin's* ExploreCourses web site.

The Center for Latin American Studies (CLAS) supports research and teaching in all fields of study as they relate to Latin America. Academic programs encourage interdisciplinary approaches and draw on the expertise of nearly sixty active affiliated faculty members representing Stanford's various schools and departments. Stanford University Libraries' substantial Latin American collections are valuable resources for students, faculty, and visiting researchers alike. Each year CLAS hosts a number of Tinker Visiting Professors, highly distinguished Latin American and Iberian scholars who come to Stanford to teach a course in their field of specialization. The Center for Latin American Studies maintains a highly active public events calendar and provides funding to students and faculty for a variety of research, teaching, internship, and conference activities. Stanford offers three formal academic programs in Latin American Studies: an Undergraduate Minor, Interdisciplinary Honors certification, and a Master of Arts degree.

UNDERGRADUATE PROGRAMS IN LATIN AMERICAN STUDIES

Currently, Stanford University does not offer an undergraduate major in Latin American Studies; however, undergraduates may pursue a minor or interdisciplinary honors certification in Latin American Studies. In addition, students may concentrate on Latin America through other departmental and interdisciplinary degree programs, such as Anthropology, History, Political Science, Iberian and Latin American Cultures, or International Relations. Interested students should consult the relevant departmental web sites and sections of this bulletin for further information.

SUMMER INTERNSHIP GRANTS

Each summer, CLAS awards grants to a small number of undergraduates to complete internships in Latin America. Applications include a proposal, academic transcript, and letters of recommendation. Students from any department are eligible to apply. See http://las.stanford.edu.

GRADUATE PROGRAMS IN LATIN AMERICAN STUDIES

The one-year master's program in Latin American Studies is designed for students who have experience working, living, or studying in Latin America or Iberia and little prior course work on Latin America.

Stanford University does not offer a Ph.D. program in Latin American Studies; however, doctoral candidates may concentrate on Latin America through other departmental programs, such as Anthropology, History, Political Science, or Iberian and Latin American Cultures. Interested applicants should consult the relevant departmental web sites and sections of this bulletin for admissions information and further details.

Admission—The application deadline for the 2011-12 academic year is January 11, 2011. Applicants submit an online application, including a 500-word statement of purpose, resumé, 10-15 page double-spaced academic writing sample, and three letters of recommendation. In addition, all applicants must submit official transcripts and GRE general test scores. TOEFL scores are required of applicants whose first language is not English or who did not earn a degree from an undergraduate institution where English is the primary language of instruction. For information on university graduate admissions and to access the online application, visit http://gradadmissions.stanford.edu.

Applicants must meet the University admission requirements, have a working knowledge of Spanish or Portuguese at the university third-year level or higher, and have experience working, living, or studying in Latin America or Iberia prior to admission.

CLAS takes a broad approach to evaluating applications for admission. As important as GRE scores and grades are the applicant's essay, letters of recommendation, academic writing sample, and the experiences and goals conveyed through the personal statement and resume.

Students interested in pursuing the joint degree program in Latin American Studies and Law (J.D.) or a dual degree in Latin American Studies and Business (M.B.A.) or Medicine (M.D.) must apply to each program separately and be accepted by both. Details about the joint and dual degree programs can be found in the "Master of Arts in Latin American Studies" section of this bulletin.

Financial Aid—The Center for Latin American Studies provides several graduate fellowships as well as limited research and course assistantship positions with the Tinker Visiting Professors each quarter.

MINOR IN LATIN AMERICAN STUDIES

The Minor in Latin American Studies is open to students in any major. Students who wish to complete the minor must declare online (through Axess) and submit a proposal of course work no later than the second quarter of their junior year. The minor must be completed by the second quarter of the senior year. Units taken for a student's major cannot be double-counted towards the minor.

Requirements for the minor include:

1. Completion of 25 units as follows:
   a. A 5-unit course surveying Latin America: either HISTORY 170, Colonial Latin America, or OSPSANTG 68, The Emergence of Nations in Latin America (or an approved substitute).
   b. 20 additional units in a number of courses which together comprise a coherent focus on a theoretical problem or issue of the region, such as (but not limited to) culture and identity, political economy, or sustainable development. All courses, with the exception of Overseas Studies courses, must be at the 100-level or higher. For approved courses, see the "Latin American Studies Cognate Courses" section of this bulletin.
   c. At least 10 of the 25 units must be completed at Stanford. All courses to be counted toward the minor must be taken for a letter grade.
2. Fulfill the Foreign Language Requirement. The minimum requirement for completion of the minor in Latin American Studies is advanced proficiency in Spanish or Portuguese by any one of the following means:
   a. Successful completion of seven quarters of college-level study of Spanish or Portuguese.
   b. Completion of a course taught in Spanish or Portuguese at the 100-level or higher, with a letter grade of 'B' (3.0) or higher. This may be a course on Spanish or Portuguese language or literature, or some other subject, as long as it fulfills the above criteria.
   c. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Stanford Language Center. Contact the Language Center for test dates and procedures.
3. Recommended: experience in Latin America such as study abroad, field research, or an internship.

Upon completion of all requirements, the CLAS subcommittee on undergraduate programs authorizes the designation of the Minor in Latin American Studies on the student's transcript.

HONORS IN LATIN AMERICAN STUDIES

The Honors Program in Latin American Studies is open to undergraduate students in any major. The aim of the honors program is to prepare students to pursue individualized research on Latin America, culminating in an honors thesis completed under the supervision of a faculty adviser. The honors program is particularly suited to the student who wishes to go on to graduate school or pursue employment in an institution emphasizing research and independent work. Although not required, students are encouraged to undertake independent field research in Latin America for their thesis. It is strongly recommended that students enroll in HISTORY 299X, Design and Methodology for International Field Research (1 unit), during their sophomore or junior year for an overview of research design and methods for international field research.

Admission to the honors program is by application by the end of the junior year. Applications are reviewed and approved by the CLAS director and associate director. Applicants must have a cumulative grade point average (GPA) of 3.3 (B+) or higher and maintain this average in courses taken to satisfy the requirements. Courses must be taken for a letter grade where that option is available. Courses credited toward LAS honors may be double-counted toward the student's major requirements.

To graduate with interdisciplinary honors in Latin American Studies a student must:

1. Complete a total of 35 units in courses certified for honors by the Center for Latin American Studies, distributed as follows:
   a. A 5-unit survey course, normally taken in the sophomore year: either HISTORY 170, Colonial Latin America, or OSPSANTG 68, The Emergence of Nations in Latin America (or an approved substitute).
   b. For breadth: two 4-5-unit courses at the 100-level or higher with a focus on Latin America. These courses are normally taken during the sophomore and junior years. For approved courses, see the "Latin American Studies Cognate Courses" section of this bulletin.
   c. For depth: one 4-5-unit course, approved by the honors adviser, at the 100-level or higher with a focus on Latin America that explores in depth an issue of particular interest to the student. See the "Latin American Studies Cognate Courses" section of this bulletin.
   d. LATINAM 198, Honors Thesis (1-10 units), under the supervision of the honors adviser. Normally these units are spread over two or three quarters of the senior year and are devoted to the completion of the honors thesis.
   e. Honors Seminar in Latin American social history, taken in the senior year. Please consult the Center for Latin American Studies website for the 2010-11 honors seminar.
   f. Additional courses at the 100-level or higher focusing on Latin America to bring the total to 35 units. Up to 5 units may come from study of Spanish or Portuguese beyond the seventh quarter. For approved courses, see the "Latin American Studies Cognate Courses" section of this bulletin.
   g. Of the courses applied to 'b' and 'c' above, up to 10 units may be completed in Overseas Studies, and up to 5 units may be taken as directed individual study. For approved Overseas Studies courses, see the "Latin American Studies Cognate Courses" section of this bulletin.
   h. All courses to be counted toward the honors certification must be taken for a letter grade.
2. Fulfill the Foreign Language Requirement. The minimum requirement for completion of the honors program in Latin American Studies is advanced proficiency in Spanish or Portuguese by any one of the following means:
   a. Successful completion of seven quarters of college-level study of Spanish or Portuguese.
   b. Completion of a course taught in Spanish or Portuguese at the 100-level or higher, with a letter grade of 'B' (3.0) or higher. This may be a course on Spanish or Portuguese language or literature, or another subject, as long as it fulfills the above criteria.
3. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Stanford Language Center. Contact the Language Center for test dates and procedures.
4. Submit an honors thesis that meets standards of scholarly excellence and is approved by the thesis adviser. If graduating in June, participate in the LAS honors symposium in late May or early June.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN LATIN AMERICAN STUDIES

Undergraduates at Stanford may apply for admission to the coterminal master's program in Latin American Studies when they have earned a minimum of 120 units toward graduation, including advanced placement and transfer credit, and no later than the quarter prior to the expected completion of their undergraduate degree. The application deadline for the 2011-12 academic year is January 11, 2011.

Coterminal applicants must submit:

- an application form
- a 500-word statement of purpose
- a resumé
- a 10-15 page double-spaced academic writing sample
- three letters of recommendation
- a Stanford transcript
- GRE general test scores

Coterminal applicants must have a minimum cumulative GPA of 3.5 and a working knowledge of Spanish or Portuguese at a university third-year level or higher.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

Requirements for the coterminal master's degree are outlined in the "Master of Arts in Latin American Studies" section of this bulletin.

MASTER OF ARTS IN LATIN AMERICAN STUDIES

The Master of Arts in Latin American Studies is an interdisciplinary program. The curriculum consists of a core set of courses surveying the history, politics, society, ecology, and culture of the Latin American region; advanced language training; and in-depth course work. In consultation with a faculty adviser, students select a course of study suited to their individual interests.

JOINT DEGREE PROGRAM IN LATIN AMERICAN STUDIES AND LAW

The joint degree program in Latin American Studies and Law allows students to pursue the M.A. degree in Latin American Studies concurrently with the Doctor of Jurisprudence (J.D.) degree, with a significant number of courses that may apply to both degrees. It is designed to train students interested in a career in teaching, research, or the practice of law related to Latin American legal affairs. Students must apply separately to the Latin American Studies M.A. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student's background and level of language training. For more information, see the "Joint Degree Programs" section of this bulletin and consult with the program offices for the two programs.

DUAL MASTER'S DEGREE WITH MEDICINE OR BUSINESS

Stanford offers dual degree programs that grant an M.A. degree in Latin American Studies and a Master of Business Administration degree or a Medical Doctor degree. Students must apply separately to and be accepted by both the Latin American Studies M.A. program and the Graduate School of Business or School of Medicine.

DEGREE REQUIREMENTS

University requirements for the master's degree are described in the "Graduate Degrees General Requirements" section of this bulletin.

The program requires completion of a minimum of 45 graduate units. Each student is assigned a faculty adviser who works with the student to develop a customized program of study. All courses for the M.A. degree must be at the 100-level or higher, with at least half being at the 200-level or higher.

Candidates to the M.A. in Latin American Studies must complete the following:

1. *Core courses* (15 units): one core 5-unit course in each of three fields of specialization:
   a. Culture and Society: HISTORY 371, Graduate Colloquium: Explorations in Latin American Social History (Autumn)
   b. Political Economy: POLISCI 248S, Latin American Politics (Winter)
   c. Environment and Ecology: ANTHRO 162/262, Indigenous Peoples and Environmental Problems (Spring)
2. *Cognate courses* (15 units): three courses (5 units each), one from each of the three fields of specialization listed in '1' above. For approved courses, see the "Latin American Studies Cognate Courses" section of the Bulletin.
3. *Elective courses* (10-15 units): three elective courses (3-5 units each) in one of the three fields of specialization (see '1' above) from across the University's offerings, selected with guidance and approval from the faculty adviser.
4. *Language requirement:* at least 3 units of course work on a second Latin American language. Students proficient in both Spanish and Portuguese must take an advanced third-year language course in either Spanish or Portuguese; students proficient in only Spanish or only Portuguese must take a basic course in the language in which they are not already proficient. Up to 6 units of foreign language coursework may be applied toward the MA degree. All foreign language coursework must be taken at the 100-level or higher.
5. *Seminar requirement:* 3 units (1 per quarter) of LATINAM 200, Contemporary Issues in Latin American Studies.
6. *Thesis option:* students may elect to write a master's thesis; they may register for LATINAM 398 for up to 10 units of thesis research under the guidance of an Academic Council faculty member. Thesis units may be counted toward the elective field unit requirements (requirement number 3, above).
7. *Grade requirements:* All courses to be counted toward the MA (with the only exception being LATINAM 200) must be taken for a letter grade and earn a B- or better. M.A. candidates must maintain a cumulative GPA of 3.0 or higher.

LATIN AMERICAN STUDIES COGNATE COURSES

The following courses may be used to satisfy requirements for the M.A degree, honors certification, or minor in Latin American Studies. Consult the *Stanford Bulletin's* Explore Courses web site for full course descriptions and class schedules.

When selecting courses from this list, please be aware of the following:

1. Overseas Studies courses, denoted by the subject codes OSPMADRD or OSPSANTG, apply only to the undergraduate minor or honors programs and are not options for M.A. students.
2. Courses with numbers ending in the letter N or Q are Introductory Seminars for undergraduates and are not options for M.A. students. Courses ending in N give preference to freshmen; courses ending in Q give preference to sophomores.
3. All courses to be counted toward the M.A., minor, or honors in Latin American Studies must be taken at the 100-level or higher, with the exception of Overseas Studies courses included on this list (see also note 1, above).
4. All courses to be counted toward the M.A., minor, or honors in Latin American Studies must be taken for a letter grade.
5. For the M.A. degree, cognate courses must be taken for 5 units each. M.A. elective courses may be taken for 3-5 units each.
6. Some courses have prerequisites or special enrollment requirements. Students are responsible for making sure they have completed any prerequisites and/or secured an instructor's permission, as needed.

CULTURE AND SOCIETY

- ANTHRO 100C. Chavín de Huántar Research Seminar
- ANTHRO 101. Aztecs and their Ancestors: Intro to Mesoamerican Archaeology
- ANTHRO 105/205. Ancient Cities in the New World
- ANTHRO 106/206A. Incas and their Ancestors: Peruvian Archaeology

- ANTHRO 122B/222B. Research in Maya Hieroglyphic Writing
- ANTHRO 164B. Anthropology of Tourism
- ARTHIST 293. Latin American Avant Garde
- ARTHIST 396. African Visual Art and Graphic Communication in the Americas
- COMPLIT 121. Poems, Poetry, Worlds: An Introductory Course
- COMPLIT 134. The Poetry of History in the Americas
- COMPLIT 142. The Literature of the Americas (same as ENGLISH 172E)
- COMPLIT 242. The Global South: Faulkner, García Márquez, Morrison, and Cisneros
- EDUC 177/277. Education of Immigrant Students: Psychological Perspectives
- HISTORY 106B. Global Human Geography: Europe and the Americas
- HISTORY 170. Colonial Latin America *(minor/honors survey course)*
- HISTORY 306G. Colonial Law
- HISTORY 370. Graduate Colloquium on Colonial Latin American History
- HISTORY 371. Graduate Colloquium: Explorations in Latin American Social History *(M.A. core course and honors core course)*
- HISTORY 406. Graduate Research Seminar on Colonial Law
- HISTORY 470A. Graduate Research Seminar: Latin American Social History
- ILAC 114N. Lyric Poetry
- ILAC 117N. Film, Nation, Latinidad
- ILAC 131. Cultural Perspectives in the Luso-Hispanic Americas
- ILAC 141. The Spanish American Short Story as Cultural and Political Artifact
- ILAC 142. Modernismo and the World Interior
- ILAC 161. Survey of Modern Latin American Literature
- ILAC 193Q. Spaces and Voices of Brazil through Films (same as PORTLANG 193Q)
- ILAC 194E. Black Brazil
- ILAC 211. The Poetry of Pablo Neruda
- ILAC 241. Fiction Workshop in Spanish
- ILAC 256. Drug Wars: Narcos in Media and Literature
- ILAC 260. The Mexican Revolution of 1910 in the Cinema
- ILAC 265. Museums and Novels in Argentina
- ILAC 273. Brazilian Resonances: Poems, Lyrics, Songs
- ILAC 278A. Senior Seminar: Amazonia-Manhattan: Visions of El Dorado
- ILAC 280. Latina/o Literature
- ILAC 343. García Márquez
- ILAC 357. Juan Carlos Onetti: The Creation of Urban Narratives
- ILAC 365. Anthropological Fictions in Latin America: Alejo Carpentier and Guimarães Rosa
- ILAC 380E. Critical Concepts in Chicana/o Literature
- INTNLREL 141A. Camera as Witness: International Human Rights Documentaries
- LAW 455. Law and Society in International Perspective
- OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World
- OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almodóvar
- OSPSANTG 10. Borges and Argentina
- OSPSANTG 14. Women Writers of Latin America in the 20th Century
- OSPSANTG 66. Latin American Current Affairs
- OSPSANTG 67. 21st Century Chilean Literature
- OSPSANTG 68. Emergence of Nations in Latin America
- OSPSANTG 104X. Modernization and Culture in Latin America
- OSPSANTG 118X. Artistic Expression in Latin America
- OSPSANTG 141X. Politics and Culture in Chile
- SOC 164/264. Immigration and the Changing United States

ENVIRONMENT AND ECOLOGY

- ANTHRO 162/262. Indigenous Peoples and Environmental Problems *(M.A. core course)*
- ANTHRO 166/266. Political Ecology of Tropical Land Use: Conservation, Natural Resource Extraction, and Agribusiness
- ANTHRO 177/277. Environmental Change and Emerging Infectious Diseases (same as HUMBIO 114)
- BIO 175. Tropical Ecology and Conservation
- CEE 265A. Sustainable Water Resources Development
- CEE 265D. Water & Sanitation in Developing Countries
- EARTHSYS 132/232. Energy and Climate Cooperation in the Western Hemisphere (same as IPS 263, INTNLREL 146A)
- HRP 240. Rethinking International Health (same as MED 230)
- HUMBIO 119C. Demography and Measurement of the Effects of Armed Conflict
- OSPSANTG 58. Living Chile: A Land of Extremes
- OSPSANTG 85. Marine Ecology of Chile and the South Pacific
- PEDS 220. Latin America's Millennium Development Goals and Children's Health

POLITICAL ECONOMY

- ANTHRO 166/266. Political Ecology of Tropical Land Use: Conservation, Natural Resource Extraction, and Agribusiness
- EARTHSYS 132/232. Energy and Climate Cooperation in the Western Hemisphere (same as IPS 263/INTNLREL 146A)
- ECON 127. Economics of Health Improvement in Developing Countries (same as MED 262)
- EDUC 306A. Economics of Education in the Global Economy
- INTNLREL 147. The Political Economy of the Southern Cone of South America
- INTNLREL 148. Economic Integration of the Americas
- OSPSANTG 68. Emergence of Nations in Latin America
- OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century
- OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies
- OSPSANTG 129X. Latin America in the International System
- OSPSANTG 130X. The Chilean Economy in Comparative Perspective
- OSPSANTG 141X. Politics and Culture in Chile
- OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective
- POLISCI 125S. Chicano/Latino Politics
- POLISCI 240. The Politics of Wealth Redistribution
- POLISCI 240P. Trials, Truth, and Mentality
- POLISCI 242D. Political Economy of Property Rights (same as HISTORY 278A)
- POLISCI 248S. Latin American Politics *(M.A. core course)*

OVERSEAS STUDIES COURSES IN LATIN AMERICAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

MADRID

- OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World. 4-5 units, Santiago Tejerina-Canal, GER:DB:Hum
- Santiago
- OSPSANTG 14. Women Writers of Latin America in the 20th Century. 4-5 units, Sergio Missana, GER:DB:Hum, EC:Gender
- OSPSANTG 58. Living Chile: A Land of Extremes. 5 units, Marcela A. Bustamante, GER:DB:EngrAppSci
- OSPSANTG 66. Latin American Current Affairs. 3-5 units, Héctor Hoyos
- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci
- OSPSANTG 104X. Modernization and Culture in Latin America. 5 units, Bernardo Subercaseaux, GER:DB:SocSci, EC:GlobalCom
- OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective. 5 units, Sergio Micco, GER:DB:SocSci

WINTER QUARTER

SANTIAGO

- OSPSANTG 14. Women Writers of Latin America in the 20th Century. 4-5 units, Sergio Missana, GER:DB:Hum, EC:Gender
- OSPSANTG 58. Living Chile: A Land of Extremes. 5 units, Marcela A. Bustamante, GER:DB:EngrAppSci
- OSPSANTG 62. Topics in Chilean History. 4-5 units, Ivan Jaksic
- OSPSANTG 118X. Artistic Expression in Latin America. 5 units, César Albornoz, GER:DB:SocSci, EC:GlobalCom
- OSPSANTG 129X. Latin America in the International System. 4-5 units, Claudio Fuentes, GER:DB:SocSci

SPRING QUARTER

MADRID

- OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almódovar. 4-5 units, Santiago Tejerina-Canal, GER:DB:Hum

SANTIAGO

- OSPSANTG 10. Borges and Argentina. 4-5 units, Sergio Missana, GER:DB:Hum
- OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 units, Ivan Jaksic, GER:DB:SocSci
- OSPSANTG 85. Marine Ecology of Chile and the South Pacific. 5 units, Alvaro Palma, GER:DB:NatSci
- OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century. 5 units, Gerrman Correa, GER:DB:SocSci
- OSPSANTG 141X. Politics and Culture in Chile. 5 units, Bernardo Subercaseaux, GER:DB:Hum, EC:GlobalCom

LINGUISTICS

Emeriti: (Professors) Joan Bresnan, Clara N. Bush, Shirley Brice Heath, William R. Leben, Stanley Peters, Elizabeth C. Traugott
Chair: Beth Levin
Professors: Eve V. Clark, Penelope Eckert, Daniel Jurafsky, Martin Kay, Paul Kiparsky, Beth Levin, John R. Rickford, Ivan A. Sag, Thomas A. Wasow (on leave)
Associate Professors: Arto Anttila, Christopher Manning (on leave), Christopher Potts (on leave Spring)
Assistant Professors: Vera Gribanova, Meghan Sumner
Courtesy Professors: Herbert H. Clark, Kenji Hakuta, James McClelland, Orrin W. Robinson III, Chao Fen Sun
Courtesy Associate Professors: H. Samy Alim, James A. Fox, Miyako Inoue, Yoshiko Matsumoto
Courtesy Assistant Professor: Michael C. Frank
Senior Lecturer: Philip L. Hubbard
Visiting Professors: Philip Baldi, Arnold Zwicky
Visiting Associate Professor: Gerald Penn
Lecturers: Asya Pereltsvaig (Autumn and Spring), Kathryn Potts
Consulting Professors: Ronald Kaplan, Lauri Karttunen, Annie Zaenen
Consulting Associate Professors: Jared Bernstein, Cleo Condoravdi
Department Offices: Margaret Jacks Hall, Building 460
Mail Code: 94305-2150
Phone: (650) 723-4284
Email: linguistics@lists.stanford.edu
Web site: http://linguistics.stanford.edu

Courses offered by the Department of Linguistics are listed under the subject code LINGUIST on the *Stanford Bulletin's* ExploreCourses web site.

Linguistics concerns itself with the fundamental questions of what language is and how it is related to the other human faculties. In answering these questions, linguists consider language as a cultural, social, and psychological phenomenon and seek to determine what is unique in languages, what is universal, how language is acquired, and how it changes. Linguistics is, therefore, one of the cognitive sciences; it provides a link between the humanities and the social sciences, as well as education, and hearing and speech sciences.

The department offers courses at the undergraduate and graduate levels in the areas central to linguistic theory and analysis. Many of them deal with the analysis of structural patterns in the different components that make up language, including sounds (phonetics and phonology), meanings (semantics and pragmatics), words (morphology), sentences (syntax), and the way they vary and change over time. Other courses integrate the analysis of linguistic structure with phenomena that directly concern other disciplines. These include courses in computational linguistics, language acquisition, the philosophy of language, psycholinguistics, and sociolinguistics.

A variety of open forums provide for the discussion of linguistic issues, including colloquia and regularly scheduled workshops in child language, computational linguistics, phonology, psycholinguistics, semantics, sociolinguistics, and syntax.

MISSION OF THE UNDERGRADUATE PROGRAM IN LINGUISTICS

The mission of the undergraduate program in Linguistics is to provide students with the skills necessary to analyze the structure of human languages including sounds (phonetics and phonology), meanings (semantics and pragmatics), words (morphology), sentences (syntax), and the way in which these structural patterns vary and change over time. Courses in the major also integrate the analysis of linguistic structure with phenomena that directly concern other disciplines including computer science, psychology, cognitive science, communication, anthropology, and foreign language. The program provides students with excellent preparation for further study in graduate or professional schools as well as careers in business, social services, government agencies, and teaching.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to formulate theoretically interesting and tractable research questions.
2. the ability to identify sources of data relevant to answering their research questions.
3. facility with methods of collecting data relevant to their research questions.
4. knowledge of analytical methods to apply to the data they have collected.
5. the ability to bring the results of their data analysis to bear on their research questions.

GRADUATE PROGRAMS IN LINGUISTICS

The department offers an M.A., Ph.D., and Ph.D. minor in Linguistics.

COGNITIVE SCIENCE

Linguistics is participating with the departments of Computer Science, Philosophy, and Psychology in an interdisciplinary program in Cognitive Science for doctoral students. The program is intended to provide an interdisciplinary education as well as a deeper concentration in linguistics. Students who complete the Linguistics and Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Linguistics. To receive this field designation, students must complete 30 units of approved courses, to be determined in consultation with the graduate studies adviser.

LINGUISTICS COURSE CATALOG NUMBERING SYSTEM

Courses numbered under 100 are designed primarily for pre-majors. Courses with 100-level numbers are designed for majors, minors, and M.A. and Ph.D. minor candidates in Linguistics. Those with numbers 200 and above are primarily for graduate students, but with consent of instructor some of them may be taken for credit by qualified undergraduates. At all levels, the course numberings indicate a special area, as follows:

00-04	General
05-09	Phonetics
10-14	Phonology
15-19	Morphology
20-29	Syntax
30-39	Semantics, Pragmatics, Discourse
40-49	Language Acquisition, Psycholinguistics
50-61	Sociolinguistics, Language Variation, Change
62-73	Language and Culture, Structure of a Language
74-79	Methods, Mathematical Linguistics, Statistics
80-89	Computational Linguistics
90-93	Applied Linguistics
94-99	Directed Work, Theses, Dissertations

BACHELOR OF ARTS IN LINGUISTICS

The undergraduate major stresses the study of language both as a fundamental human faculty and as a changing social institution. At the core of the program is a set of departmental courses on the nature of human language; the major also draws on courses offered by other departments and programs.

The Linguistics major cuts across the humanities and the social and physical sciences. It provides a solid general education as a background for advanced studies in such disciplines as anthropology, cognitive science, communication, computer science, education (language, literacy, and culture), hearing and speech sciences, languages, law, linguistics, philosophy, and psychology.

REQUIREMENTS

Requirements for the B.A. include at least 50 units of course work in Linguistics and approved courses in related fields. Of the 50 units required for the major, no more than 12 may be below the 100 level. No more than two courses, neither of which can be a core course, may be taken on a credit/no credit basis. Students must receive a 'C-' or better in courses used towards the requirements.

Core Courses—The core courses are:
LINGUIST 1. Introduction to Linguistics
LINGUIST 110. Introduction to Phonetics and Phonology
LINGUIST 120. Introduction to Syntax
LINGUIST 130A. Introduction to Linguistic Meaning
or LINGUIST 130B. Introduction to Lexical Semantics
LINGUIST 150. Language in Society, which fulfills the Writing in the Major requirement (WIM)
LINGUIST 160. Introduction to Language Change, *or*, in advance consultation with the Linguistics undergraduate studies adviser, a course in historical linguistics or the history of a language.

All majors must complete at least five core courses, including LINGUIST 150, Language and Society.

Other Courses—Other courses counting toward the unit requirement should form a coherent program with emphases from among the areas of concentration listed below. Students should consult with the Linguistics undergraduate studies adviser when declaring the major, and maintain regular contact during the remainder of their Stanford career. Each student's major program must be approved by the Linguistics undergraduate studies adviser, or approved department adviser.

Students in the major must also take:

1. At least two 200-level Linguistics courses, typically in their area of concentration.
2. LINGUIST 197, Undergraduate Research Seminar, in the junior year. Special arrangements can be made for transfer students and others who start the major late.

Other Requirements—

1. *Foreign language:* majors must have competence in at least one language other than English as part of their understanding of the field of linguistics and its study. This is usually demonstrated by the completion of six quarters of language study at Stanford or equivalent; level of proficiency is determined by the Language Center or the relevant language department. Students may petition to be exempted from the Language Requirement if they have grown up speaking a language other than English and can use it for everyday purposes and for linguistic analysis.
2. *Junior research paper:* this requirement is typically fulfilled by providing an additional stage of revision on a research paper previously submitted in a Linguistics course. It must be approved by both the instructor of the course and the Linguistics undergraduate studies adviser by the end of the junior year.

AREAS OF CONCENTRATION

Students select one of the following areas of concentration or develop one themselves in advance consultation with the Linguistics undergraduate studies adviser. These areas of concentration are not declared on Axess, and they do not appear on the transcript or diploma.

General Linguistics—This concentration provides a broad education in Linguistics and is advisable for students interested in advanced degrees in Linguistics. All six core courses are required.

Language and Society—This concentration focuses on the social dimensions of language.

Language Structures—This concentration focuses on the cognitive aspects of language.

Language Specialization—This concentration focuses on linguistics as it pertains to a particular language. To date, Chinese, Japanese, and Spanish language specializations have been pre-approved. Other language specializations can be arranged on an ad hoc basis if appropriate courses are available in the relevant departments.

HONORS PROGRAM

Students who wish to undertake a more intensive program of study, including independent research, should pursue departmental honors. Students should apply for honors by the end of Winter

Quarter of their junior year. As part of the application, the student must write a research proposal describing the honors project which must be approved by the faculty adviser. Approval is given only to students who have maintained a grade point average (GPA) of 3.3 (B+) or better in the courses required for the major.

Honors students complete a total of 60 units including the 50 units for the major, plus 10 additional units of independent study and Honors Research. In addition, they must complete an honors thesis based on research conducted with a principal adviser who must be a member of the Linguistics faculty, and a secondary faculty adviser who may, with the approval of the Undergraduate Studies Committee, be a member of another department. In the Autumn Quarter of the senior year, honors students enroll in LINGUIST 199, Independent Study, to work closely with one of their advisers on the research project. In Winter and Spring quarters, honors students enroll in LINGUIST 198, Honors Research, with the student's principal adviser for close supervision of the honors thesis. The thesis must be submitted in final, acceptable, form by May 15. The thesis topic is presented orally at a department Honors Colloquium late in Spring Quarter.

MINOR IN LINGUISTICS

Requirements for the minor include at least 28 units of course work (typically seven courses) in Linguistics and related fields, approved in advance by the Linguistics undergraduate studies adviser. No more than two courses, neither of which can be a core course, may be taken on a credit/no credit basis. The courses counting towards the minor must be incremental units beyond those needed to satisfy the student's major course of study. The minor consists of:

1. LINGUIST 1. Introduction to Linguistics
2. Two out of the following Linguistics core courses:
   LINGUIST 110. Introduction to Phonetics and Phonology
   LINGUIST 120. Introduction to Syntax
   LINGUIST 130A. Introduction to Linguistic Meaning
   or LINGUIST 160. Introduction to Language Change
   or, in advance consultation with the Linguistics undergraduate studies adviser, a course in historical linguistics or the history of a language.
3. At least four other courses determined in advance consultation with the Linguistics undergraduate studies adviser. Students are encouraged to take at least one 200-level Linguistics course. Students may also choose to do independent work with a faculty member of their choice.

COTERMINAL BACHELOR'S AND MASTER'S DEGREE PROGRAM IN LINGUISTICS

The Department of Linguistics admits a limited number of undergraduates to the coterminal degree program. Students are required to submit to the department a complete application, which includes a statement of purpose identifying a thesis topic, a Stanford transcript, three letters of recommendation (at least one of which must be from a faculty member in Linguistics), and a proposed course of study (worked out in advance with a Linguistics adviser). Applicants for the coterminal degree may apply as early as their eighth quarter and no later than early in the eleventh quarter of undergraduate study. Decisions on admission to the coterminal degree program rest with the Graduate Admissions Committee of the Department of Linguistics. For further application information, see the department's web pages.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

MASTER OF ARTS IN LINGUISTICS

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. The following are additional departmental requirements. Candidates should review the department's *Guidelines for the M.A. Degree in Linguistics* for further particulars concerning these requirements.

1. *Courses:* candidates must complete 45 units of graduate work in Linguistics, including at least four courses in the student's area of specialization. No more than two courses should be at the 100 level.
   Individual programs should be worked out in advance with an adviser to ascertain that the necessary courses in the area of specialization are offered over the course of the year of anticipated enrollment. The overall grade point average (GPA) must be at least 3.0 (B) for all degree program coursework.
2. *Language:* reading knowledge of a non-native language in which a substantial linguistic literature is written, with sufficient facility to understand and interpret linguistic research published in that language, or in-depth research on the structure of a non-native language.
3. *Thesis or Thesis Project:* a research paper supervised by a committee of three faculty (normally fulfilled by up to 6 units of LINGUIST 398, Directed Research).

DOCTOR OF PHILOSOPHY IN LINGUISTICS

The following requirements are in addition to the basic University requirements for the degree sought; see the "Graduate Degrees" section of this bulletin. Candidates should review the department's *Guidelines for the Degree of Ph.D. in Linguistics*, downloadable at http://www-linguistics.stanford.edu/graduate/phd-guidelines.pdf, for further particulars concerning these requirements.

1. *Language*—candidates must demonstrate the ability to read at least one foreign language in which a substantial linguistic literature is written, with sufficient facility to understand and to interpret linguistic research published in that language. (Particular areas of specialization may require additional research languages.)
   In addition, each candidate must demonstrate an explicit in-depth knowledge of the structure of at least one language (normally neither the candidate's native language nor the language used for the reading exam). This requirement is fulfilled by writing an original research paper on a language.
2. *Courses*—a minimum of 135 units of graduate work beyond the bachelor's degree, or 90 units beyond the master's degree. The course requirements detailed in the *Guidelines for the Degree of Ph.D. in Linguistics* guarantee that each student covers a sufficient set of subareas within the field.
   Candidates must maintain a satisfactory record in the number and distribution of units completed. The overall course work GPA must be at least 3.0 (B), and all of the basic courses should be completed with at least a 'B.'
3. *Research*—the prospective Ph.D. candidate is expected to complete two substantial qualifying papers. The deadline for completion of the first qualifying paper is the end of Autumn Quarter of the second year; the deadline for completion of the second qualifying paper is the end of Autumn Quarter of the third year. The subject matter of the two papers, although it may be related (for example, same language), must be clearly distinct. The requirement is fulfilled by two quarters of LINGUIST 395, Research Workshop (1-2 units each), and by oral discussion with a committee of at least three faculty members selected by the student and the faculty.
4. *Candidacy*—students must complete a prescribed portion of the basic course requirement (see item 2 above), one foreign language requirement (see item 1 above), and one qualifying paper (see item 3 above) by the end of their second year.
5. *Teaching*—at least three quarters serving as a teaching assistant in Linguistics courses.
6. *Colloquia*—two oral presentations exclusive of the public portion of the University oral (see item 7b below). This requirement is satisfied by class presentations, conference papers, or

colloquium talks. Normally, both should be given during the first four years of study.

7. *Dissertation*—
   a. appointment of a dissertation committee.
   b. an approved written dissertation proposal is required by the end of Autumn Quarter of the fourth year.
   c. oral discussion of the dissertation proposal with an augmented dissertation committee.
   d. passing a University oral examination on the dissertation and related areas which includes a public presentation of the dissertation research.
   e. dissertation (up to 15 units of LINGUIST 399).

PH.D. MINOR IN LINGUISTICS

1. *Courses:* the candidate must complete 30 units of course work in linguistics. The University requires that at least 20 of these units be at the 200 level or above; the remaining 10 units must be at the 100 level or above. The course work for the minor must include LINGUIST 110, 120, and either 130A or 130B or 200-level introductory courses in the same areas and at least three courses related to the area of specialization. Courses submitted for the minor must be incremental units beyond those used to satisfy the major. Individual programs should be worked out in advance with the student's Ph.D. minor adviser in Linguistics.
2. *Research Project* (optional): the candidate may elect to present a paper which integrates the subject matter of linguistics into the field of specialization of the candidate.
3. The Linguistics minor adviser or designee serves on the candidate's University oral examination committee and may request that up to one-third of the examination be devoted to the minor subject.

OVERSEAS STUDIES COURSES IN LINGUISTICS

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

WINTER QUARTER

PARIS

- OSPPARIS 37. Gesture. 3 units, Eve Clark, GER:DB:SocSci
- OSPPARIS 38. First Language Acquisition, with Emphasis on French. 4 units, Eve Clark

DIVISION OF LITERATURES, CULTURES, AND LANGUAGES

Division Chair: Gabriella Safran
Division Offices: Building 260, Rooms 114-119
Mail Code: 94305-2005
Phone: (650) 724-1333; Fax: (650) 725-9306
Email: dlcl@stanford.edu
Web Site: http://dlcl.stanford.edu

Courses offered by the Division of Literatures, Cultures, and Languages are listed under the subject code DLCL on the *Stanford Bulletin's* ExploreCourses web site.

The Division of Literatures, Cultures, and Languages consists of five academic departments (Comparative Literature, French and Italian, German Studies, Iberian and Latin American Cultures, and Slavic Languages and Literatures), five focal groups (Humanities Education, Performance, Philosophy and Literature, Poetics, and Renaissances) as well as the Language Center, which oversees language instruction at Stanford. All the departments of the division offer academic programs leading to B.A., M.A., and Ph.D. degrees. The division brings together scholars and teachers dedicated to the study of literatures, cultures, and languages from humanistic and interdisciplinary perspectives. The departments in the division are distinguished by the quality and versatility of their faculty, a wide variety of approaches to cultural traditions and expressions, and the intense focus on the mastery of languages. This wealth of academic resources, together with small classes and the emphasis on individual advising, creates a superior opportunity for students who wish to be introduced to or develop a deeper understanding of non-English speaking cultures.

The division's departments and the Language Center offer instruction at all levels, including introductory and general courses that do not require knowledge of a language other than English. These courses satisfy a variety of undergraduate requirements and can serve as a basis for developing a minor or a major program in the member departments. The more advanced and specialized courses requiring skills in a particular language are listed under the relevant departments, as are descriptions of the minor and major programs.

The DLCL itself offers two undergraduate minor programs, an undergraduate multimedia laboratory course, and several graduate courses focused on the teaching of second languages, the teaching of literature, and academic professionalization.

MINOR IN LITERATURES, CULTURES, AND LANGUAGES

The Division of Literatures, Cultures, and Languages offers two undergraduate minors that draw upon courses in literature and language within the division's departments and elsewhere in the University.

Course work in these minors may not duplicate work counted toward other majors or minors. Advanced Placement credit and transfer credit do not apply to the minors. All courses must be taken for a letter grade. By University policy, no more than 36 units may be awarded in these minors.

Prospective minors should obtain a Minor Declaration form from the DLCL office of undergraduate student services.

MINOR IN LITERATURE

The minor in Literature allows students from any major to develop skills in the interpretation and criticism of literature, while acquiring a familiarity with types of literature from different national traditions and periods. Students must complete 30 units of course work on literature or literary theory. Courses may be in the original language or in translation.

The courses must include a minimum of:

1. One course on literary theory or the history of criticism.
2. One course on literature prior to the eighteenth century.
3. One course on literature reflecting perspectives outside of the European traditions.
4. One course from each of three distinct national or linguistic traditions from among Arabic, Chinese, English (including Anglophone literatures broadly conceived), French, German, Greek, Hebrew, Italian, Japanese, Korean, Latin, Persian, Portuguese, Russian, Spanish, Yiddish, and other national or linguistic traditions when appropriate courses are available. The pre-eighteenth-century course and the non-European course may be counted toward fulfilling this requirement.
5. Courses from two different genres such as poetry, drama, and prose fiction. Theory does not count as a genre.
6. One course requiring a research paper.

Students must consult with the minor adviser for approval of courses to meet these requirements. Second-year foreign language courses are not normally counted unless the syllabus reflects a primary emphasis on the reading of literature. Students are encouraged to acquire second-language skills and to explore courses in related disciplines; such courses, however, are not counted toward the 30 units required for the minor in Literature.

Course work in the minor may not duplicate work counted toward specific language majors or minors. Neither Advanced Placement credit nor transfer credit may be applied to the minor. All courses applied to the minor must be Stanford courses. At least 25 units of the course work must be taken for a letter grade.

The DLCL office of undergraduate student services verifies course work for the minor. The minor in Literature must be approved by a divisional faculty member designated by the DLCL.

MINOR IN MODERN LANGUAGES

The minor in Modern Languages is offered to students who want to supplement the course work in their major with course work in modern languages and literatures. The minor must be approved by the chairs of undergraduate studies of the respective language departments. Students in any field qualify for the minor by meeting the following requirements:

1. A minimum of 20 units at the intermediate level (second year), not including conversation, or beyond in two languages other than English offered by the DLCL..
2. At least one additional course, at the 100 level or above, whose subject code ends in -LIT or -GEN in each modern language in '1' above. These courses should be taught by Academic Council members or other senior members of the faculty.

Students are recommended to study, work, or intern abroad for at least eight weeks at a location where one of the languages is spoken.

FOCAL GROUPS

While the five departments in the Division of Literatures, Cultures, and Languages serve common interests in literary and cultural traditions and their languages, the DLCL's focal groups bring together faculty members and graduate students who share topics and approaches that range across languages and national literatures. These groups are designed to respond directly to the research interests of the faculty as a community, and reflect long-term commitments by the participants. They are conceived as portals that open from the Division outward to the wider community of literary and humanities scholars at Stanford. The membership may include any member of the Stanford faculty or any Ph.D. student with an interest in the topic. Most Focal Groups include participants from several humanities departments outside the DLCL.

Thus the DLCL is characterized by two axes of intellectual inquiry:

- the departmental axis, which is organized by language, nation, and culture
- the focal axis, which may be organized by genre, period, methodology, or other criteria.

The convergence of the two axes, departments and focal groups, locates faculty members and graduate students in at least two intersecting communities. The DLCL believes that this convergence gives institutional form to the intellectual conditions under which many scholars of literature and culture presently work.

Each focal group maintains a standing research workshop at which both faculty and graduate student members discuss their work. Some focal groups offer formal courses; and all groups are responsible for overseeing research-oriented activities and extracurricular events in the relevant area, including sponsoring conferences, publications, podcasts, and other activities that disseminate the outcomes of their research.

HUMANITIES EDUCATION

Chairs: Jenny Bergeron (Institutional Research and Decision Support), Russell A. Berman (Comparative Literature, German Studies)

Faculty Members: Elizabeth Bernhardt (German Studies, Language Center), Eamonn Callan (School of Education), Adrian Daub (German Studies), Marisa Galvez (French and Italian), Orrin Robinson (German Studies), Gabriella Safran (Slavic Languages and Literatures), Mitchell Stevens (School of Education), Jennifer Summit (English), Guadalupe Valdés (School of Education)

Web Site: http://dlcl.stanford.edu/groups/humanities-education

The focal group on Humanities Education explores issues concerning teaching and learning in the humanities, including research on student learning, innovation in pedagogy, the role of new technologies in humanities instruction, and professional issues for humanities teachers at all educational levels.

PERFORMANCE

Chairs: Monika Greenleaf (Comparative Literature, Slavic Languages and Literatures), Peggy Phelan (Drama, English)

Faculty Members: Julie Draskoczy (Slavic Languages and Literatures), Indra Levy (East Asian Literature and Culture), Marília Librandi Rocha (Iberian and Latin American Cultures), Gabriella Safran (Slavic Languages and Literatures), Lisa Surwillo (Iberian and Latin American Cultures)

Web Site: http://dlcl.stanford.edu/groups/performance

The Performance group brings together departments of the DLCL with other disciplines, such as Drama, to achieve a cross-pollination and to reinvigorate performance theory through consciously re-mediated research interests, methodologies, and forms of scholarly expression. Each year of a three-year program focuses on a distinct goal:

1. Discussion of seminal texts and topics with key guests, extended through a blog on Arcade.
2. A writing colloquium culminating in a conference and guest performances by invited artists at the Bing Concert Hall opening (2012).
3. Joint publication.

PHILOSOPHY AND LITERATURE

Chairs: R. Lanier Anderson (Philosophy), Joshua Landy (French and Italian)

Faculty Members: Russell Berman (Comparative Literature, German Studies), Alexis Burgess (Philosophy), Martón Dornbach (German Studies), Jean-Pierre Dupuy (French and Italian), Amir Eshel (Comparative Literature, German Studies), Gregory Freidin (Slavic Languages and Literatures), Robert Harrison (French and Italian), David Hills (Philosophy), Héctor Hoyos (Iberian and Latin American Cultures), Michelle Karnes (English), Marília Librandi Rocha (Iberian and Latin American Cultures), Joan Ramon Resina (Iberian and Latin American Cultures), Nariman Skakov (Slavic Languages and Literatures), Blakey Vermeule (English), Laura Wittman (French and Italian), Lee Yearley (Religious Studies)

Web Site: http://dlcl.stanford.edu/groups/philosophy-literature

The focal group on Philosophy and Literature brings together faculty and students from eight departments to investigate questions in aesthetics and literary theory, philosophically-inflected literary texts, and the form of philosophical writings. Fields of interest include both continental and analytic philosophy, as well as cognitive science, political philosophy, rational choice theory, and related fields.

The group offers undergraduate major tracks within nine programs, a graduate workshop, and a lecture series.

WORKSHOP IN POETICS

Chairs: Roland Greene (Comparative Literature, English), Nicholas Jenkins (English)

Faculty Members: Marisa Galvez (French and Italian), Michael Predmore (Iberian and Latin American Cultures)

Web Site: http://dlcl.stanford.edu/groups/workshop-poetics

The Workshop in Poetics focal group is concerned with the theoretical and practical dimensions of the reading and criticism of poetry. During the three years of its existence, the Workshop has become a central venue at Stanford enabling participants to share their individual projects in a general conversation outside of disciplinary and national confinements. The two dimensions that the workshop sees as urgent are:

- poetics in its specificity as an arena for theory and interpretive practice.
- historical poetics as a particular set of challenges for the reader and scholar.

The core mission is to offer Stanford graduate students a space to develop and critique their current projects.

RENAISSANCES

Chairs: Cécile Alduy (French and Italian), Vincent Barletta (Iberian and Latin American Cultures), Roland Greene (Comparative Literature, English), Carolyn Springer (French and Italian)

Faculty Members: Shahzad Bashir (Religious Studies), Paula Findlen (History), Tamar Herzog (History), Bissera Pentcheva (Art and Art History), Morten Steen Hansen (Art and Art History), Jennifer Summit (English)

Web Site: http://dlcl.stanford.edu/groups/renaissances

The Renaissances focal group discusses work in progress, draws different fields of literature into conversation, and considers the present and future of early modern studies. In addition to sponsored lectures and seminars, the group convenes monthly as a research workshop.

MATHEMATICAL AND COMPUTATIONAL SCIENCE

Co-Directors: Bradley Efron, Susan Holmes

Committee in Charge: Takeshi Amemiya (Economics), Emmanuel Candes (Mathematics and Statistics), Gunnar Carlsson (Mathematics), Richard Cottle (Management Science and Engineering), Thomas M. Cover (Electrical Engineering, Statistics), Bradley Efron (Statistics), J. Michael Harrison (Graduate School of Business), Susan Holmes (Statistics), Parviz Moin (Engineering), George Papanicolaou (Mathematics), Eric Roberts (Computer Science), David Rogosa (Education), Tim Roughgarden (Computer Science), Amin Saberi (Management Science and Engineering), David Siegmund (Statistics), Jonathan Taylor (Statistics), Arthur F. Veinott, Jr. (Management Science and Engineering), Brian White (Mathematics), Nancy R. Zhang (Statistics)

Program Offices: Sequoia Hall, 390 Serra Mall
Mail Code: 94305-4065
Phone: (650) 723-2620
Email: helen@stat.stanford.edu
Web Site: http://stanford.edu/group/mathcompsci

Courses offered by the Program in Mathematical and Computational Science are listed under the subject code MCS on the *Stanford Bulletin's* ExploreCourses web site.

This interdepartmental interschool undergraduate program provides a major for students interested in the mathematical and computational sciences, or in the use of mathematical ideas and analysis in problems in the social or management sciences. It provides a core of mathematics basic to all the mathematical sciences and an introduction to concepts and techniques of computation, optimal decision making, probabilistic modeling, and statistical inference. It also provides an opportunity for elective work in any of Stanford's mathematical science disciplines.

The program uses the faculty and courses of the departments of Computer Science, Management Science and Engineering, Mathematics, and Statistics. It prepares students for graduate study or employment in the mathematical and computational sciences or in those areas of applied mathematics which center around the use of computers and are concerned with the problems of the social and management sciences.

A biology option is offered for students interested in applications of mathematics, statistics, and computer science to the biological sciences (bioinformatics, computational biology, statistical genetics, neurosciences); and in a similar spirit, an engineering option.

UNDERGRADUATE MISSION STATEMENT FOR MATHEMATICAL AND COMPUTATIONAL SCIENCE

The mission of the Mathematical and Computational Science Program is to provide students with a core of mathematics basic to all the mathematical sciences and an introduction to concepts and techniques of computation, optimal decision making, probabilistic modeling and statistical inference. The program is interdisciplinary in its focus, and students are required to complete course work in mathematics, computer science, statistics, and management science and engineering. A computational biology track is available for students interested in biomedical applications. The program prepares students for careers in academic, financial and government settings as well as for study in graduate or professional schools.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able to demonstrate:

1. understanding of principles and tools of statistics.
2. command of optimization and its applications and to be able to analyze and interpret problems from various disciplines.
3. an understanding of computer applications emphasizing modern software engineering principles.
4. an understanding of multivariate calculus, linear algebra, and agebraic and geometric proofs.

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

The requirement for the bachelor's degree, beyond the University's basic requirements, is an approved course program of 72-77 units, distributed as follows:

Mathematics (MATH): 29-31 units

	Qtr. and Units	
MATH 41. Calculus	A	5
and MATH 42. Calculus	A,W	5
MATH 51. Linear Algebra and Differential Calculus of Several Variables	A,W,S	5
or MATH 51H. Honors Advanced Calculus	A	5
MATH 52. Integral Calculus of Several Variables	A,W,S	5
or MATH 52H. Honors Advanced Calculus	W	5
MATH 53. Ordinary Differential Equations with Linear Algebra	A,W,S	5
or MATH 53H. Honors Advanced Calculus	S	5
MATH 109. Applied Group Theory (WIM)	W	3
or MATH 110. Applied Number Theory and Field Theory (WIM)	S	3
or MATH 120. Modern Algebra (WIM)	A,S	3
or MATH 171. Fundamental Concepts of Analysis (WIM)	A,S	3
MATH 104. Applied Matrix Theory	A,W	3
or MATH 113. Linear Algebra and Matrix Theory	W,S	3

Computer Science (CS): 16-18 units

CS 103. Mathematical Foundations of Computing	A,S	5
CS 106X. Programming Methodology and Abstractions (Accel)	A,W	3-5
or CS 106A. Programming Methodology	A,W,S	3-5
and CS 106B. Programming Abstractions	A,W,S	3-5
And two of the following (CS or CME):		
CME 108. Introduction to Scientific Computing	W	3-4
CS 107. Programming Paradigms	A,S	3-5
CS 154. Introduction to Automata and Complexity Theory	W,S	3-4
CS 161. Design and Analysis of Algorithms	A,W	3-4
CS 181. Computers, Ethics and Public Policy (WIM)	W,S	3-4

Management Science and Engineering (MS&E): 8-9 units
Both:

MS&E 211. Linear and Nonlinear Optimization	A	4
and	W	3
MS&E 221. Stochastic Modeling		
Or 3 of the following:		
MS&E 111. Introduction to Optimization (same as ENGR 62)	A,S	4
	S	3
MS&E 121. Introduction to Stochastic Modeling	A	4
MS&E 211. Linear and Nonlinear Optimization	W	3
MS&E 212. Mathematical Programming and Combinatorial Optimization	W	3
MS&E 221. Stochastic Modeling		3
MS&E 251. Stochastic Decision Models (not given 2010-11)		

Statistics (STATS): (11 units)

STATS 116. Theory of Probability	A,S	3-5
STATS 191. Introduction to Applied Statistics	W	3-4
or STATS 203. Introduction to Regression Models and Analysis of Variance	W	3
STATS 200. Introduction to Statistical Inference	W	3

HONORS PROGRAM

The honors program is designed to encourage a more intensive study of mathematical sciences than the B.S. program. In addition to meeting all requirements for the B.S., the student must:

1. Maintain an average letter grade equivalent in mathematical sciences courses of at least a 3.4.
2. Complete at least 15 units in mathematical sciences in addition to the requirements for the major listed above. These courses should form a sustained effort in one area and constitute a program approved by the committee in charge of the Mathematical and Computational Science Program.
3. Include in the above 15 units at least one of the following:
   a. an approved higher-level graduate course
   b. participation in a small group seminar
   c. at least 3 units of directed reading.

Students interested in doing honors work should consult with their advisers by the last quarter of the junior year to prepare a program of study. Honors work may be concentrated in fields outside the Mathematical and Computational Science programs such as biological sciences, medicine, physics.

MATHEMATICAL AND COMPUTATIONAL SCIENCE ELECTIVES (9 UNITS)

Three courses in mathematical and computational science, 100-level or above, at least 3 units each. At least one must be chosen from the following:

	Qtr. and Units	
ECON 102C. Advanced Topics in Econometrics	S	5
ECON 140. Introduction to Financial Economics	W,S	5
ECON 160. Game Theory and Economic Applications (prerequisite ECON 51)	S	5
ECON 179. Experimental Economics	W	5
EE 261. The Fourier Transform and its Applications	A,W	3
EE 263. Introduction to Linear Dynamical Systems	A,S	3
EE 278. An Introduction to Statistical and Signal Processing	A,W	3
MS&E 211. Linear and Nonlinear Optimization	A,S	3-4
MS&E 212. Mathematical Programming and Combinatorial Optimization	W	3
MS&E 221. Stochastic Modeling	W	3
MS&E 251. Stochastic Decision Models (not given 2010-11)		3
MCS 100. Mathematics of Sports (same as STATS 50) (not given 2010-11)		3
MATH 104. Applied Matrix Theory	A, W	3
MATH 106. Functions of a Complex Variable	S	3
MATH 108. Introduction to Combinatorics and its Applications	A	3
MATH 113. Linear Algebra & Matrix Theory	W,S	3
MATH 115. Functions of a Real Variable	A,S	3
MATH 116. Complex Analysis	W	3
MATH 131. Partial Differential Equations I	A,W	3
MATH 132. Partial Differential Equations II	S	3
MATH 136. Stochastic Processes		3
MATH 171. Fundamental Concepts of Analysis	A,S	3
MATH 172. Lebesgue Integration and Fourier Analysis	S	3
PHIL 151. First-Order Logic	W	4
STATS 202. Data Mining and Analysis	A	3
STATS 208. Introduction to the Bootstrap	W	3
STATS 215. Statistical Models in Biology	W	3
STATS 217. Introduction to Stochastic Processes	W	3

For Computer Science (CS), electives can include courses not taken as units under the CS list above and the following:

CME 302. Numerical Linear Algebra	A	3
CS 108. Object-Oriented Systems Design	A,W	3-4
CS 110. Principles of Computer Systems	W,S	5
CS 140. Operating Systems and Systems Programming	W,S	3-4
CS 143. Compilers	A	3-4
CS 157. Logic and Automated Reasoning	A	3-4
CS 161. Design and Analysis of Algorithms	A,W	3-4
CS 164. Computing with Physical Objects (not given 2010-11)		3
CS 194. Software Project (prerequisite CS 108)	S	3
CS 221. Artificial Intelligence: Principles and Techniques	A	3-4
CS 223A. Introduction to Robotics	W	3
CS 223B. Introduction to Computer Vision	W	3
CS 225A. Experimental Robotics	S	3
CS 228. Probabilistic Models in Artificial Intelligence	W	3
CS 229. Machine Learning	A	3
CS 243. Advanced Compiling Techniques	W	3-4
EE 282. Computer Systems Architecture	S	3

With the adviser's approval, courses other than those offered by the sponsoring departments may be used to fulfill part of the elective requirement. These may be in fields such as biology, economics, electrical engineering, industrial engineering, and medicine, that might be relevant to a mathematical sciences major, depending on a student's interests.

- At least three quarters before graduation, majors must file with their advisers a plan for completing degree requirements.
- All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered satisfactory/no credit only.
- A course used to fulfill the requirements of one section of the program may not be applied toward the fulfillment of the requirements of another section.
- The student must have a grade point average (GPA) of 2.0 or better in all course work used to fulfill the major requirement.

MATHEMATICAL AND COMPUTATIONAL SCIENCE BIOLOGY OPTION

Replace MATH 109/110 with:

	Qtr. and Units	
Replace STATS 191/203 with		
STATS/BIO 141. Biostatistics	A	3-5
Take at least 2 courses from the Biology core:		
BIO 41. Genetics and Biochemistry	A	5
BIO 42. Cell Biology and Animal Physiology	W	5
BIO 43. Plant Biology, Evolution, and Ecology	S	5
Take a third course either from the core or		
STATS 166. Statistical Methods in Computational Genetics (WIM)	A	3
BIO 102. Population Biology (not given 2010-11)		3
BIO 136. Evolutionary Paleobiology	W	4
BIO 143/243. Evolution	A	4
BIO 144. Conservation Biology	W	3-4
BIO 160A. Developmental Biology I	A	4
BIO 160B. Developmental Biology II	W	4
BIO 183. Theoretical Population Genetics (not given 2010-11)		3
BIO 203. Advanced Genetics	A	4
BIO 230. Molecular and Cellular Immunology	A	4-5
Honors students should take 3 of the following:		
STATS 166. Statistical Methods in Computational Genetics (WIM)	A	3

ANTHRO 178. Introduction to Anthropological Genetics	W	5
ANTHRO 187. The Genetic Structure of Populations (not given 2010-11)		5
ANTHRO 188. Research in Anthropological Genetics (not given 2010-11)		5
BIO 113. Fundamentals of Molecular Evolution	S	4
BIO 146. Population Studies	W	1

MATHEMATICAL AND COMPUTATIONAL SCIENCE ENGINEERING OPTION

Students in the Engineering option take the introductory courses for the Mathematics and Computational Sciences major with the following allowable substitutions.

The MATH 51-53 series may be replaced by:

	Qtr.	*and Units*
CME 100/ENGR 154. Vector Calculus for Engineers	A	5
CME 102/ENGR 155A. Ordinary Differential Equations for Engineers	W	5
CME 104/ENGR 155B. Linear Algebra and Partial Differential Equations for Engineers	S	5
MATH 115. Functions of a Real Variable	A,S	3

STATS 116 may be replaced by either one of the following:

STATS 110. Statistical Methods in Engineering and Physical Sciences	A	4-5
or CME 106/ENGR 155C. Introduction to Probability and Statistics for Engineers	W	3-4

STATS 191/STATS 203 may be replaced by:

STATS 202. Data Analysis	A	3

Electives—

Take at least one course from the following list:

MATH 106. Introduction to Theory of Functions of a Complex Variable	A	3
MATH 108. Introduction to Combinatorics Applications	A	3
MATH 116. Complex Analysis	W	3
MATH 132. Partial Differential Equations II	S	3
PHIL 151. First-Order Logic	W	4

Take at least two courses from the following list:

ENGR 15. Dynamics	A,S	3
ENGR 20. Introduction to Chemical Engineering	S	3
ENGR 25. Biotechnology	W,S	3
ENGR 30. Engineering Thermodynamics	A,W	3
ENGR 40. Introductory Electronics	A, S	5
ENGR 50. Introductory Science Materials	W, S	4
ENGR 105. Feedback Control Design		3

MINOR IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

The minor in Mathematical and Computational Science is intended to provide an experience of the four constituent areas: Computer Science, Mathematics, Management Science and Engineering, and Statistics. Five basic courses are required:

CS 106X. Programming Methodology and Abstractions (Accelerated)
or CS 106A,B. Programming Methodology
MATH 51. Linear Algebra and Differential Calculus of Several Variables
or MATH 104. Applied Matrix Theory
ENGR 62/MS&E 111. Introduction to Optimization
or MS&E 121. Introduction to Stochastic Modeling
STATS 116. Theory of Probability, *and either*
STATS 191. Introduction to Applied Statistics
or STATS 200. Introduction to Statistical Inference

In addition to the above, the minor requires three courses from the following, two of which must be in different departments:

CME 108. Introduction to Scientific Computing
CS 103. Mathematical Foundations of Computing
CS 107. Programming Paradigms
CS 154. Introduction to Automata and Complexity Theory
CS 161. Design and Analysis of Algorithms
EE 261. The Fourier Transform and its Applications
ECON 102C. Advanced Topics in Econometrics
ECON 160. Game Theory and Economic Applications (prerequisite ECON 51)
ECON 181. Optimization and Economic Analysis
MS&E 121. Introduction to Stochastic Modeling
MS&E 211. Linear and Nonlinear Optimization
MS&E 212. Mathematical Programming and Combinatorial Optimization
MS&E 221. Stochastic Modeling
MS&E 251. Stochastic Decision Models
MATH 104. Applied Matrix Theory
MATH 106. Functions of a Complex Variable
MATH 108. Introduction to Combinatorics and its Applications
MATH 109. Applied Group Theory
MATH 110. Applied Number Theory and Field Theory
MATH 115. Functions of a Real Variable
MATH 131. Partial Differential Equations I
MATH 132. Partial Differential Equations II
MATH 171. Fundamental Concepts of Analysis
PHIL 151. First-Order Logic
STATS 191. Introduction to Applied Statistics
STATS 200. Introduction to Statistical Inference
STATS 202. Data Analysis
STATS 203. Introduction to Regression Models and Analysis of Variance
STATS 217. Introduction to Stochastic Processes

Other upper-division courses appropriate to the program major may be substituted with consent of the program director. Undergraduate majors in the constituent programs may not count courses in their own departments.

MATHEMATICS

Emeriti: Solomon Feferman, Robert Finn, Joseph Keller, Georg Kreisel, Harold Levine, Tai-Ping Liu, R. James Milgram, Donald Ornstein, Robert Osserman
Chair: Rafe Mazzeo
Professors: Simon Brendle, Gregory Brumfiel, Daniel Bump, Emmanuel Candes, Gunnar Carlsson, Ralph L. Cohen, Brian Conrad, Amir Dembo, Persi Diaconis, Yakov Eliashberg, Eleny Ionel, Yitzhak Katznelson, Steven Kerckhoff, Jun Li, Rafe Mazzeo, Maryam Mirzakhani, George Papanicolaou, Lenya Ryzhik, Richard Schoen, Leon Simon, Kannan Soundararajan, Ravi Vakil, Andras Vasy, Akshay Venkatesh, Brian White
Associate Professor: Soren Galatius
Szegö Assistant Professors: Fei Han, Pierre Garapon, Vladislav Kargin, Joan Licata, Antoine Toussaint, Denis Trotabas, Leo Tzou, Melanie Wood
Lecturers: Eric Bahuaud, Mark Lucianovic, Laurence Nedelec, Wojciech Wieczorek
Courtesy Professors: Renata Kallosh, Grigori Mints
Consulting Professors: Brian Conrey, Keith Devlin, David Hoffman, Wu-chung Hsiang
Samelson Fellows: Matthew Kahle, Anthony Licata, Samuel Lisi, Catherine Williams
Web site: http://math.stanford.edu

Courses offered by the Department of Mathematics are listed under the subject code MATH on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Mathematics offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy in Mathematics, and participates in the program leading to the B.S. in Mathematical and Computational Science. The department also participates in the M.S. and Ph.D. degree programs in Scientific Computing and Computational Mathematics and the M.S. degree program in Financial Mathematics.

MISSION OF THE UNDERGRADUATE PROGRAM IN MATHEMATICS

The mission of the undergraduate program in Mathematics is to provide students with a broad understanding of mathematics encompassing logical reasoning, generalization, abstraction, and formal proof. Courses in the program teach students to create, analyze, and interpret mathematical models and to communicate sound arguments based on mathematical reasoning and careful data analysis. The mathematics degree prepares students for careers in the corporate sector and government agencies, and for graduate programs in mathematics.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to comprehend mathematical arguments.
2. problem solving skills.
3. the ability to formulate proofs and to structure mathematical arguments.
4. the ability to communicate mathematical ideas.

ADVANCED PLACEMENT IN MATHEMATICS FOR FRESHMEN

Students of unusual ability in mathematics often take one or more semesters of college-equivalent courses in mathematics while they are still in high school. Under certain circumstances, it is possible for such students to secure both advanced placement and credit toward the bachelor's degree. A decision as to placement and credit is made by the department after consideration of the student's performance on the Advanced Placement Examination in Mathematics (forms AB or BC) of the College Entrance Examination Board, and also after consideration of transfer credit in mathematics from other colleges and universities.

The department does not give its own advanced placement examination. Students can receive either 5 or 10 units of advanced placement credit, depending on their scores on the CEEB Advanced Placement Examination. Entering students who have credit for two quarters of single variable calculus (10 units) are encouraged to enroll in MATH 51-53 in multivariable mathematics, or the honors version 51H-53H. These three-course sequences, which can be completed during the freshman year, supply the necessary mathematics background for most majors in science and engineering. They also serve as excellent background for the major or minor in Mathematics, or in Mathematical and Computational Science. Students who have credit for one quarter of single variable calculus (5 units) should take MATH 42 in Autumn Quarter and 51 in Winter Quarter. Options available in Spring Quarter include MATH 52, or 53. For proper placement, contact the Department of Mathematics.

BACHELOR OF SCIENCE IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

The Department of Mathematics participates with the departments of Computer Science, Management Science and Engineering, and Statistics in a program leading to a B.S. in Mathematical and Computational Science. See the "Mathematical and Computational Science" section of this bulletin.

INTRODUCTORY AND UNDERGRADUATE COURSES

The department offers two sequences of introductory courses in single variable calculus.

1. MATH 41, 42 present single variable calculus. Differential calculus is covered in the first quarter, integral calculus in the second.
2. MATH 19, 20, 21 cover the material in 41, 42 in three quarters instead of two.

There are options for studying multivariable mathematics:

1. MATH 51, 52, 53 cover differential and integral calculus in several variables, linear algebra, and ordinary differential equations. These topics are taught in an integrated fashion and emphasize application. MATH 51 covers differential calculus in several variables and introduces matrix theory and linear algebra; 52 covers integral calculus in several variables and vector analysis; 53 studies further topics in linear algebra and applies them to the study of ordinary differential equations. This sequence is strongly recommended for incoming freshmen with 10 units of advanced placement credit.
2. MATH 51H, 52H, 53H cover the same material as 51, 52, 53, but with more emphasis on theory and rigor.

The department offers three classes on linear algebra: 51 (or 51H), 104, and 113.

GRADUATE PROGRAMS IN MATHEMATICS

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, see the "School of Education" section of this bulletin or address inquiries to Credential Secretary, School of Education.

BACHELOR OF SCIENCE IN MATHEMATICS

The following department requirements are in addition to the University's basic requirements for the bachelor's degree:

Students wishing to major in Mathematics must satisfy the following requirements:

1. Department of Mathematics courses (other than MATH 100) totaling at least 49 units credit; such courses must be taken for a letter grade. For the purposes of this requirement, STATS 116, PHIL 151, and PHIL 152 count as Department of Mathematics courses.
2. Additional courses taken from Department of Mathematics courses numbered 101 and above or from approved courses in other disciplines with significant mathematical content, totaling at least 15 units credit. At least 9 of these units must be taken for a letter grade.
3. A Department of Mathematics adviser must be selected, and the courses selected under items '1' and '2' above must be approved by the department's director of undergraduate study, acting under guidelines laid down by the department's Committee for Undergraduate Affairs. The Department of Mathematics adviser can be any member of the department's faculty.
4. To receive the department's recommendation for graduation, a student must have been enrolled as a major in the Department of Mathematics for a minimum of two full quarters, including the quarter immediately before graduation. Students are encouraged to declare as early as possible, preferably by the end of the sophomore year.

Students are normally expected to complete either the sequence 19, 20, 21 or the sequence 41, 42 (but not both). Students with an Advanced Placement score of at least 4 in BC math or 5 in AB math may receive 10 units credit and fulfill requirement '1' by taking at least 39 units of Department of Mathematics courses numbered 51 and above. Students with an Advanced Placement score of at least 3 in BC math or at least 4 in AB math may receive 5 units credit and fulfill requirement '1' by taking at least 44 units of Department of Mathematics courses numbered 42 and above.

Sophomore seminar courses may be counted among the choice of courses under item '1'. Other variations of the course requirements laid down above (under items '1' and '2') may, in some circumstances, be allowed. For example, students transferring from other universities may be allowed credit for some courses completed before their arrival at Stanford. However, at least 24 units of the 49 units under item '1' above and 9 of the units under item '2'

above must be taken at Stanford. In all cases, approval for variations in the degree requirements must be obtained from the department's Committee for Undergraduate Affairs. Application for such approval should be made through the department's director of undergraduate studies. The policy of the Mathematics Department is that no courses other than the MATH 50 series and below may be double-counted toward any other University major or minor.

It is to be emphasized that the above regulations are minimum requirements for the major; students contemplating graduate work in mathematics are strongly encouraged to include the courses 116, 120, 121, 147 or 148, and 171 in their selection of courses, and in addition, take at least three Department of Mathematics courses over and above the minimum requirements laid out under items '1' and '2' above, including at least one 200-level course. Such students are also encouraged to consider the possibility of taking the honors program, discussed below.

To help develop a sense of the type of course selection (under items '1' and '2' above) that would be recommended for math majors with various backgrounds and interests, see the following examples. These represent only a few of a very large number of possible combinations of courses that could be taken in fulfillment of the Mathematics major requirements:

Example 1—A general program (a balanced program of both pure and applied components, without any particular emphasis on any one field of mathematics or applications) as follows:

A. either MATH 19, 20, and 21, or 41 and 42 (or satisfactory Advanced Placement credit); 51, 52, 53; 104 or 113; 106; 109; 110; 115;
B. plus any selection of at least eight of the following courses, including three Department of Mathematics courses: MATH 108, 131, 132, 143, 146, 147, 148, 152, 161; CS 137; ECON 50; PHYSICS 41, 43, 45; STATS 116. These courses from other departments are only meant as examples; there are many suitable courses in several departments that can be taken to fulfill part or all of requirement '2.'

Example 2—A theoretical program recommended for those contemplating possible later graduate work providing an introduction to the main areas of mathematics both broader and deeper than the general program outlined above:

A. either MATH 19, 20 and 21, or 41 and 42 (or satisfactory Advanced Placement credit)
B. either the sequence 51, 52, 53, or the sequence 51H, 52H, 53H; 106 or 116; 113; 120; 171
C. plus nine or more 3-unit math courses numbered 121 or higher (the logic courses PHIL 151 and PHIL 152 are considered to be such courses), including at least one algebra course, one analysis course, and one geometry/topology course. (See the description of the honors program below.)

In addition, those contemplating eventual graduate work in Mathematics should consider including at least one graduate-level math course such as MATH 205A, 210A, or 215A or B. Such students should also consider the possibility of entering the honors program.

*Example 3**—An applied mathematics program:

A. either MATH 19, 20, and 21; or 41 and 42 (or satisfactory Advanced Placement credit); 51, 52, 53; 104; 106; 108; 109; 110; 115; 131; 132; STATS 116
B. plus at least 15 units of additional courses in Applied Mathematics, including, for example, suitable courses from the departments of Physics, Computer Science, Economics, Engineering, and Statistics.

* Students with interests in applied mathematics, but desiring a broader-based program than the type of program suggested in Example 3, including significant computational and/or financial and/or statistical components, are encouraged to also consider the Mathematics and Computational Science program.

HONORS PROGRAM

The honors program is intended for students who have strong theoretical interests and abilities in mathematics. The goal of the program is to give students a thorough introduction to the main branches of mathematics, especially analysis, algebra, and geometry. Through the honors thesis, students may be introduced to a current or recent research topic, although occasionally more classical projects are encouraged. The program provides an excellent background with which to enter a master's or Ph.D. program in Mathematics. Students completing the program are awarded a B.S. in Mathematics with Honors.

It is recommended that the sequence 51H, 52H, 53H be taken in the freshman year. To graduate with a B.S. in Mathematics with Honors, the following conditions apply in addition to the usual requirements for math majors:

1. The selection of courses under items '1' and '2' above must contain MATH 106 or 116, MATH 120, and MATH 171 and must also include seven additional 3-unit Math courses numbered 121 or higher. (The logic courses PHIL 151 and 152 can also be used.) These seven courses must include at least one algebra course (121, 122, 152, 154, or 155), one analysis course (131P, 132, 136, 151, 172, 173, or 175), and one geometry/topology course (143, 145, 146, 147, or 148).
2. Students in the honors program must write a senior thesis. In order to facilitate this, the student must, by the end of the junior year, choose an undergraduate thesis adviser from the Department of Mathematics faculty, and map out a concentrated reading program under the direction and guidance of the adviser. During the senior year, the student must enroll in MATH 197 for a total of 6 units (typically spread over two quarters), and work toward completion of the thesis under the direction and guidance of the thesis adviser. The thesis may contain original material, or be a synthesis of work in current or recent research literature. The 6 units of credit for MATH 197 are required in addition to the course requirements laid out under items '1' and '2' above and in addition to all other requirements for math majors.

In addition to the minimum requirements laid out above, it is strongly recommended that students take at least one graduate-level course (that is, at least one course in the 200 plus range). MATH 205A, 210A, and 215A or B are especially recommended in this context.

Students with questions about the honors program should see the director of undergraduate advising.

MINOR IN MATHEMATICS

To qualify for the minor in Mathematics, a student should complete, for a letter grade, at least six Department of Mathematics courses (other than MATH 100) numbered 51 or higher, totaling a minimum of 24 units. It is recommended that these courses include either the sequence 51, 52, 53 or the sequence 51H, 52H, 53H. At least 12 of the units applied toward the minor in Mathematics must be taken at Stanford. The policy of the Mathematics Department is that no courses other than the MATH 50 series and below may be double-counted toward any other University major or minor.

MASTER OF SCIENCE IN MATHEMATICS

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees" section of this bulletin. Students should pay particular attention to the University's course requirements for graduate degrees. The following are specific departmental requirements:

Candidates must complete an approved course program of 45 units of courses beyond the department requirements for the B.S. degree, of which at least 36 units must be Mathematics Department courses, taken for a letter grade. The Mathematics courses must include at least 18 units numbered 200 or above. The candidate must have a grade point average (GPA) of 3.0 (B) over all course work taken in Mathematics, and a GPA of 3.0 (B) in the 200-level courses considered separately. Course work for the M.S. degree must be approved during the first quarter of enrollment in the program by the department's Director of Graduate Studies.

For the M.S. degree in Financial Mathematics, see the "Financial Mathematics" section of this bulletin.

DOCTOR OF PHILOSOPHY IN MATHEMATICS

The University's basic requirements for the doctorate (residence, dissertation, examinations, etc.) are discussed in the "Graduate Degrees" section of this bulletin. The following are specific departmental requirements.

To be admitted to candidacy, the student must have successfully completed 27 units of graduate courses (that is, courses numbered 200 and above). In addition, the student must pass qualifying examinations given by the department.

Beyond the requirements for candidacy, the student must complete a course of study approved by the Graduate Affairs Committee of the Department of Mathematics and submit an acceptable dissertation. In accordance with University requirements, Ph.D. students must complete a total of 135 course units beyond the bachelor's degree. These courses should be Department of Mathematics courses or approved courses from other departments. The course program should display substantial breadth in mathematics outside the student's field of application. The student must receive a grade point average (GPA) of 3.0 (B) or better in courses used to satisfy the Ph.D. requirement. In addition, the student must pass the Department area examination and the University oral examination.

Experience in teaching is emphasized in the Ph.D. program. Each student is required to complete nine quarters of such experience. The nature of the teaching assignment for each of those quarters is determined by the department in consultation with the student. Typical assignments include teaching or assisting in teaching an undergraduate course or lecturing in an advanced seminar.

For further information concerning degree programs, fellowships, and assistantships, inquire of the academic associate of the department.

PH.D. MINOR IN MATHEMATICS

The student should complete both of the following:*

1. MATH 106 *or* 116, 131, 132
2. MATH 113, 114, 120 *or* 152

These courses may have been completed during undergraduate study, and their equivalents from other universities are acceptable.

In addition, the student should complete 21 units of 200-level courses in Mathematics. These must be taken at Stanford and approved by the Department of Mathematics Ph.D. minor adviser.

* A third coherent sequence designed by the student, subject to the approval of the graduate committee, may be considered as a substitute for items '1' or '2'.

MEDIEVAL STUDIES

Co-Directors: Paula Findlen, Jennifer Summit
Associate Director: Michael Wyatt
Committee in Charge: Philippe Buc, Hester Gelber, Hans Ulrich Gumbrecht, Robert P. Harrison, Nancy S. Kollman, Seth Lerer, William Mahrt, Bissera Pentcheva, Jennifer Summit, Rega Wood
Affiliated Faculty: Cecile Alduy (French and Italian), Theodore Andersson (German Studies), Vincent Barletta (Iberian and Latin American Cultures), Shahzad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), George H. Brown (English), Philippe Buc (History), Steven Carter (Asian Languages), Charlotte Fonrobert (Religious Studies), Hester Gelber (Religious Studies), Avner Greif (Economics), Hans Ulrich Gumbrecht (French and Italian), Robert Harrison (French and Italian), Michelle Karnes (English), Nancy S. Kollmann (History), Seth Lerer (English, Comparative Literature), Mark E. Lewis (History), William Mahrt (Music), David Malkiel (Religious Studies), Michael Markham (Music), Kathryn Miller (History), Patricia Parker (Comparative Literature), Bissera Pentcheva (Art and Art History), Orrin W. Robinson (German Studies), Jesse Rodin (Music), Behnam Sadeki (Religious Studies), Stuart Sargent (Asian Languages), Jeffrey Schnapp (French and Italian) Carolyn Springer (French and Italian), Edward Steidle (English), Jennifer Summit (English), Rega Wood (Philosophy)
Program Offices: Pigott Hall 205
Mail Code: 94305-2087
Department Phone: (650) 721-4099
Email: ganymede@stanford.edu
Web Site: http://stanford.edu/dept/medieval

Courses offered by the Program in Medieval Studies are listed under the subject code MEDVLST on the *Stanford Bulletin's* ExploreCourses web site.

The Program in Medieval Studies draws together a wide range of disciplines: art and architecture; literature and languages; music; philosophy; religious studies; and economic, social, and political history. Faculty interests bridge Western, Islamic, and Asian cultures, and encompass both traditional and innovative materials and methods.

The Medieval Studies Program is administered through the Center for Medieval and Early Modern Studies, but the degree is conferred by the School of Humanities and Sciences. The committee has approved the program as below. Students interested in pursuing a Medieval Studies major or minor should visit the program office in Pigott Hall and consult with one of the co-directors. The major is normally declared by the beginning of the student's junior year.

The major combines interdisciplinary breadth with a disciplinary focus. The interdisciplinary emphasis is provided by MEDVLST 165, Crusades: Interdisciplinary Approaches, by upper-division interdisciplinary colloquia, and by the requirement that students take courses in three different areas. Depth is ensured by the requirement that students take at least four courses in one area. A faculty adviser helps each student choose courses that integrate the requirements of breadth and depth. To that end, the following guidelines are provided.

The student should take a minimum of 60 units of course work from the list of Medieval Studies courses or appropriate alternatives approved by the co-directors, including ten courses as follows:

1. the introductory course, MEDVLST 165, Crusades: Interdisciplinary Approaches (given alternate years).
2. two upper-division courses, ideally with an interdisciplinary component, in any field dealing with the Middle Ages.
3. four courses in one of the following categories:
   a. Literature: English, French, German and Scandinavian, Italian, Latin, Slavic, Spanish
   b. History
   c. Art History, Drama, Music
   d. Humanities, Philosophy, Religious Studies. Certain humanities courses may fulfill requirements within other categories.
4. two courses in a second category from the above list
5. one courses in a third category from the above list.

Students doing the Medieval Studies concentration for the Humanities major should use these requirements as guidelines for developing their program of study.

In addition to the ten courses, a language proficiency equal to two years of college-level study is suggested in Latin or one of the following: French, German, Italian, or Spanish.

The Medieval Studies Writing in the Major (WIM) requirement can be fulfilled in one of three ways:

1. through a course designated as WIM by a department contributing to the Medieval Studies major
2. through a paper in a Medieval Studies course
3. through an independent paper with a member of the Medieval Studies faculty

Check with the program office regarding requirements for each of these options.

Courses used to satisfy Medieval Studies major requirements must be taken for a letter grade.

OPTIONAL COURSES

Students may choose courses from the following list to complete the 60-unit major requirement:

ARTHIST 105/305. Introduction to Medieval Art
ARTHIST 106A. Art of Pilgrimage and Crusade
ARTHIST 206. Virginity and Power: Mary in the Middle Ages
ECON 228. Institutions and Organizations in Historical Perspectives
ENGLISH 104C. Arthurian Literature and Medieval Romance
ENGLISH 184C. Texts in History: Medieval to Early Modern
FRENGEN 204. Songs of Love and War: Gender Crusade, Politics
FRENGEN 233. Afterlife of the Middle Ages
FRENLIT 130. Authorship, Book Culture, and National Identity in Medieval and Renaissance France
GERGEN 38A/138. Introduction to Germanic Languages
GERGEN 50N. Charlemagne's Germany
GERLIT 257. Gothic
HISTORY 14N. Crusades
HISTORY 110A Europe from Late Antiquity to 1500
HISTORY 133A. Yorkist and Tudor England
HISTORY 135/335. History of European Law, Medieval to Contemporary
HISTORY 182. Medieval Islamic History, 600-1500 (not given 2009-10)
HISTORY 182C. From Prophet to Empire: The Making of the Muslim Middle East, 600-1500
HISTORY 211/311. Body, Gender, and Society in Medieval Europe
HISTORY 211B. Jews under Islam and Christianity in the Middle Ages
HISTORY 212/312. Holy Wars: Medieval Perspectives (not given 2009-10)
HISTORY 217A/317A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
HISTORY 217B/317B. Land of Three Religions: Medieval Spain
HISTORY 218A. Barcelona to Berlin: Muslim Minorities in History
ITALLIT 127. Inventing Italian Literature: Dante, Boccaccio and Petrarca
LAW 586. Classical Islamic Law (same as RELIGST 201/301; not given 2009-10)
MUSIC 40. Music History to 1600
MUSIC 140/240. Studies in Medieval Music (not given 2009-10)
MUSIC 301A. Analysis of Music: Modal
PHIL 101. Introduction to Medieval Philosophy
PHIL 115/215. Problems of Medieval Philosophy
RELIGST 27. Exploring Islam
RELIGST 84. Mystics, Pilgrims, Monks, and Scholars: Religious Devotion in Medieval Christianity (not given 2009-10)
RELIGST 101. Who Is Allah?
RELIGST 172. Sex, Body, and Gender in Medieval Religion (not given 2009-10)
RELIGST 222. Literature and Society in Medieval Islam (not given 2009-10)
RELIGST 222B. Sufism
RELIGST 224B. Unveiling the Sacred: Explorations in Islamic Religious Imagination
RELIGST 227/327. *The Qur'ân* (not given 2009-10)
RELIGST 226/326. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period (not given 2009-10)
RELIGST 258/358. Japanese Buddhist Texts
SPANLIT 157. Introduction to Medieval and Early Modern Iberian Literatures (Same as PORTLIT 157)

MINOR IN MEDIEVAL STUDIES

An undergraduate minor in Medieval Studies is available through the program. Students interested in completing the minor should inquire about enrollment procedures at the program office.

Requirements are as follows:

1. *Language:* in addition to the University foreign language requirement, at least a one quarter course in a classical and/or medieval vernacular language is recommended, which may count as one of the five required courses for the minor listed under item 2b.
2. The minor consists of six courses, which include:
   a. MEDVLST 165, Crusades: Interdisciplinary Approaches (core course). If 165 is not offered in a given year, students may petition to take a substitute course if necessary. Petitions should be directed to the Director of Medieval Studies.
   b. an additional five courses dealing directly with the Middle Ages. If the student's major department or program offers medieval courses, he/she should take two of them for the Medieval Studies minor, but those courses may not also count for the major. At least three courses must be taken outside the student's major, selected from two or more of the following categories:
      1. Language and Literature
      2. History
      3. Art History, Drama, Music
      4. Humanities, Philosophy, Religious Studies
      5. From among the Medieval Studies faculty, the student chooses an adviser who assists in the selection of courses and the design of the program.

Courses applied to the minor in Medieval Studies must be taken for a letter grade. Courses applied to the minor cannot also be applied to a student's major or another minor.

MODERN THOUGHT AND LITERATURE

Director: Ursula K. Heise
Committee in Charge: Ursula K. Heise (Chair), Scott Bukatman, Joshua Cohen, Shelley Fisher Fishkin, Hans U. Gumbrecht , Sean Hanretta (on leave), Andrea A. Lunsford, Saikat Majumdar, Robert McGinn, Helen Stacy, Fred Turner
Affiliated Faculty: Lanier Anderson (Philosophy), Shahzad Bashir (Religious Studies), Scott Bukatman (Art and Art History), Eamonn Callan (Education), Joshua Cohen (Political Science, Philosophy, Law), Jean-Pierre Dupuy (French and Italian), Paulla Ebron (Anthropology), Dan Edelstein (French and Italian), Harry Elam (Drama), Michele Elam (English), Amir Eshel (German Studies), Shelley Fisher Fishkin (English), James Ferguson (Anthropology), Gregory Freidin (Slavic Languages and Literatures), Theodore Glasser (Communication), Roland Greene (English, Comparative Literature), Hans U. Gumbrecht (French and Italian, Comparative Literature), Sean Hanretta (History), Ursula K. Heise (English), Matthew Kohrman (Anthropology), Joshua Landy (French and Italian), Helen Longino (Philosophy), Andrea A. Lunsford (English), Saikat Majumdar (English), Liisa Malkki (Anthropology), Barbaro Martinez-Ruiz (Art and Art History), Robert McGinn (Management Science and Engineering; Science, Technology, and Society), Franco Moretti (English, Comparative Literature), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Italian), David Palumbo-Liu (Comparative Literature), Richard Roberts (History), Ramón Saldívar (English, Comparative Literature), Priya Satia (History), Debra Satz (Philosophy), Londa Schiebinger (History), Stephen Sohn (English), Helen Stacy (Law), Fred Turner (Communication), Richard White (History), Bryan Wolf (Art and Art History), Alex Woloch (English), Sylvia Yanagisako (Anthropology), Yvonne Yarbro-Bejarano (Iberian and Latin American Cultures)
Program Offices: Building 460, Room 219
Mail Code: 94305-2022
Phone: (650) 723-3413
Email: monica.moore@stanford.edu

Web Site: http://www.stanford.edu/dept/MTL

Courses offered by the Program in Modern Thought and Literature are listed under the subject code MTL on the *Stanford Bulletin's* ExploreCourses web site.

The program in Modern Thought and Literature admits students for the Ph.D. and a limited number for a coterminal B.A./M.A. Program.

UNDERGRADUATE PROGRAMS IN MODERN THOUGHT AND LITERATURE

Although Modern Thought and Literature has no formal undergraduate degree granting program, undergraduates interested in completing a major in this field may do so through the Individually Designed Majors Program. Students interested in this option should consult the Director of the Program in Modern Thought and Literature, in addition to the Dean's Office in the School of Humanities and Sciences, which administers the IDM Programs.

GRADUATE PROGRAMS IN MODERN THOUGHT AND LITERATURE

Modern Thought and Literature (MTL) is an interdisciplinary graduate program advancing the study of critical issues in the modern world. Since 1971, MTL students have helped to redefine the cutting edge of many interdisciplinary fields and to reshape the ways in which disciplinary scholarship is understood and practiced. MTL graduates are leaders in fields such as American studies, ethnic studies, film studies, social and cultural studies, and women's studies, as well as disciplines such as English, cultural anthropology, and comparative literature.

The program trains students to understand the histories and methods of disciplines and to test their assumptions. It considers how disciplines shape knowledge and, most importantly, how interdisciplinary methods reshape objects of study. MTL students produce innovative analyses of diverse texts, forms, and practices, including those of literature, history, philosophy, anthropology, law, and science; film, visual arts, popular culture, and performance; and material culture and technology.

Each student constructs a unique program of study suited to his or her research. Students have focused on such areas as gender and sexuality; race and ethnicity; science, technology, and medicine; media and performance; legal studies; and critical and social theory. The program's faculty is drawn from fields in the humanities and social sciences, as well as from education, law, and medicine. As interdisciplinary study is impossible without an understanding of the disciplines under consideration, each student is expected to master the methods of one discipline and to gain a foundation in a second field.

MASTER OF ARTS

The Master of Arts is available to students who are admitted to the doctoral program. Students are not admitted into the program for the purpose of earning a terminal Master of Arts degree. Candidates for the Ph.D. who satisfy the committee of their progress and satisfactorily complete 45 units of course work forming a coherent program of study, may apply for an M.A. in Modern Thought and Literature.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN MODERN THOUGHT AND LITERATURE

Each year, one or two undergraduates who are exceptionally well prepared in literature and at least one foreign language and whose undergraduate course work includes a strong interdisciplinary component, may petition to be admitted to the program for the purpose of completing a coterminal M.A. degree. Admission to this program is granted only on condition that in the course of working on their master's degrees they do not apply to enter the Ph.D. program in Modern Thought and Literature. The deadline for application is early February.

To apply, applicants submit:

1. An unofficial grade transcript from Axess.
2. A Petition for Admission to the Coterminal Program from the Registrar's Office.
3. A statement giving the reasons the student wishes to pursue this program and its place in his or her future plans. This statement should pay particular attention to the reasons why the student could not pursue the studies he or she desires in some other way.
4. A plan of study listing, quarter by quarter, each course by name, units, and instructor, to be taken in order to fulfill the requirements for the degree for a total of 45 units, including at least 20 units of advanced work in one literature, and at least 20 units in a coherent interdisciplinary program of courses taken in non-literature departments.
5. A writing sample of critical or analytical prose.
6. Two letters of recommendation from members of the faculty who know the applicant well and who can speak directly to the question of his or her ability to do graduate-level work.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

REQUIREMENTS

The candidate for the M.A. must complete at least 45 units of graduate work, to be divided in the following manner:

1. One of the two introductory seminars, MTL 334A, Concepts of Modernity 1, or 334B, Concepts of Modernity 2, 5 units.
2. At least 20 units of advanced course work in literature, to be approved by the director.
3. At least 20 units of course work in a coherent and individually arranged interdisciplinary program, to be approved by the director.

By the end of the course of study, each candidate must also demonstrate a reading knowledge of at least one foreign language.

DOCTOR OF PHILOSOPHY IN MODERN THOUGHT AND LITERATURE

University requirements for the Ph.D. are discussed in the "Graduate Degrees" section of this bulletin.

A candidate for the Ph.D. degree in Modern Thought and Literature must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the B.A. degree. He or she is expected to complete at least 18 courses of graduate work in addition to the dissertation. Students may spend one year of graduate study abroad.

Requirements for the Ph.D. in Modern Thought and Literature are:

1. MTL 334A,B. Concepts of Modernity 1 and 2 (5 units each).
2. MTL 299. Edgework: New Directions in the Study of Culture (2 units, Spring Quarter), required of all first-year students.
3. A coherent program of eight courses of advanced work in literary studies to be worked out with the adviser, of which at least six must be regularly scheduled courses in literature. Courses in the teaching of composition (ENGLISH 396, 397), ad hoc graduate seminars (MTL 395), research courses (MTL 398), and thesis registration (MTL 802) may not be counted among these six courses; MTL 396L, 397, 399, 802 may not be counted toward these requirements under any circumstances.
4. Eight courses of advanced work in non-literature departments, the core of which is completion of either a departmental minor or an interdepartmental concentration, typically consisting of six courses. Departmental minors are available from the departments of Anthropology, Art and Art History, Communication, History, Philosophy, Political Science, Religious Studies, and Sociology (see the relevant information in those sections of this bulletin). Approved interdepartmental concentrations

have been established in popular culture, ethnic studies, feminist and gender studies, and science and technology studies (specific course requirements are available from the program office). Individually designed concentrations may be approved by petition to the director. In addition to the required six courses in a minor or a concentration, two additional courses from non-literature departments are chosen in consultation with the student's academic adviser. Course restrictions noted above in item 2 also apply.

5. *Qualifying Paper:* This certifies that students are likely to be able to undertake the quality of research, sustained argumentation, and cogent writing demanded in a doctoral dissertation. The qualifying paper must be a substantial revision of a seminar paper written at Stanford during the first year and should embody a substantial amount of independent research, develop an intellectual argument with significant elements of original thinking, and demonstrate the ability to do interdisciplinary work. Each paper is evaluated by two or three readers (designated before the end of the first year of graduate study), one of whom must be a member of the Committee in Charge. Qualifying papers must be submitted to the program office no later than the end of the third week of the fifth quarter of enrollment, normally, Winter Quarter of the second year.
6. *Teaching*, an essential part of the program, is normally undertaken in conjunction with the Department of English. Candidates are required to demonstrate competence in teaching.
7. Students must demonstrate, by the end of the third quarter of the first year, a reading knowledge of one foreign language and, by the beginning of the first quarter of the third year, a reading knowledge of one other foreign language. Reading knowledge means the ability to make a genuine scholarly use of the language: that is, to read prose of ordinary difficulty. Students may not take the University oral examination before completion of the foreign language requirement.
8. *Candidacy:* At the end of the second year, students apply for candidacy. The following qualifications are required before candidacy can be certified: the earlier submission of a satisfactory qualifying paper; demonstration of a reading knowledge of one foreign language; satisfactory progress in course work; a list of courses applicable to the degree, distinguishing between courses appropriate to the literary component and courses appropriate to the non-literary component; designation of a departmental minor or an interdisciplinary concentration; and the submission of a statement outlining the scope and coherence of the interdisciplinary component of the program in relation to the literary component, and noting the relevance of the course work to that program.
9. *Annual Review:* The program and progress of each student must be approved by the Committee in Charge at the end of each academic year.
10. *University Oral Examination:* This examination, covering the student's areas of concentration, is normally taken in the third year of graduate study. It is a two-hour oral examination administered by four faculty members specializing in the student's areas of concentration, and a chair from another department. The exam is based on a substantial reading list prepared by the student in conjunction with the faculty committee and designed to cover the areas of expertise pertinent to the student's dissertation project.
11. *Dissertation Proposal and Colloquium:* Within one quarter after the University oral examination, the student writes up the dissertation proposal: 15-20 pages with a general description of the project and a chapter breakdown plus a bibliography. The proposal is submitted to the program director and the dissertation committee for approval. After completion of the first chapter of the dissertation, the student sets up a meeting with the dissertation committee for one hour to discuss the work accomplished in the first chapter and plans for completing the rest of the dissertation.
12. *Dissertation*: The fourth and fifth years are devoted to the dissertation, which should be a substantial and original contribution acceptable to the Committee in Charge of Modern Thought and Literature. The subject is drawn from the literature of specialization and the area of nonliterary studies. The dissertation project will conclude with a two-hour defense. The first hour is open to the public and includes a brief presentation of the dissertation project on the part of the Ph.D. candidate. The second hour is reserved to the candidate and his/her Dissertation Committee.

PH.D. IN MODERN THOUGHT AND LITERATURE AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Modern Thought and LIterature and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact Denise Winters at 650-724-1333 for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

MUSIC

Emeriti: (Professors) John M. Chowning, Albert Cohen, George Houle, William H. Ramsey, Leonard G. Ratner, Leland C. Smith; *(Professors, Performance)* Arthur P. Barnes, Marie Gibson; *(Professor, Research)* Max V. Mathews

Chair: Stephen M. Sano

Professors: Jonathan Berger, Karol Berger, Chris Chafe, Brian Ferneyhough, Thomas Grey (on leave Winter, Spring), Stephen Hinton (on leave Winter, Spring), Julius O. Smith (on leave Autumn)

Associate Professors: Mark Applebaum, Heather Hadlock, William P. Mahrt

Assistant Professors: Jaroslaw Kapuscinski, Jesse Rodin, Anna Schultz, Ge Wang

Professors (Teaching): George Barth (Piano), Stephen M. Sano (Director of Choral Studies)

Associate Professor (Performance): Jindong Cai (Director of Orchestral Studies, on leave Autumn)

Courtesy Professor: Paul DeMarinis

Senior Lecturers: Giancarlo Aquilanti (Director of Theory; Wind Ensemble), Talya Berger (Theory), Stephen Harrison (Violoncello), Thomas Schultz (Piano), Gregory A. Wait (Voice; Director of Vocal Studies), Frederick R. Weldy (Piano)

Lecturers: Kumaran Arul (Piano, on leave), Fredrick Berry (Jazz Ensemble), Mark Brandenburg (Clarinet), Marie-Louise Catsalis (Voice), Marjorie Chauvel (Harp), Jonathan Clark (Mariachi), Tony Clements (Tuba), Laura Dahl (Resident Collaborative Pianist), Anthony Doheny (Violin), John Dornenburg (Viola da Gamba), Maria Ezerova (Piano), Charles A. Ferguson (Guitar), Debra Fong (Violin), Claire Giovannetti (Voice), Dawn Harms (Violin, Viola), Alexandra Hawley (Flute), David Henderson (Classical Saxophone), Wendy Hillhouse (Voice), Robert Hubbard (Oboe), Joyce Johnson-Hamilton (Trumpet), Wendy Ju (HCI theory), Jay Kadis (Audio Recording), McDowell Kenley (Trombone), Mary Linduska (Voice, Summer only), Murray Low (Jazz Piano), Janet Maestre (Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), Seward McCain (Jazz Bass), Charles McCarthy (Jazz Saxophone), Robert Huw Morgan (University Organist, Organ), Bruce Moyer (Contrabass), Herbert Myers (Early Winds), James Nadel (Jazz), Rufus Olivier (Bassoon), Larry S. Ragent (French Horn), Melody Schaefle (Flute), Amy Schneider (Voice, on leave), Robin Sharp (Violin), Jerome Simas (Clarinet), Livia Sohn (Violin), Elaine Thornburgh (Harpsichord), Erik Ulman

(Composition, Theory), Linda Uyechi (Taiko), Rick Vandivier (Jazz Guitar), Mark Veregge (Percussion), Sharon Wei (Viola), John Worley (Jazz Trumpet), Hui (Daisy) You (Guzheng), Timothy Zerlang (University Carillonneur, Piano)

Consulting Professors: Jonathan Abel (CCRMA), David Berners (CCRMA), Marina Bosi-Goldberg (CCRMA), Walter Hewlett (Computer-Assisted Research in the Humanities), Eleanor Selfridge-Field (Computer-Assisted Research in the Humanities), Malcolm Slaney (CCRMA)

Visiting Professor: Thomas Rossing (CCRMA)

Acting Assistant Professor: Charles Kronengold

Artists-in-Residence (St. Lawrence String Quartet): Geoff Nuttall (Violin), Scott St. John (Violin), Lesley Robertson (Viola), Christopher Costanza (Violincello)

Mellon Fellow: Shana Goldin-Perschbacher (Music History)

Department Offices: Braun Music Center, Room 101

Mail Code: 94305-3076

Phone: (650) 723-3811

Email: musicdept@stanford.edu

Web Site: http://music.stanford.edu

Courses offered by the Department of Music are listed under the subject code MUSIC on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE DEPARTMENT OF MUSIC

The Department of Music's aims are to provide specialized training for those who plan careers in music as composers, performers, teachers, and research scholars, and to promote the understanding and enjoyment of music in the University at large through its courses and performance offerings.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students in the following concentrations are required to demonstrate the outcomes as described.

PERFORMANCE PRACTICE

1. the ability to select and organize a series of pieces in an effective and nuanced order.
2. appropriate performance skills derived from the progression of works taught in lessons.
3. knowledge of the relevant critical literature appropriate to the repertoire being prepared.
4. analytical writing skills in the preparation of program notes appropriate to the repertoire selected.
5. the artistic execution of their repertoire in a formal concert recital setting.

MUSIC HISTORY

1. the ability to select and outline an appropriate topic area and to select appropriate methodologies.
2. appropriate mastery of the primary source materials.
3. appropriate mastery of the secondary source materials.
4. the analytical writing skills necessary for the execution of the thesis.

COMPOSITION

1. the ability to articulate the scope of works in the portfolio.
2. appropriate understanding of the styles and techniques necessary to accomplish the creation of the portfolio's contents.
3. a compelling artistic vision or voice in the creation of the works in their portfolio.
4. the ability to compose and complete sufficient works in a variety of sizes to demonstrate versatility of the portfolio.
5. the artistic coherence of their portfolio, preferably in a concert recital reading of its contents.

MUSIC, SCIENCE, AND TECHNOLOGY

1. the ability to select and organize a project on an appropriate topic.
2. appropriate skills and techniques derived from the progression of those skills and techniques taught in classes.
3. a mastery of the primary source literature and techniques.
4. a mastery of the secondary source literature and techniques.
5. the result of the project (instrument, code, synthesis) in a public context.

BACHELOR OF ARTS IN MUSIC

The undergraduate major in Music is built around a series of foundation courses in theory, musicianship, and music history, in addition to performance and the proficiency requirements outlined below. Majors must complete a minimum of 66 units within the department. All required courses for the B.A. in any concentration must be taken for a letter grade. Electives may be taken credit/no credit, but any courses taken towards concentration requirements must carry a letter grade.

SUGGESTED PREPARATION FOR THE MAJOR

Because of the sequence of courses, it takes more than two years to complete the requirements for the major. Students are required to meet with the undergraduate student services officer in the department prior to declaring the major. It is recommended that prospective majors schedule this consultation with the undergraduate student services officer as early as possible in their careers in order to plan a program that allows sufficient time for major course work, practice, and University requirements outside the major. Early planning is especially important for students wishing to double-major, for those contemplating overseas study during their undergraduate years, for those wishing to do an in-depth concentration in the Music major, and for those with particular musical talents and interests. It is recommended that music majors complete MUSIC 21, 22, and 23 in the freshman year; the series should be completed by Autumn Quarter of the junior year. It is recommended that music majors complete MUSIC 40, 41, and 42 in the sophomore year; the series should be completed by the end of the junior year.

Suggested Preparatory Course—MUSIC 19. Introduction to Music Theory.

FIELDS OF STUDY OR DEGREE OPTIONS

Concentrations are offered in: performance; conducting; composition; history and theory; or music, science, and technology. Each of these concentration areas is declarable in Axess as a subplan. Specific guidelines and information on the concentration tracks are available from the Department of Music office and students are urged to select this option no later than the middle of their junior year in order to complete all of the requirements in a timely manner.

DEGREE REQUIREMENTS

In conjunction with the undergraduate student services officer, the student is assigned a departmental adviser with whom the student is required to meet at least one time each quarter. Total units and courses required to graduate for each concentration are specified in the relevant section following.

Required Courses—The following courses are required of all majors.

1. *Theory—*
   MUSIC 21. Elements of Music I (4 units)
   MUSIC 22. Elements of Music II (4 units)
   MUSIC 23. Elements of Music III (4 units)
2. *History—*
   MUSIC 40. Music History to 1600 (4 units)
   MUSIC 41. Music History 1600-1830 (4 units)
   MUSIC 42. Music History Since 1830 (4 units)
3. *Analysis—*
   MUSIC 121. Analysis of Tonal Music (4 units)
   and two at the 4-unit level, from:

MUSIC 122A. Renaissance and Baroque Counterpoint
MUSIC 122B. Harmonic Materials of the 19th Century
MUSIC 122C. Introduction to 20th-Century Composition

4. *Writing in the Major (WIM)*—Three (at least two at the 4-unit level) from:
MUSIC 140. Studies in Medieval Music
MUSIC 141. Studies in Renaissance Music
MUSIC 142. Studies in Baroque Music
MUSIC 143. Studies in Classical Music
MUSIC 144. Studies in Romantic Music
MUSIC 145. Studies in Modern Music
MUSIC 146. Music and Urban Film
MUSIC 147. The Soul Tradition in African American Music
MUSIC 148. Musical Shakespeare: Theater, Song, Opera, and Film
MUSIC 149. Reactions to the Record: Early Recordings, Lost Styles, and Music's Future
MUSIC 190H. Sex, Sacrifice, and Civilization: Baroque Opera and Tragedy
MUSIC 251. Psychophysics and Music Cognition
5. *Applied*—
   a. A minimum of five quarters totaling 15 units of private instruction in instrumental and/or vocal performance (MUSIC 172/272-177/277); students who do not qualify for private instruction at the intermediate or advanced level, but who wish to pursue the major may take introductory voice (MUSIC 65 and 73), piano (MUSIC 12 and 72A), or guitar (MUSIC 74C) to reach the minimum proficiency levels required to be accepted into a private studio and then complete their 5 quarters. Requirements for the minimum levels of proficiency in each instrument for private instruction are posted at: http://music.stanford.edu/Academics/Auditions.html.
   b. A minimum of five quarters totaling at least 5 units of work in one or more of the department's organizations or chamber groups. To fulfill the ensemble requirement, Music majors need at least three quarters of participation in the department's traditional large ensembles (MUSIC 159–167), with the exception of students whose primary instrument is harp, keyboard, or guitar, who need to participate at least one quarter in the ensembles above, but who may fulfill the rest of the requirement with chamber music (MUSIC 171). MUSIC 181 and MUSIC 156 may count for up to two of the ensemble-unit requirements for the Music major.
   Note—MUSIC 128, Composition, Coding, and Performance with SLOrk; MUSIC 157, Mariachi Band; MUSIC 158, Soundwire Ensemble; MUSIC 160A, Stanford Philharmonia Orchestra; MUSIC 160B, Stanford New Ensemble; MUSIC 161C, Red Vest Band; and MUSIC 161D, Stanford Brass Ensemble do not satisfy this requirement.
6. *Additional requirements*—
   a. Majors are required to pass a Piano Proficiency examination as part of the music theory core (MUSIC 21, 22, 23). The examination is given in the first two weeks of MUSIC 21. Students who do not pass the Piano Proficiency examination are required to enroll in MUSIC 12 concurrently with the music theory core until they are able to pass the examination. The examination consists of scales and arpeggios, performance of a simple tune to be set by the examiner, sight-reading, and the performance of prepared pieces. Information regarding the proficiency examination may be downloaded at http://music.stanford.edu/private/downloads/PIANO%20PROFICIENCY%20EXAM.doc
   b. Majors must also pass an ear-training proficiency examination, which is one of the requirements to complete MUSIC 23. It may be taken by arrangement and demonstrates a student's ability to hear music accurately and to perform it at sight.
7. *Electives*—

I. *Concentration in Performance*—In addition to degree requirements required of majors listed above, students in the Performance concentration must:
   1. Complete at least 6 additional, graded course units in performance. Acceptable courses are described under "Applied" in the section describing private instruction and ensemble course work above. Additional courses might include, but are not limited to:
   MUSIC 126. Introduction to Thoroughbass
   MUSIC 154. Composition and Performance of Instrumental Music with Electronics
   MUSIC 182. Diction for Singers
   MUSIC 183. Art Song Interpretation
   MUSIC 269. Research in Performance Practices
   1. Register for an independent project (MUSIC 198, 4 units) in the senior year under faculty supervision, leading to a senior recital.

II. *Concentration in Conducting*—In addition to degree requirements required of majors listed above, students in the Conducting concentration must:
   1. Complete at least 6 additional, graded course units in conducting. Additional courses might include, but are not limited to:
   MUSIC 127. Instrumentation and Orchestration
   MUSIC 130. Elementary Conducting
   MUSIC 230. Advanced Orchestral Conducting
   MUSIC 231. Advanced Choral Conducting
   1. Register for an independent project (MUSIC 198, 4 units) in the senior year under faculty supervision, leading to a senior conducting project.

III. *Concentration in Composition*—In addition to degree requirements required of majors listed above, students in the Composition concentration must:
   1. Complete at least 6 additional, graded course units in composition. Additional courses might include, but are not limited to:
   MUSIC 123. Undergraduate Seminar in Composition
   MUSIC 125. Individual Undergraduate Projects in Composition
   MUSIC 127. Instrumentation and Orchestration
   MUSIC 150. Musical Acoustics
   MUSIC 154. Composition and Performance of Instrumental Music with Electronics
   MUSIC 220A, B, or C—any of the series in computer-generated sound, music, and composition
   1. Register for an independent project (MUSIC 198, 4 units) in the senior year under faculty supervision, leading to a composition.

IV. *Concentration in History and Theory*—In addition to degree requirements required of majors listed above, students in the History and Theory concentration must:
   1. Complete at least 6 additional, graded course units in history and theory. Additional courses might include, but are not limited to:
   MUSIC 122A, B, or C—any course not taken in fulfillment of the major requirement
   MUSIC 140-149/240-249, 251—any courses not taken in fulfillment of the major requirement
   MUSIC 221. Topics in the History of Theory
   MUSIC 220A, B, or C—any of the series in computer-generated sound, music, and composition
   1. Register for an independent project (MUSIC 198, 4 units) in the senior year under faculty supervision, leading to a senior research paper.

V. *Concentration in Music, Science, and Technology*—Requires completion of 66 units of course work that differs from that of the major and is delineated below. This field of study is designed for those students interested in the musical ramifications of rapidly evolving computer technology and digital audio, and in the acoustic and psychoacoustic foundations of music. This

program can serve as a complementary major to students in the sciences and engineering. Students in the program are required to include the following courses in their studies:

1. *Theory and Analysis*—

MUSIC 21. Elements of Music I (4 units)
MUSIC 22. Elements of Music II (4 units)
MUSIC 23. Elements of Music III (4 units; includes passing the piano and ear-training proficiency examinations, as described for the major)
MUSIC 121. Analysis of Tonal Music (4 units)
MUSIC 150. Musical Acoustics (3 units)
MUSIC 251. Psychophysics and Music Cognition (WIM) (4 units)
MUSIC 220A. Fundamentals of Computer-Generated Sound (4 units)
MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing (4 units)
MUSIC 220C. Research Seminar in Computer-Generated Music (4 units)
MUSIC 220D. Research in Computer-Generated Music (4 units)
MUSIC 250A. Human-Computer Interface Theory and Practice (4 units)

1. *Applied*—
   a. Individual studies in performance, MUSIC 171/272-177/277, (6 units), *or* MUSIC 192A, Foundations of Sound Recording Technology *and* MUSIC 192B, Advanced Sound-Recording Technology (3 units each).
   b. Ensemble as described above for the major (5 units) *or* MUSIC 192C. Session Recording (5 units).
2. *History*—Two at the 4-unit level from:

MUSIC 40. Music History to 1600
MUSIC 41. Music History 1600–1830
MUSIC 42. Music History Since 1830

1. The program requires a senior research project (4 units) completed under faculty guidance. May be completed in conjunction with enrollment in any of the following: MUSIC 220D; MUSIC 199; MUSIC 198.

HONORS PROGRAM

Honors in Music are awarded by the faculty to concentrators who have produced an independent project of exceptional quality and meet certain departmental standards in musicianship, scholarship, and academic standing. The conferral of honors is done solely through faculty consultation. Students do not petition for honors.

OVERSEAS STUDY OR STUDY ABROAD

Courses in Music are often available at Stanford overseas programs, especially in Berlin, Paris, Florence, and Oxford. See the "Overseas Studies Program" section of this bulletin for this year's listings. Music majors and minors should talk to the Department of Music undergraduate administrator prior to going overseas.

MINOR IN MUSIC

Minors in Music in the concentration areas of performance, conducting, composition and history and theory, as well as in the concentration in music, science, and technology provide the student with a core of essential Music courses in the disciplines that establish both a foundation for informed appreciation of music and a basis for more advanced study, should the student wish to pursue it.

Requirements—Total of 36 units required course work as delineated below. Students in either minor must also pass the piano and ear-training proficiency examinations required of Music majors.

Required Courses for the Minor in Music with concentrations in performance, conducting, composition, and history and theory—

1. *Theory*—
   - MUSIC 21. Elements of Music I (4 units)
   - MUSIC 22. Elements of Music II (4 units)
   - MUSIC 23. Elements of Music III (4 units)
2. *History*—
   - MUSIC 40. Music History to 1600 (4 units)
   - MUSIC 41. Music History 1600–1830 (4 units)
   - MUSIC 42. Music History Since 1830 (4 units)
3. *Applied (two quarters)*—
   - MUSIC 159-171. Ensemble (2 units, total)
   - MUSIC 172-177. Individual Instruction (6 units, total)
4. *Choice of one (WIM)*—
   - MUSIC 140-149, 190H, 251 (4 units)

Required Courses for the Minor in Music with a concentration in music, science, and technology—

1. *Theory*—
   - MUSIC 21. Elements of Music I (4 units)
   - MUSIC 22. Elements of Music II (4 units)
   - MUSIC 23. Elements of Music III (4 units)
   - MUSIC 150. Musical Acoustics (3 units)
   - MUSIC 251. Psychophysics and Music Cognition (WIM) (4 units)
   - MUSIC 220A. Fundamentals of Computer-Generated Sound (4 units)
   - MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing (4 units)
2. *Applied*—
   - MUSIC 192A. Foundations of Sound-Recording Technology (3 units)
   - MUSIC 192B. Advanced Sound-Recording Technology (3 units)
   - MUSIC 192C. Session Recording (two quarters; 3 units total)

MASTER OF ARTS IN MUSIC

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

None of Stanford's required undergraduate courses may be credited toward an advanced degree unless specifically required for both degrees. Only work that receives a grade of 'A,' 'B,' or 'Satisfactory' (a passing grade in an instructor-mandated credit/no credit course) in Music courses numbered 100 or higher taken as a graduate student is recognized as fulfilling the advanced-degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

ADMISSION

Applicants are required to submit evidence of accomplishment (scores, recordings, and/or research papers) when they complete the application form. Applicants should arrange to take the Graduate Record Examination (GRE) well in advance of the December 14 application deadline. All components of the application are due by December 14. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see http://studentaffairs.stanford.edu/gradadmissions).

FIELDS OF STUDY OR DEGREE OPTIONS

All of the above fields of study are declarable as subplans in Axess:

- Master of Arts degree (M.A.)—in Composition.
- Master of Arts degree (M.A.)—in Music History.
- Master of Arts degree (M.A.)—in Computer-Based Music Theory and Acoustics.
- Master of Arts degree (M.A.)—in Music, Science, and Technology (M.A./M.S.T.) Note: The MA/MST program is the only terminal master's degree; it is one year in duration and consists only of course work.

DEGREE REQUIREMENTS

A minimum of 45 academic units is required for the master's degree in Music. The Department of Music does not accept stu-

dents for study only towards the M.A. degree except in the Music, Science, and Technology program, described below.

Required Courses—

I. *Composition*—Students are not admitted into the M.A. as a terminal degree for composition: rather, students in the D.M.A. program in composition who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in composition.

II. *Music History*—Students are not admitted into the M.A. as a terminal degree for music history: rather, students in the Ph.D. program in musicology who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in music history.

III. *Computer-Based Music Theory and Acoustics*—Students are not admitted into the M.A. as a terminal degree for computer-based music theory and acoustics: rather, students in the Ph.D. program in computer-based music theory and acoustics who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in computer-based music theory and acoustics.

IV. *Music, Science, and Technology (M.S.T.)*—The M.A. in music, science, and technology is the department's only terminal master's degree. This is a one-year program of 45 graduate-level units focusing on the integration of music perception, music-related signal processing and controllers, and synthesis. The program is designed for students who have an undergraduate engineering or science degree or a degree that includes course work in engineering mathematics. Modifications to the required course work listed below may be proposed on a student's behalf by the student's program adviser.

1. Required:
   - MUSIC 154. Composition and Performance of Instrumental Music with Electronics (3 units)
   - MUSIC 192A. Foundations of Sound-Recording Technology (3 units)
   - MUSIC 192B. Advanced Sound-Recording Technology (3 units)
   - MUSIC 220A. Fundamentals of Computer-Generated Sound (4 units)
   - MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing (4 units)
   - MUSIC 220C. Research Seminar in Computer-Generated Music (4 units)
   - MUSIC 250A. Human-Computer Interface Theory and Practice (4 units)
   - MUSIC 320. Introduction to Digital Audio Signal Processing (4 units)
   - MUSIC 420. Signal Processing Models in Musical Acoustics (3 units)
   - MUSIC 421. Audio Applications of the Fast Fourier Transform (3 units)
2. Electives: students are required to complete an additional 10 units of graduate level work that may be taken outside the department.

DOCTOR OF MUSICAL ARTS (D.M.A.) AND DOCTOR OF PHILOSOPHY (PH.D.) IN MUSIC

University requirements for the D.M.A and Ph.D. are described in the "Graduate Degrees" section of this bulletin. The following statements apply to all the graduate degrees described below, unless otherwise indicated.

Department Examinations—All entering doctoral graduate students are required to take: (1) a diagnostic examination testing the student in theory (counterpoint, harmony, and analysis) and (for musicologists only) the history of Western art music; and, (2) a proficiency examination in sight-singing and piano sight-reading. These exams are given at the beginning of study in the department (usually the week before school begins). Teaching Assistant assignments and the funding associated with this portion of a graduate student's financial aid package are determined based upon successful completion of these exams.

None of Stanford's required undergraduate courses may be credited toward an advanced degree unless specifically required for both degrees. Only work that receives a grade of 'A,' 'B,' or 'Satisfactory' (a passing grade in an instructor-mandated credit/no credit course) in music courses numbered 100 or higher taken as a graduate student is recognized as fulfilling the advanced-degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

The following may be taken as electives for graduate credit:

a. any course in another department numbered 100 or over (with adviser's consent)
b. any course in the Music department numbered 100 or over except those required for the B.A. degree. A letter grade of 'A', 'B,' or 'S' (in an instructor-mandated pass/fail course) is required.
c. Music department group instruction: MUSIC 72–77.

ADMISSION

Applicants are required to submit evidence of accomplishment (scores, recordings, and/or research papers, according to the proposed field of concentration) when they complete the application form. Applicants should arrange to take the Graduate Record Examination (GRE) well in advance of the December 14 application deadline. All components of the application are due by December 14. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see http://studentaffairs.stanford.edu/gradadmissions).

FIELDS OF STUDY OR DEGREE OPTIONS

All of the following fields of study are declarable as subplans in Axess:

Doctor of Musical Arts degree (D.M.A.) in Composition—The D.M.A. is offered to a limited number of students who demonstrate substantial training in the field and high promise of attainment as composers. Students may work in traditional and/or electronic forms. Breadth is given through studies in other branches of music and in relevant fields outside music, as desirable. The final project for this degree is a large-scale composition.

Doctor of Philosophy degree (Ph.D.) in Musicology

Doctor of Philosophy degree (Ph.D.) in Computer-Based Music Theory and Acoustics—The Ph.D. is offered in areas of the research of Stanford's graduate faculty: Musicology, including specialties in musical aesthetics, history of music theory, and performance practice; and Computer-Based Music Theory and Acoustics (CBMTA), specializing in research in musical acoustics at the Center for Computer Research in Music and Acoustics (CCRMA). The department seeks students who demonstrate substantial scholarship, high promise of attainment, and the ability to do independent investigation and present the results of such research in a dissertation.

DEGREE REQUIREMENTS

Residence—The candidate must complete a minimum of 135 academic units (see Residency under the "Graduate Degrees" section of this bulletin). Doctoral candidates working on Ph.D. dissertations or Doctor of Musical Arts (D.M.A.) final projects that require consultation with faculty members continue enrollment in the University under Terminal Graduate Registration (TGR), after they have reached the required 135 academic units and have completed their Special Area examinations.

Qualifying Examination—A written and oral examination for admission to candidacy is given just prior to the fourth quarter of residence for D.M.A. students and Ph.D. students in the Computer-Based Music Theory and Acoustics programs; for Ph.D. students in Musicology, the exams are given just prior to the eighth quarter

of residence. This exam tests knowledge of history, theory, repertory, and analysis.

Teaching—All students in the Ph.D. or D.M.A. degree programs, regardless of sources of financial support, are required to complete six quarters of supervised teaching at half time. Music 280 (given in Spring Quarter and taken at the end of the first year) is a required course for Teaching Assistants. Additional quarters of teaching may be required by the department.

Required Courses—

MUSIC 200. Graduate Proseminar (4 units)—required of all composition and computer-based music theory and acoustics students entering directly from the bachelor's degree and of all students in musicology, regardless of entering degree level.

MUSIC 280. TA Training (1 unit)

MUSIC 301A. Analysis of Music: Modal (4 units)

MUSIC 301B. Analysis of Music: Tonal (4 units)

MUSIC 301C. Analysis of Music: Post-Tonal (4 units)

I. *Composition*—The Doctor of Musical Arts (D.M.A.) degree in Composition is given breadth through collateral studies in other branches of music and in relevant studies outside music as seems desirable. In addition to degree requirements required of all doctoral graduate students and listed above, students must complete at least 24 units of:

1. MUSIC 323. Doctoral Seminar in Composition
2. Besides those requirements listed above, candidates are expected to produce a number of works demonstrating their ability to compose in a variety of forms and for the common media: vocal, instrumental, and electronic music. If possible, the works submitted are presented in public performance prepared by the composer. Annual progress is reviewed by the composition faculty with a major portfolio review conducted at the conclusion of the second year.
3. *Foreign Language Requirement*—At the time of advancement to candidacy, all D.M.A. students are required to have demonstrated a reading knowledge of one language other than English and the ability to translate it into idiomatic English.
4. *Special-Area Examination*—A written examination in the candidate's field of concentration, including a final project proposal, is required to be completed during the fourth year of study, no later than the last day of classes in Autumn Quarter of that year.
5. *Final Project Presentation*—Required during the last quarter of residence, the purpose of the presentation is to demonstrate the ability of the candidate to organize and present the topic of the final project for public review. It should be two hours in length, treating aspects of the final project. Details regarding the D.M.A. final project presentation may be found in the *Department of Music Graduate Handbook* available at: http://music.stanford.edu/Academics/gradStudies.html
6. *Final Project*—Candidate's work culminates in a required Final Project. The final project in composition must be a substantial composition, the scope of which shall be agreed upon by the members of the committee. Typically, work on the final project encompasses several quarters. Usually, smaller works, for specific performances, are composed at the same time.
7. *Reading Committee*—The membership of the reading committee is the principal final project adviser and a minimum of two additional members. The notice of appointment of a D.M.A. Final Project Reading Committee should be submitted to the department at the same time as the approved final project proposal and the completion of the special area exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee. Obtain the D.M.A. reading committee form from the department office; fill it out; obtain committee members' signatures; return to the department office.

II. *Musicology*—In addition to degree requirements required of all doctoral graduate students and listed above, students must complete at least 42 units of approved courses including:

1. *Required:*

   MUSIC 221. Topics in the History of Theory (3–5 units)

   MUSIC 300A. Medieval Notation (4 units)

   MUSIC 300B. Renaissance Notation (4 units)

   MUSIC 310. Research Seminar in Musicology (24–40 units); the requirement is for eight seminars of 3-5 units each. Students may petition to take up to two graduate seminars in other departments, in consultation with their adviser.
2. *Foreign Language Requirement*—At the time of advancement to candidacy, all Ph.D. students in Musicology must have passed a Ph.D. Language examination in German and in a second language, chosen from French, Italian, or Latin (or, on a case-by-case basis, another language, if it has significant bearing on the candidate's field of study). If one of these languages is the student's native language, the student may be exempted from an examination.
3. *Special-Area Examination*—A written and oral examination testing the student's knowledge of music and research in the student's field of concentration is completed during the fourth year of study, no later than the last day of classes in Autumn Quarter of that year. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation.
4. *University Oral Examination*—Taken once the dissertation is substantially under way; an oral presentation is a defense of dissertation research methods and results.
5. *Dissertation*—After the first two years of graduate study, the student concentrates on research and writing of the dissertation. The dissertation demonstrates the student's ability to work systematically and independently to produce an essay of competent scholarship.
6. *Reading Committee*—The minimum membership of the reading committee is 1) the principal dissertation adviser, 2) a second member from the department, and 3) a third member from the major department or another department. If a third member is from another institution, a fourth member must be appointed from the department. The principal dissertation adviser and all other members of the committee must belong to the Academic Council. The notice of appointment of a Reading Committee should be submitted to the department at the same time as the approved dissertation proposal and the completion of the Special-Area Exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee.

III. *Computer-Based Music Theory and Acoustics*—In addition to degree requirements required of all doctoral graduate students and listed above, students must complete at least 28 units of approved courses including:

1. *Required:*

   MUSIC 220A. Fundamentals of Computer-Generated Sound (4 units)

   MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing (4 units)

   MUSIC 220C. Research Seminar in Computer-Generated Music (4 units)

   MUSIC 220D. Research in Computer-Generated Music (12 units total)

   MUSIC 320. Introduction to Digital Audio Signal Processing (4 units)
2. *Foreign Language Requirement*—At the time of advancement to candidacy, all Ph.D. students in computer-based music theory and acoustics are required to have demonstrated a reading knowledge of one language other than English and the ability to translate it into idiomatic English.
3. *Special-Area Examination*—A written and oral examination testing the student's knowledge of music and research in the student's field of concentration is completed during the fourth year of study, no later than the last day of classes in Autumn Quarter of that year. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation.

4. *University Oral Examination*—Taken once the dissertation is substantially under way; an oral presentation is a defense of dissertation research methods and results.
5. *Dissertation*—After the first two years of graduate study, the student concentrates on research and writing of the dissertation. The dissertation demonstrates the student's ability to work systematically and independently to produce an essay of competent scholarship.
6. *Reading Committee*—The minimum membership of the reading committee is 1) the principal dissertation adviser, 2) a second member from the department, and 3) a third member from the major department or another department. If a third member is from another institution, a fourth member must be appointed from the department. The principal dissertation adviser and all other members of the committee must belong to the Academic Council. The notice of appointment of a Reading Committee should be submitted to the department at the same time as the approved dissertation proposal and the completion of the Special-Area Exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee.

IV. *Ph.D. in Music and Humanities*—The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Music and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

PHILOSOPHY

Emeriti (Professors): Fred Dretske, Solomon Feferman, Dagfinn Føllesdal, Georg Kreisel, John Perry, David S. Nivison, Patrick Suppes, James O. Urmson; *(Courtesy Professor)* Denis Phillips
Chair: Helen Longino
Director of Graduate Study: Michael Bratman
Director of Undergraduate Study: Chris Bobonich
Professors: Chris Bobonich, Michael Bratman, Joshua Cohen, John Etchemendy, Michael Friedman (on leave), Helen Longino, Grigori Mints, Debra Satz, Brian Skyrms (Spring), Kenneth Taylor, Johan van Benthem (Spring), Thomas Wasow, Allen Wood, Rega Wood (Research)
Associate Professors: Lanier Anderson, Mark Crimmins, Graciela De Pierris, David Hills (Teaching), Nadeem Hussain, Krista Lawlor, Tamar Schapiro
Assistant Professor: Alexis Burgess
Courtesy Professors: Reviel Netz, Josiah Ober, Rob Reich
Lecturers: David Barker-Plummer, Shane Duarte, Daniel Giberman, John Mumma, Thomas Ryckman, Laurel Scotland-Stewart, Richard Sommer
Department Offices: Building 90
Mail Code: 94305-2155
Department Phone: (650) 723-2547
Email: philosophy@stanford.edu
Web Site: http://philosophy.stanford.edu

Courses offered by the Department of Philosophy are listed under the subject code PHIL on the *Stanford Bulletin's* ExploreCourses web site.

Philosophy concerns itself with fundamental problems. Some are abstract and deal with the nature of truth, justice, value, and knowledge; others are more concrete, and their study may help guide conduct or enhance understanding of other subjects. Philosophy also examines the efforts of past thinkers to understand the world and people's experience of it.

Although it may appear to be an assortment of different disciplines, there are features common to all philosophical inquiry. These include an emphasis on methods of reasoning and the way in which judgments are formed, on criticizing and organizing beliefs, and on the nature and role of fundamental concepts.

Students of almost any discipline can find something in philosophy which is relevant to their own specialties. In the sciences, it provides a framework within which the foundations and scope of a scientific theory can be studied, and it may even suggest directions for future development. Since philosophical ideas have had an important influence on human endeavors of all kinds, including artistic, political, and economic, students of the humanities should find their understanding deepened by acquaintance with philosophy.

MISSION OF THE UNDERGRADUATE PROGRAM IN PHILOSOPHY

The mission of the undergraduate program in Philosophy is to train students to think clearly and critically about the deepest and broadest questions concerning being, knowledge, and value and their connections to the full range of human activities and interests. The Philosophy major presents students with paradigms and perspectives of past thinkers and introduces students to a variety of methods of reasoning and the ways in which judgments are formed. Courses in the major equip students with core skills involved in critical reading, analytical thinking, sound argumentation, and the clear and well-organized expression of ideas. Philosophy is an excellent major for those planning a career in law, medicine, or business. It provides analytical skills and a breadth of perspective helpful to those called upon to make decisions about their own conduct and the welfare of others. Philosophy majors who have carefully planned their undergraduate program have an excellent record of admission to professional and graduate schools.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to communicate philosophical ideas effectively orally and in writing.
2. close reading, argument evaluation, and analytical writing.
3. dialectical ability to identify strengths and weaknesses of an argument and devise appropriate and telling responses.
4. the ability to think critically and demonstrate clarity of conceptualization.
5. the ability to differentiate good from unpromising philosophical questions.
6. the ability to sustain an argument of substantial scope, showing control over logical, argumentative, and evidential relations among its parts.

SPECIAL AND JOINT MAJORS

The Special Program in the History and Philosophy of Science enables students to combine interests in science, history, and philosophy. Students interested in this program should see the special adviser.

The joint major in Philosophy and Religious Studies combines courses from both departments into a coherent theoretical pattern.

LIBRARY AND ASSOCIATIONS

The Tanner Memorial Library of Philosophy contains an excellent working library and ideal conditions for study. Graduate students and undergraduate majors in philosophy have formed associations for discussion of philosophical issues and the reading of papers by students, faculty, and visitors.

BACHELOR OF ARTS IN PHILOSOPHY

There are three ways of majoring in Philosophy:

- The General Program
- The Special Program in the History and Philosophy of Science
- The Special Option in Philosophical and Literary Thought.

A student completing any of these receives a B.A. degree in Philosophy. There is also a major program offered jointly with the Department of Religious Studies. To declare a major, a student should consult with the Director of Undergraduate Study and see the undergraduate student services administrator to be assigned an adviser and work out a coherent plan. The department recommends proficiency in at least one foreign language.

GENERAL PROGRAM

1. Course requirements, minimum 55 units:
   a. preparation for the major: an introductory course (under 100) and 80. (PHIL 80 should normally be taken no later than the first quarter after declaring the major.) Students taking both quarters of the Winter/Spring Philosophy Introduction to the Humanities (IHUM) track can count 5 units toward the introductory Philosophy requirement.
   b. the core, 24 additional Philosophy units as follows:
      1. logic: one from 50, 150, 151, 154
      1. philosophy of science: any course from 60, 61, 156, 163-168
      2. moral and political philosophy: one from 170-173
      3. metaphysics and epistemology: one from 180-189
      4. history of philosophy: 100 and 102 are required of each major
   c. one undergraduate philosophy seminar from the 194 series.
   d. electives: courses numbered 10 or above, at least 13 units of which must be in courses numbered above 99.
2. Units for Tutorial, Directed Reading (PHIL 196, 197, 198), *The Dualist* (PHIL 198), Honors Seminar (PHIL 199), or affiliated courses may not be counted in the 55-unit requirement. No more than 10 units completed with grades of 'satisfactory' and/or 'credit' may be counted in the 55-unit requirement.
3. A maximum of 10 transfer units or two courses can be used for the departmental major. In general, transfer courses cannot be used to satisfy the five area requirements or the undergraduate seminar requirement. Students may not substitute transfer units for the PHIL 80 requirement.

SPECIAL PROGRAM IN HISTORY AND PHILOSOPHY OF SCIENCE

Undergraduates may major in Philosophy with a field of study in History and Philosophy of Science. This field of study is declared on Axess. Each participating student is assigned an adviser who approves the course of study. A total of 61 units are required for the sub-major, to be taken according to requirements 1 through 5 below. Substitutions for the listed courses are allowed only by written consent of the undergraduate adviser for History and Philosophy of Science. Students are encouraged to consider doing honors work with an emphasis on the history and philosophy of science. Interested students should see the description of the honors thesis in Philosophy and consult their advisers for further information.

1. Three science courses (for example, biology, chemistry, physics) for 12 units.
2. The following Philosophy (PHIL) core courses must be completed with a letter grade by the end of the junior year:
   a. one from 50, 150, 151, 154
   b. 60 or 61
   c. 80
3. Three history of science courses.
4. Three philosophy of science courses, of which one must be PHIL 164.
5. Three additional courses related to the major, in philosophy or history, to be agreed on by the adviser.
6. At least six courses in the major must be completed at Stanford with a letter grade. Units for Tutorial, Directed Reading, or *The Dualist* (196, 197, 198) may not be counted in the requirement. No more than 10 units completed with grades of 'satisfactory' and/or 'credit' may be counted in the requirement.
7. Transfer units must be approved in writing by the Director of Undergraduate Study at the time of declaring a major. Transfer courses are strictly limited when used to satisfy major requirements.

SPECIAL OPTION IN PHILOSOPHICAL AND LITERARY THOUGHT

Undergraduates may major in Philosophy with a special option in philosophy and literature. This option is declared to the department; it is not declared on Axess, and it does not appear on the transcript or the diploma. Students in this option take courses alongside students from other major departments which also have a specialized option associated with the program for the study of philosophical and literary thought, with administrative staff in the DLCL. Each student in this option is assigned an adviser in Philosophy, and students' schedules and overall course of study must be approved in writing by the adviser, and the Directors of Undergraduate Studies of Philosophy and of the program.

A total of 65 units must be completed for this option, including the following requirements.

1. Core requirements for the major in Philosophy, including:
   a. an introductory course
   b. PHIL 80
   c. the core distribution requirements listed in section 1b of the general program above.
2. Gateway course in philosophy and literature (PHIL 81). This course should be taken as early as possible in the student's career, normally in the sophomore year.
3. Three courses in a single national literature, chosen by the student in consultation with the adviser and the program director of undergraduate studies. This normally involves meeting the language proficiency requirements of the relevant literature department.
4. Electives within Philosophy beyond the core requirements totaling at least 5 units, and drawn from courses numbered 100 or higher.
5. Two upper division courses of special relevance to the study of philosophy and literature, as identified by the committee in charge of the program. A list of approved courses is available from the program director of undergraduate studies.
6. Capstone seminar in the PHIL 194 series.
7. Capstone seminar of relevance to the study of philosophy and literature, as approved by the program committee. In some cases, with approval of the Philosophy Director of Undergraduate Study and the program director of undergraduate studies, the same course may be used to meet requirements 6 and 7 simultaneously. In any case, the student's choice of a capstone seminar must be approved in writing by the Philosophy Director of Undergraduate Study and the program director of undergraduate studies.

Students are encouraged to consider doing honors work in a topic related to philosophy and literature through the Philosophy honors program.

The following rules also apply to the special option:

1. Units for Honors Tutorial, Directed Reading (PHIL 196, 197, 198), *The Dualist* (PHIL 198), Honors Seminar (PHIL 199) may not be counted toward the 65-unit requirement. No more than 10 units with a grade of 'satisfactory' or 'credit' may be counted toward the unit requirement.
2. A maximum of 15 transfer units may be counted toward the major, at most 10 of which may substitute for courses within Philosophy. Transfer credits may not substitute for PHIL 80 or 81, and are approved as substitutes for the five area requirements or PHIL 194 only in exceptional cases.

3. Courses offered in other departments may be counted toward requirements 3, 5 and 7, but such courses, including affiliated courses, do not generally count toward the other requirements. In particular, such courses may not satisfy requirement 4.
4. Units devoted to meeting the language requirement are not counted toward the 65-unit requirement.

HONORS PROGRAM

Students who wish to undertake a more intensive and extensive program of study, including seminars and independent work, are invited to apply for the honors program during Winter Quarter of the junior year. Admission is selective on the basis of demonstrated ability in philosophy, including an average grade of at least 'A-' in a substantial number of philosophy courses and progress towards satisfying the requirements of the major.

With their application, candidates should submit an intended plan of study for the remainder of the junior and the senior years. It should include at least 5 units of Senior Tutorial (196) during Autumn and/or Winter Quarter(s) of the senior year. Students who are applying to Honors College may use the same application for philosophy honors. In the quarter preceding the tutorial, students should submit an essay proposal to the Philosophy undergraduate director and determine an adviser.

Students applying for honors should enroll in Junior Honors Seminar (199) during the Spring Quarter of the junior year.

The length of the honors essay may vary considerably depending on the problem and the approach; usually it falls somewhere between 7,500 and 12,500 words. This essay may use work in previous seminars and courses as a starting point, but it cannot be the same essay that has been used, or is being used, in some other class or seminar. It must be a substantially new and different piece of work reflecting work in the tutorials.

A completed draft of the essay is submitted to the adviser at the end of the Winter Quarter of the senior year. Any further revisions must be finished by the fifth full week of the Spring Quarter, when three copies of the essay are to be given to the undergraduate secretary. The honors essay is graded by the adviser together with a second reader, chosen by the adviser in consultation with the student. The student also provides an oral defense of the thesis at a meeting with the adviser and second reader. The essay must receive a grade of 'A-' or better for the student to receive honors.

Honors tutorials represent units in addition to the 55-unit requirement.

MINOR IN PHILOSOPHY

A minor in Philosophy consists of at least 30 units of Philosophy courses satisfying the following conditions:

1. Students taking both quarters of the Winter/Spring Philosophy Introduction to the Humanities (IHUM) track may count these courses as equivalent to a maximum of 5 units of Philosophy courses under 100.
2. At least 10 units must be from courses numbered 100 or above.
3. The 30 units must include one of:
   a. a history of philosophy course numbered 100 or above
   b. two quarters of IHUM (only 5 of the 10 units can count towards 30-unit requirement)
4. One course from any two of the following three areas (PHIL):
   a. philosophy of science and logic: 60, 61, 156, 163-168; 50, 150, 151, 154
   b. moral and political philosophy: 20, 30, 170-172
   c. metaphysics and epistemology: 10, 80, 180-189
5. Units for tutorials, directed reading, and affiliated courses may not be counted.
6. Transfer units must be approved in writing by the Director of Undergraduate Study at the time of declaring. The number of transfer units is generally limited to a maximum of 10.
7. No more than 6 units completed with grades of 'satisfactory' or 'credit' count towards the 30-unit requirement.

Students must declare their intention to minor in Philosophy in a meeting with the Director of Undergraduate Study. This formal declaration must be made no later than the last day of the quarter two quarters before degree conferral. The Permission to Declare a Philosophy Minor (signed by the Director of Undergraduate Study) lists courses taken and to be taken to fulfill minor requirements. This permission is on file in the department office. Before graduation, a student's record is checked to see that requirements have been fulfilled, and the results are reported to the University Registrar.

JOINT MAJOR IN PHILOSOPHY AND RELIGIOUS STUDIES

The joint undergraduate major in Philosophy and Religious Studies consists of 60 units of course work with approximately one third each in the philosophy core, the religious studies core, and either the general major or the special concentration. Affiliated courses cannot be used to satisfy this requirement.

No courses in either the philosophy or religious studies core may be taken satisfactory/no credit or credit/no credit.

In general, transfer units cannot be used to satisfy the core requirements. Transfer units and substitutions must be approved by the director of undergraduate studies in the appropriate department.

CORE REQUIREMENTS

1. Philosophy (PHIL) courses:
   a. 80
   b. 16 units, including at least one Philosophy course from each of the following areas:
      1. logic and philosophy of science: 50, 60, 61, 150, 151, 154, 156, 162-168
      1. ethics and value theory: 170-173
      2. epistemology, metaphysics, and philosophy of language: 180-189
      3. history of philosophy: 100-103
2. Religious Studies (RELIGST) courses: 20 units, chosen in consultation with the student's adviser, including:
   a. RELIGST 290. Theories of Religion (5 units; Winter Quarter; recommended junior year; fulfills WIM requirement)
   b. at least one course in philosophy of religion, broadly construed: RELIGST 52, 54, 62, 101, 173, 174E, 183, 212, 220, 226, 238, 240, 242, 244, 245, 271A, 271B, 273 274, 275, 278, 279, 280
   c. diversity requirement: Students may not take all their religion courses in one religious tradition.

General Major Requirements—Five additional courses (approximately 20 units) divided between the two departments. No more than five of these units may come from courses numbered under 99 in either department. Each student must also take at least one undergraduate seminar in religious studies and one undergraduate seminar in philosophy.

Special Concentration—With the aid of an adviser, students pursue a specialized form of inquiry in which the combined departments have strength; for example, American philosophy and religious thought, philosophical and religious theories of human nature and action, philosophy of religion. Courses for this concentration must be approved in writing by the adviser.

Directed Reading and Satisfactory/No Credit Units—Units of directed reading for fulfilling requirements of the joint major are allowed only with special permission. No more than 10 units of work with a grade of 'satisfactory' count toward the joint major.

HONORS PROGRAM

Students pursuing a joint major in Philosophy and Religious Studies may also apply for honors by following the procedure for honors in either of the departments.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN PHILOSOPHY

It is possible to earn an M.A. in Philosophy while earning a B.A. or B.S. This can usually be done by the end of the fifth undergraduate year, although a student whose degree is not in Philosophy may require an additional year. Standards for admission to, and completion of, this program are the same as for M.A. applicants who already have the bachelor's degree when matriculating. Applicants for the coterminal program are not, however, required to take the Graduate Record Exam.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN PHILOSOPHY

University requirements for the M.A. are discussed in the "Graduate Degrees" section of this bulletin.

Three programs lead to the M.A. in Philosophy. One is a general program providing a grounding in all branches of the subject. The others provide special training in one branch.

Admissions—All prospective master's students, including those currently enrolled in other Stanford programs, must apply for admission to the program. No fellowships are available. Entering students must meet with the director of the master's program and have their adviser's approval, in writing, of program proposals. The master's program should not be considered a stepping stone to the doctoral program; these two programs are separate and distinct.

Unit Requirements—Each program requires a minimum of 45 units in philosophy. Students in a special program may be allowed or required to replace up to 9 units of philosophy by 9 units in the field of specialization. Although the requirements for the M.A. are designed so that a student with the equivalent of a strong undergraduate philosophy major at Stanford might complete them in one year, most students need longer. Students should also keep in mind that although 45 units is the minimum required by the University, quite often more units are necessary to complete department requirements. Up to 6 units of directed reading in philosophy may be allowed. There is no thesis requirement, but an optional master's thesis or project, upon faculty approval, may count as the equivalent of up to 8 units. A special program may require knowledge of a foreign language. At least 45 units in courses numbered 100 or above must be completed with a grade of 'B-' or better at Stanford. Students are reminded of the University requirements for advanced degrees, and particularly of the fact that for the M.A., students must complete three full quarters as measured by tuition payment.

GENERAL PROGRAM

The General Program requires a minimum of 45 units in Philosophy courses numbered above 99. These courses must be taken for a letter grade, and the student must receive at least a 'B-' in the course. Courses taken to satisfy the undergraduate core or affiliated courses may not be counted in the 45 units. The requirement has three parts:

1. *Undergraduate Core*—
   Students must have when they enter, or complete early in their program, the following undergraduate courses (students entering from other institutions should establish equivalent requirements with a master's adviser upon arrival or earlier):
   a. Logic: 50 (formerly 57), 150 (formerly 159), or 151 (formerly 160A)
   b. Philosophy of science: any course from 60, 61, 163-167
   c. Moral and political philosophy: one from 170-173
   d. Metaphysics and epistemology: one from 80, 180-189
   e. History of philosophy: two history of philosophy courses numbered 100 or above
2. *Graduate Core*—
   Students must take at least one course numbered over 105 from three of the following five areas (courses used to satisfy the undergraduate core cannot also be counted toward satisfaction of the graduate core). Crosslisted and other courses taught outside the Department of Philosophy do not count towards satisfaction of the core.
   a. Logic and semantics
   b. Philosophy of science and history of science
   c. Ethics, value theory, and moral and political philosophy
   d. Metaphysics, epistemology, and philosophy of language
   e. History of philosophy
3. Each master's candidate must take at least two courses numbered above 200; these cannot be graduate sections of undergraduate courses.
4. *Specialization*—
   Students must take at least three courses numbered over 105 in one of the five areas.

SPECIAL PROGRAM IN SYMBOLIC SYSTEMS

Students should have the equivalent of the Stanford undergraduate major in Symbolic Systems. Students who have a strong major in one of the basic SSP disciplines (philosophy, psychology, linguistics, computer science) may be admitted, but are required to do a substantial part of the undergraduate SSP core in each of the other basic SSP fields. This must include the following three philosophy courses or their equivalents: 80; 151 (formerly 160A); and one from 181, 183, 184, 186. This work does not count towards the 45-unit requirement.

COURSE REQUIREMENTS

1. Four courses in philosophy at the graduate level (numbered 200 or above), including courses from three of the following five areas:
   a. Philosophy of language
   b. Logic
   c. Philosophy of mind
   d. Metaphysics and epistemology
   e. Philosophy of science
   At most two of the four courses may be graduate sections of undergraduate courses numbered 100 or higher.
2. Three courses numbered 100 or higher from outside Philosophy, chosen in consultation with an adviser. These courses should be from two of the following four areas:
   a. Psychology
   b. Linguistics
   c. Computer Science
   d. Education
   Remaining courses are chosen in consultation with and approved by an adviser.

SPECIAL PROGRAM IN THE PHILOSOPHY OF LANGUAGE

Admission is limited to students with substantial preparation in philosophy or linguistics. Those whose primary preparation has been in linguistics may be required to satisfy all or part of the undergraduate core requirements as described in the "General Program" subsection above. Those whose preparation is primarily in philosophy may be required to take additional courses in linguistics.

COURSE REQUIREMENTS

1. Philosophy of language: two approved courses in the philosophy of language numbered 180 or higher.
2. Syntactic theory and generative grammar: 384 and LINGUIST 231.
3. Logic: at least two approved courses numbered 151 (formerly 160A) or higher.
4. An approved graduate-level course in mathematical linguistics or automata theory.

DOCTOR OF PHILOSOPHY IN PHILOSOPHY

Prospective graduate students should see http://gradadmissions.stanford.edu for information and application materials. Applicants should take the Graduate Record Examination by October of the year the application is submitted.

The University's basic requirements for the Ph.D. degree including residence, dissertation, and examination are discussed in the "Graduate Degrees" section of this bulletin. The requirements detailed here are department requirements.

Courses used to satisfy any course requirement in Philosophy must be passed with a letter grade of 'B-' or better (no satisfactory/no credit), except in the case of a course/seminar used to satisfy the third-year course/seminar requirement and taken for only 2 units. Such a reduced-unit third-year course/seminar must be taken credit/no credit.

At the end of each year, the department reviews the progress of each student to determine whether the student is making satisfactory progress, and on that basis to make decisions about probationary status and termination from the program where appropriate.

Any student in one of the Ph.D. programs may apply for the M.A. when all University and department requirements have been met.

PROFICIENCY REQUIREMENTS

1. *First-year Ph.D. Proseminar*—A one quarter, topically focused seminar offered in Autumn Quarter, and required of all first-year students.
2. *Distribution requirements during the first six quarters*—
   a. six courses distributed across three areas as follows:
      1. two courses in value theory including ethics, aesthetics, political philosophy, social philosophy, philosophy of law. At least one of the courses satisfying this distribution requirement must be in ethics or political philosophy.
      2. Two courses in language, mind, and action. One course satisfying this requirement must be drawn from the language related courses, and one from mind and action related courses.
      3. two courses in metaphysics and epistemology (including metaphysics, epistemology, philosophy of science). At least one of the courses satisfying this requirement must be drawn from either metaphysics or epistemology.

      • Instructors indicate which courses may satisfy particular requirements. If a course potentially satisfies more than one requirement the student may use it for only one of those area requirements; no units may be double-counted. Students must develop broad competencies in all these areas. Those without strong backgrounds in these areas would normally satisfy these distribution requirements by taking more basic courses rather than highly specialized and focused courses. Students should consult with their adviser in making these course decisions, and be prepared to explain these decisions when reviewed for candidacy; see requirement 6 below.

   b. Logic requirement: PHIL 150 or equivalent.
   c. History/logic requirement. Three of the four courses listed below.
      1. Three approved history courses
      2. PHIL 151

      • To satisfy this history/logic requirement it is necessary to take at least one course in ancient philosophy and one course in the history of modern philosophy.

   d. Students should normally take at least 64 graduate level units at Stanford during their first six quarters (in many cases students would take more units than that) and of those total units, at least 49 units of course work are to be in the Philosophy department. These courses must be numbered above 110, but not including Teaching Methods (PHIL 239) or affiliated courses. Units of Individual Directed Reading are normally not to be counted toward this 49-unit requirement unless there is consent from the student's adviser and the Director of Graduate Studies.
3. *Writing requirement*—A qualifying paper of professional quality and approximately 8000 words. Students must complete a version of the paper, which is itself likely to be a revision of a paper written during the first year of course work, by the beginning of their fourth quarter. The paper is read by a committee of two faculty who make suggestions for additional revision. The final version must be submitted by the first day of the sixth quarter, normally Spring Quarter of the second year.
4. *Teaching Assistancy*—A minimum of five quarters of teaching assistancy are required for the Ph.D. Normally students do not teach in their first year and teach no more than two quarters in their second year. Students are required to take PHIL 239 during Spring Quarter of their first year and during Autumn Quarter of their second year.
5. *Review at the End of the Second Year for Advancement to Candidacy*—By the fourth week of the sixth quarter students must submit a one-page explanation of their first- and second-year course plan and their writing requirement paper. The faculty's review of each student includes a review of the student's record, an assessment of the qualifying paper, and an assessment of the student's preparation for work in her/his intended area of specialization, as well as recommendations of additional preparation, if necessary.
6. *Candidacy*—To continue in the Ph.D. program, each student must be approved for candidacy during the sixth academic quarter, normally the Spring Quarter of the student's second year. Students may be approved for candidacy on a conditional basis if they have only one or two outstanding deficiencies, but are not officially advanced to candidacy until these deficiencies have been removed. Approval for candidacy indicates that, in the department's judgment, the student can complete the Ph.D. In reaching this judgment, the department considers the overall quality of the student's work during the first six quarters and the student's success in fulfilling course and writing requirements.
7. During the Summer Quarter of the second year, students are required to attend a dissertation development seminar given by the department.
8. During the third year of graduate study, and after advancement to candidacy, a Ph.D. student must complete at least three graduate-level courses and/or seminars, at least two of which must be in Philosophy. Courses required for candidacy are not counted toward satisfaction of this requirement. Courses and/or seminars outside Philosophy are determined in consultation with a student's adviser. Except in special circumstances, one of these courses and/or seminars may be taken for reduced units if that option is provided by the faculty teaching the course or seminar. Courses used to satisfy these requirements must be passed with a letter grade of 'B-' or better, except in the case of a course or seminar used to satisfy the third-year course and/or seminar requirement and taken for only 2 units. Such a reduced-unit third-year course or seminar must be taken credit/no credit.
9. *Dissertation Work and Defense*—The third and fourth, and normally fifth, years are devoted to dissertation work. Students should make every effort to conform to the following deadlines.
   a. *Dissertation Proposal*—By Spring Quarter of the third year, students choose a dissertation topic, a reading committee, and a possible thesis relative to that topic. The topic and thesis should be sketched in a proposal of 3-5 pages, along with a detailed, annotated bibliography demonstrating familiarity with the relevant literature. Individual faculty on the committee may impose further requirements on the proposal. The proposal should be approved by the read-

ing committee before the meeting on graduate student progress late in Spring Quarter.

b. *Departmental Oral*—During Autumn Quarter of the fourth year, students take an oral examination, called the departmental oral, based on at least 30 pages of written work, in addition to the proposal. The aim of the exam is to help the student arrive at an acceptable plan for the dissertation and to make sure that student, thesis topic, and adviser make a reasonable fit.

c. *Fourth-Year Colloquium*—No later than Spring Quarter of the fourth year, students present a research paper in a seminar open to the entire department. This paper should be on an aspect of the student's dissertation research.

d. *University Oral Exam*—Ph.D. students must submit a completed draft of the dissertation to the reading committee at least one month before the student expects to defend the thesis in the University oral exam. If the student is given consent to go forward, the University oral take place approximately two weeks later. A portion of the exam consists of a student presentation based on the dissertation and is open to the public. A closed question period follows. If the draft is ready by Autumn Quarter of the fourth year, the student may request that the University oral count as the department oral.

SPECIAL GRADUATE PROGRAMS

The department recognizes that some students may need to spend a large amount of time preparing themselves in some other discipline related to their philosophical goals, or in advanced preparation in some area within philosophy. In such circumstances, the department may be willing to waive some of the Ph.D. requirements. Such an exemption is not automatic; a program must be worked out with an adviser and submitted to the department some time in the student's first year. This proposal must be in writing and must include:

1. The areas to be exempted (see below).
2. A program of additional courses and seminars in the special area, usually at least 12 units.
3. A justification of the program that considers both intellectual coherence and the student's goals.

The department believes there is plenty of room for normal specialization within the program as it stands, and that all students specialize to some extent. In particular, a normal course schedule for the first six quarters would involve graduate units considerably beyond the basic requirement of 49 units in Philosophy. Thus, the intent is not to exempt courses on a one-to-one basis, but only to grant exemptions when a student plans an extensive and intensive study of some relevant area.

Special program students may be exempted from the following:

1. One item from the Proficiency requirement 2.a in the general Ph.D. program.
2. PHIL 150 (formerly 159); but in this case, a student must take PHIL 50. Note that PHIL 50 does not earn graduate credit towards the Proficiency Requirement 2.d.

   If a student's special program involves substantial course work outside of philosophy, the student may, with the approval of the adviser, petition the department to reduce requirement 2.d, the Philosophy unit requirement for the first two years. Normally this requirement is not reduced below 37 units.

INTERDEPARTMENTAL PROGRAMS

PH.D. IN PHILOSOPHY AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Philosophy and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

GRADUATE PROGRAM IN COGNITIVE SCIENCE

Philosophy participates with the departments of Computer Science, Linguistics, and Psychology in an interdisciplinary program in Cognitive Science. It is intended to provide an interdisciplinary education, as well as a deeper concentration in philosophy, and is open to doctoral students. Students who complete the requirements within Philosophy and the Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Philosophy. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of philosophy. The list of approved courses can be obtained from the Cognitive Science program located in the Department of Psychology.

SPECIAL TRACK IN PHILOSOPHY AND SYMBOLIC SYSTEMS

Students interested in interdisciplinary work relating philosophy to artificial intelligence, cognitive science, computer science, linguistics, or logic may pursue a degree in this program.

Prerequisites—Admitted students should have covered the equivalent of the core of the undergraduate Symbolic Systems Program requirements as described in the "Symbolic Systems" section of this bulletin, including courses in artificial intelligence (AI), cognitive science, linguistics, logic, and philosophy. The graduate program is designed with this background in mind. Students missing part of this background may need additional course work. Aside from the required course work below, the Ph.D. requirements are the same as for the regular program, with the exception that one course in value theory and one course in history may be omitted.

Courses of Study—The program consists of three years of courses and two years of dissertation work. Students are required to take the following courses in the first two years:

1. Philosophy courses:
   a. at least three graduate seminars in the general area of symbolic systems other than logic, such as philosophy of mind and philosophy of language.
   b. two quarters of graduate logic courses from among 350A, 351A, 352A, 353A
2. Five cognitive science and computer science courses:
   a. at least two courses in cognitive psychology
   b. two or three graduate courses in computer science, at least one in AI and one in theory
3. Three linguistics and computational linguistics courses:
   a. graduate courses on natural language that focus on two of the following areas: phonetics and phonology, syntax, semantics, or pragmatics
   b. one graduate course in computational linguistics, typically LINGUIST 288
4. At least two additional graduate seminars at a more advanced level, in the general area of the program, independent of department. These would typically be in the area of the student's proposed dissertation project.

The requirements for the third year and subsequent years are the same as for other third-year graduate students in philosophy: The dissertation committee must include at least one member of the Department of Philosophy and one member of the Program in Symbolic Systems outside the Department of Philosophy.

JOINT PROGRAM IN ANCIENT PHILOSOPHY

This program is jointly administered by the Departments of Classics and Philosophy and is overseen by a joint committee composed of members of both departments. It provides students with the training, specialist skills, and knowledge needed for research and teaching in ancient philosophy while producing scholars who are fully trained as either philosophers with a strong spe-

cialization in ancient languages and philology, or classicists with a concentration in philosophy.

Students are admitted to the program by either department. Graduate students admitted by the Philosophy department receive their Ph.D. from the Philosophy department; those admitted by the Classics department receive their Ph.D. from the Classics department. For Philosophy graduate students, this program provides training in classical languages, literature, culture, and history. For Classics graduate students, this program provides training in the history of philosophy and in contemporary philosophy.

Each student in the program is advised by a committee consisting of one professor in each department.

Requirements for Philosophy Graduate Students—These are the same as the proficiency requirements for the Ph.D. in Philosophy with the following exception: if the student has already taken two courses in modern philosophy, there is no need to take a course in modern philosophy to satisfy proficiency requirement 2.c.

One year of Greek is a requirement for admission to the program. If students have had a year of Latin, they are required to take 3 courses in second- or third-year Greek or Latin, at least one of which must be in Latin. If they have not had a year of Latin, they are then required to complete a year of Latin, and take two courses in second- or third-year Greek or Latin.

Students are also required to take at least three courses in ancient philosophy at the 200 level or above, one of which must be in the Classics department and two of which must be in the Philosophy department.

GRADUATE DEGREES IN HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY

See the description in the "History and Philosophy of Science and Technology" section of this bulletin.

PH.D. MINOR IN PHILOSOPHY

To obtain a Ph.D. minor in Philosophy, students must follow these procedures:

1. Consult with the Director of Graduate Study to establish eligibility, and select a suitable adviser.
2. Give to the department academic assistant a signed copy of the program of study (designed with the adviser) which offers:
   a. 30 units of courses in the Department of Philosophy with a letter grade of 'B-' or better in each course. No more than 3 units of directed reading may be counted in the 30-unit requirement.
   b. At least one course or seminar numbered over 99 to be taken in each of these five areas:
      1. Logic
      2. Philosophy of science
      3. Ethics, value theory, and moral and political philosophy
      4. Metaphysics, epistemology, and philosophy of language
      5. History of philosophy
   c. Two additional courses numbered over 199 to be taken in one of those (b) five areas.
3. A faculty member from the Department of Philosophy (usually the student's adviser) serves on the student's doctoral oral examination committee and may request that up to one third of this examination be devoted to the minor subject.
4. Paperwork for the minor must be submitted to the department office before beginning the program.

COGNATE COURSES

The following courses have substantial philosophical content. However, in the absence of special permission these courses cannot generally be used to satisfy requirements for the Philosophy major or graduate degrees in Philosophy.

- CLASSHIS 101. The Greeks
- CLASSGRK 113. Advanced Greek: Thucydides
- CLASSGEN 94. Ethics of Pleasure
- CLASSGEN 208B. Survey of Greek and Latin Literature: Classical Greek
- CLASSGEN 237. Augustine on the Body (Same as COMPLIT 337)
- ETHICSOC 179M. Libertarianism, Egalitarianism, and Public Policy
- GERGEN 246/346. Being at Home in the World: Kant's Critique of the Power of Judgment
- IPS 206A. Politics and Collective Action (same as POLISCI 331S, PUBLPOL 304A)
- MATH 161. Set Theory
- POLISCI 132. Ethics of Political Animals
- POLISCI 332R,S. Greek Political Economy I,II
- RELIGST 278/378. Heidegger: Confronting the Ultimate

PHYSICS

Emeriti: (Professors) Steven Chu, Alexander L. Fetter, Stanley S. Hanna, William A. Little, David M. Ritson, H. Alan Schwettman, Robert V. Wagoner, John Dirk Walecka, Stanley G. Wojcicki*, Mason R. Yearian; *(Professors, Research)* John A. Lipa*, Todd I. Smith*, John P. Turneaure; *(Professors, Courtesy)* Peter A. Sturrock (Applied Physics), Richard Taylor (SLAC National Accelerator Laboratory)

Chair: Steven Kahn

Associate Chair: Giorgio Gratta

Professors: Roger Blandford, Phil Bucksbaum, Patricia Burchat, Blas Cabrera, Savas G. Dimopoulos, Sebastian Doniach, Giorgio Gratta, Shamit Kachru, Steven Kahn, Renata E. Kallosh, Aharon Kapitulnik, Mark Kasevich, Steven A. Kivelson, Robert B. Laughlin, Andrei D. Linde, Peter F. Michelson, Douglas D. Osheroff, Vahé Petrosian, Roger W. Romani, Zhi-Xun Shen, Stephen Shenker, Eva Silverstein, Leonard Susskind, Shoucheng Zhang

Associate Professors: Tom Abel, Steven Allen, Sarah Church, David Goldhaber-Gordon, Hari Manoharan, Kathryn Moler

Assistant Professors: Stefan Funk, Peter Graham, Sean Hartnoll (Effective Autumn 2010), Chao-Lin Kuo, Xiao-liang Qi, Leonardo Senatore, Risa Wechsler

Professor (Research): Phillip H. Scherrer

Courtesy Professors: Rhiju Das, Craig Levin,Stephen Quake, Richard N. Zare

Lecturer: Chaya Nanavati, Rick Pam

Consulting Professors: Ralph Devoe, Gerald Fisher, Barbara Jones, Greg Madejski, Alan Title

Visiting Professors: Edward Witten, Chandra Varma

* Recalled to active duty.

Department Offices: 382 Via Pueblo Mall

Mail Code: 94305-4060

Phone: (650) 723-4344

Web Site: http://stanford.edu/dept/physics

Courses offered by the Department of Physics are listed under the subject code PHYSICS on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN PHYSICS

The mission of the undergraduate program in Physics is to provide students with a sound foundation in both classical and modern physics. Courses in the program include labs in which undergraduates carry out individual experiments which, in advanced courses, may include the conception, design, and fabrication of laboratory equipment. Students are also encouraged to participate in independent research projects. The program prepares students for future careers in medicine, engineering, government, and industry, as well as graduate programs in physics.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to formulate testable scientific hypotheses and to design approaches to obtain data to test the respective hypotheses.
2. the ability to make appropriate, logical measurements and produce quantitative results.
3. the ability to draw appropriate conclusions supported by experimental results, including the ability to methodically determine statistical and systematic errors to report limits (uncertainties) on the accuracy of results.
4. the ability to communicate content understanding and research outcomes effectively (i.e., produce a written product that is well organized and demonstrates understanding of the discipline and its techniques.)

COURSE WORK

Course work is designed to provide students with a sound foundation in both classical and modern physics. Students who wish to specialize in astronomy, astrophysics, or space science should also consult the "Astronomy Program" section of this bulletin.

Three introductory series of courses include labs in which undergraduates carry out individual experiments. The Intermediate Physics Laboratories offer facilities for increasingly complex individual work, including the conception, design, and fabrication of laboratory equipment. Undergraduates are also encouraged to participate in research; most can do this through the senior thesis and/or the summer research program.

The study of physics is undertaken by three principal groups of undergraduates: those including physics as part of a general education; those preparing for careers in professional fields that require a knowledge of physics, such as medicine or engineering; and those preparing for careers in physics or related fields, including teaching and research in colleges and universities, research in federally funded laboratories and industry, and jobs in technical areas. Physics courses numbered below 100 are intended to serve all three of these groups. The courses numbered above 100 mainly meet the needs of the third group, but also of some students majoring in other branches of science and in engineering.

ENTRY-LEVEL SEQUENCES IN PHYSICS

The Department of Physics offers three year-long, entry-level physics sequences, the PHYSICS 20, 40, and 60 series. The first of these is non-calculus-based, and is intended primarily for those who are majoring in biology. Such students with AP Physics credit, particularly those who are considering research careers, may wish to consider taking the PHYSICS 20 or 40 series, rather than using AP placement. These introductory series provide a depth and emphasis on problem solving that is of significant value in biological research, which today involves considerable physics-based technology.

For those intending to major in engineering or the physical sciences, or simply wishing a stronger background in physics, the department offers the PHYSICS 40 and 60 series. Either of these satisfies the entry-level physics requirements of any Stanford major. The 60 series is intended for those who have already taken a Physics course at the level of the 40 series, or at least have a strong background in mechanics, some background in electricity and magnetism, and a strong background in calculus. The PHYSICS 40 series begins with mechanics in Winter Quarter, electricity and magnetism in Spring Quarter, and light and heat in Autumn Quarter. While it is recommended that most students begin the sequence with mechanics (PHYSICS 41) in Winter Quarter, those who have had strong physics preparation in high school (such as a score of at least 4 on the Physics Advanced Placement C exam) may start the sequence with PHYSICS 45 in Autumn Quarter.

Effective academic year 2009-10, all courses for the Physics major must be taken for a letter grade, and a grade of 'C-' or better must be received for all units applied toward the major.

GRADUATE PROGRAMS IN PHYSICS

Graduate students find opportunities for research in the fields of astrophysics, particle astrophysics, cosmology, experimental particle physics, particle theory, string theory, intermediate energy physics, low temperature physics, condensed matter physics, materials research, atomic physics, laser physics, quantum electronics, coherent optical radiation, novel imaging technologies, and biophysics. Faculty advisers are drawn from many departments, including Physics, Applied Physics, Materials Science and Engineering, Electrical Engineering, and Biology. Opportunities for research are also available with the faculty at SLAC in the areas of theoretical and experimental particle physics, particle astrophysics, cosmology, accelerator design, and photon science.

The number of graduate students admitted to the Department of Physics is strictly limited. Students should submit applications by Tuesday, December 14, 2010 for matriculation the following Autumn Quarter. Graduate students may normally enter the department only at the beginning of Autumn Quarter.

FELLOWSHIPS AND ASSISTANTSHIPS

The Department of Physics makes an effort to support all its graduate students through fellowships, teaching assistantships, research assistantships, or a combination of sources. More detailed information is provided with the offer of admission.

TEACHING CREDENTIALS

For information on teaching credentials, consult the "School of Education" section of this bulletin or visit http://susestep.stanford.edu. Also see the section on the Individually Designed Major program in Teaching Physical Science.

MASTER OF SCIENCE

The department does not offer a coterminal degree program, or a separate program for the M.S. degree, but this degree may be awarded for a portion of the Ph.D. degree work.

University requirements for the master's degree, discussed in the "Graduate Degrees" section of this bulletin, include completion of 45 units of unduplicated course work after the bachelor's degree. Among the department requirements are a grade point average (GPA) of at least 3.0 (B) for courses 210 or 211, 212, 220, 221, 230, 231, or their equivalents. Up to 6 of these required units may be waived on petition if a thesis is submitted.

LABORATORIES AND INSTITUTES

The Russell H. Varian Laboratory of Physics, the Physics and Astrophysics Building, the W. W. Hansen Experimental Physics Laboratory (HEPL), the E. L. Ginzton Laboratory, and the Geballe Laboratory for Advanced Materials (GLAM) together house a range of physics activities from general courses through advanced research. Ginzton Lab houses research on optical systems, including quantum electronics, metrology, optical communication and development of advanced lasers. GLAM houses research on novel and nanopatterned materials, from high-temperature superconductors and magnets to organic semiconductors, subwavelength photon waveguides, and quantum dots. GLAM also supports the materials community on campus with a range of characterization tools: it is the site for the Stanford Nanocharacterization Lab (SNL) and the NSF-sponsored Center for Probing the Nanoscale (CPN). The SLAC National Accelerator Laboratory is just a few miles from the Varian Laboratory. SLAC is a national laboratory funded by the Office of Basic Energy Sciences and High Energy Physics of the Department of Energy. Scientists at SLAC conduct research in photon science, accelerator physics, particle physics, astrophysics and cosmology. The laboratory hosts a two-mile-long linear accel-

erator that can accelerate electrons and positrons. Until recently, the PEP-II asymmetric-energy electron-positron storage ring was used to study CP violation in the B meson system. The Stanford Synchrotron Radiation Laboratory (SSRL) uses intense x-ray beams produced with another smaller storage ring on the SLAC site. The Linac Coherent Light Source (LCLS), completed in 2009, is the world's first x-ray free electron laser and has opened new avenues of research in ultra-fast photon science.

The Ginzton Laboratory, HEPL, GLAM, SLAC, and SSRL are listed in the "Academic Programs and Centers, Independent Research Laboratories, Centers, and Institutes" section of this bulletin. Students may also be interested in research and facilities at two other independent labs: the Center for Integrated Systems, focused on electronics and nanofabrication; and the Clark Center, an interdisciplinary biology, medicine, and bioengineering laboratory.

The Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), formed jointly with the SLAC National Accelerator Laboratory, provides a focus for theoretical, computational, observational, and instrumental research programs, including the Fermi Gamma-Ray Space Telescope (FGST, formally known as GLAST), the Large Synoptic Survey Telescope (LSST), the Joint Dark Energy Mission (JDEM) and the Dark Energy Survey (DES). KIPAC members are also involved in several microwave background experiments, new x-ray telescopes, TeV gamma ray astronomy, the Cryogenic Dark Matter Search (CDMS) and the EXO-200 double beta decay experiments. Stanford is a member of the Hobby-Eberly Telescope Consortium, operating an innovative 9.2 meter-equivalent telescope at the McDonald Observatory in Texas. The CDMS experiment is operated in an underground laboratory on the Stanford campus and in the Soudan mine in Minnesota. Stanford is the center of activities for EXO-200, a search for neutrinoless double-beta decay, that is about to start recording data at a deep underground site in New Mexico. The experiment is sensitive to a neutrino mass close to 0.2 eV. Many research opportunities are available for students in the growing fields of particle astrophysics and cosmology.

The Stanford Institute for Theoretical Physics is devoted to the investigation of the basic structure of matter (particle theory, string theory, M-theory, quantum cosmology, condensed matter physics).

PHYSICS COURSE CATALOG NUMBERING SYSTEM

There are four series of beginning courses. One course from the teen series (15, 16, 17, 19) is recommended for the humanities or social science student who wishes to become familiar with the methodology and content of modern physics. The 20 series (21, 22, 23, 24, 25, 26) is recommended for general students and for students preparing for medicine or biology. The 40 series (41, 42, 43, 44, 45, 46) is for students of engineering, chemistry, earth sciences, mathematics, or physics. The advanced freshman series (61, 62, 63, 64, 65, 67) is for students who have had strong preparation in physics and calculus in high school. Students who have had appropriate background and wish to major in physics should take this introductory series.

The 20, 40, and 60 series consist of demonstration lectures on the fundamental principles of physics, problem work on application of these principles to actual cases, and lab experiments correlated with the lectures. Their objectives are not only to give information on particular subjects, but also to provide training in the use of the scientific method. The primary difference between the series of courses is that topics are discussed more thoroughly and treated with greater mathematical rigor in the 40 and 60 series.

Courses beyond 99 are numbered in accordance with a three-digit code. The first digit indicates the approximate level of the course:

100	undergraduate courses
200	first-year graduate courses
300	more advanced courses
400	research, special, or current topics

The second digit indicates the general subject matter:

00	laboratory
10,20,30	general courses
40	nuclear physics, nuclear energy, energy
50	elementary particle physics
60	astrophysics, cosmology, gravitation
70	condensed matter physics
80	optics and atomic physics
90	miscellaneous courses

BACHELOR OF SCIENCE IN PHYSICS

To help in deciding which introductory sequence is most suitable, students considering a major in Physics may contact the Undergraduate Program Coordinator (elva@stanford.edu) to arrange an advising appointment. Although it is possible to complete the Physics major in three years, students who contemplate starting the major during sophomore year should make an advising appointment to map out their schedule. Students who have had previous college-level courses (including EPGY) should make an advising appointment for placement and possible transfer credit. For advanced placement advice, see http://studentaffairs.stanford.edu/registrar/students/ap.

Undergraduates are offered help with physics problems in the Physics Tutoring Center in the Physics and Astrophysics Building, sub-basement, room S-17, which is staffed Monday through Friday. See schedule at http://physicstutor.stanford.edu.

1. Prospective Physics majors are advised to take PHYSICS 59, Current Research Topics, in their freshman or sophomore year.
2. A calculus-based entry-level series is required, either PHYSICS 61, (62), 63, 64, 65, 67, or 41, (42), 43, 44, 45, 46 (or preferably 67 rather than 44). One-unit mechanics lab courses (PHYSICS 42 and 62) are being introduced in 2010-11. The mechanics lab course is recommended for Physics majors taking the PHYSICS 40 or 60 series in 2010-11 and will be required for Physics majors taking either series in 2011-12.
   - Students who take the PHYSICS 40 series take PHYSICS 70, which covers the foundations of modern physics.
   - Students taking the PHYSICS 60 series do not take PHYSICS 70; instead, they must take one advanced Physics elective (100-level or higher).
3. In addition, the following advanced courses are required: PHYSICS 105, 107 (WIM), 108, 110, 120, 121, 130, 131, 170, and 171; MATH 51, 52, 53, 131P (MATH 173 can be taken in place of MATH131P); one additional Mathematics course numbered 101 or higher, or PHYSICS 112 or STATS 116 or EE 261.
   - MATH 51H, 52H, and 53H may substitute for MATH 51, 52, and 53.
4. It is recommended that students intending to complete a Ph.D. in Physics also take PHYSICS 113, 134, and one or more of the following, depending upon their interests:
   - PHYSICS 152A,B, 160, 161, 172, 204 and EE 268.
   - PHYSICS 113 is designed to be taken in parallel with 110.
5. The department advises the study of some computer science such as CS 106A,B or CS 106X.
6. Physics and Mathematics courses taken to satisfy the department's major requirements must be taken for a letter grade, and a grade of 'C-' or better must be received for all units applied toward the major.

REQUIRED COURSES FOR MAJORS

For sample schedules illustrating how to complete the Physics major, see http://physics.stanford.edu/academics/undergrad.html.

INTRODUCTORY SEQUENCE

Students must complete either the 40 or 60 series as follows:

40 Series:	*Qtr. and Units*	
PHYSICS 41. Mechanics	W	4
PHYSICS 42. Mechanics Lab (recommended in 2010/11; required 2011/12)	W	1
PHYSICS 43. Electricity and Magnetism	S	4

PHYSICS 44. Electricity and Magnetism Lab	S	1
PHYSICS 45. Light and Heat	A	4
PHYSICS 46. Light and Heat Lab	A	1
PHYSICS 67. Introduction to Laboratory Physics (recommended for physics majors in place of 44)	S	2
PHYSICS 70. Foundations of Modern Physics	A	4

60 Series: Subject and Catalog Number	*Qtr. and Units*	
PHYSICS 61. Mechanics and Special Relativity	A	4
PHYSICS 62. Mechanics Lab (recommended in 2010/11; required in 2011/12)	A	1
PHYSICS 63. Electricity, Magnetism and Waves	W	4
PHYSICS 64. Electromagnetism Lab	W	1
PHYSICS 65. Thermodynamics and Foundations of Modern Physics	S	4
PHYSICS 67. Introduction to Laboratory Physics	S	2
and		
MATH 51, 52, 53. Linear Algebra, Multivariable Calculus, and Ordinary Differential Equations	A,W,S	15
PHYSICS 59. Current Research Topics (recommended)*	A	1

INTERMEDIATE SEQUENCE

PHYSICS 105. Intermediate Laboratory I: Analog Electronics	A	3
PHYSICS 107. Intermediate Laboratory II: Experimental Techniques and Data Analysis (WIM)	W	4
PHYSICS 108. Intermediate Laboratory III: Project	W or S	3
PHYSICS 110. Intermediate Mechanics	S	4
PHYSICS 112. Math Methods of Physics (recommended)**	W	4
PHYSICS 113. Computational Physics (recommended)*	S	4
PHYSICS 120,121. Intermediate Electricity and Magnetism	W,S	8
and MATH 131P or MATH 173. Partial Differential Equations	A,W	3

ADVANCED SEQUENCE

PHYSICS 130,131. Quantum Mechanics	A,W	8
PHYSICS 134. Advanced Topics in Quantum Mechanics*	S	4
PHYSICS 170,171. Statistical Mechanics	A,W	8
and one advanced Mathematics elective (100 level or higher) *or* PHYSICS 112 or STATS 116 or EE 268.		
One advanced Physics elective (100 level or higher): required only for students who are not required to take PHYSICS 70		

* These courses are not required. PHYSICS 113 is recommended for students planning to work in technical fields. Both PHYSICS 113 and PHYSICS 134 are recommended for students who intend to complete a Ph.D. in Physics.

** Those wishing to pursue theoretical physics in graduate school may wish to take a collection of courses in the Department of Mathematics rather than or in addition to PHYSICS 112.

CONCENTRATIONS IN PHYSICS

The primary purpose of concentrations in the Physics major is to provide consistent and more formal advising to students who want to concentrate in a particular area of physics during their undergraduate education, or prepare for future graduate studies in a particular area of physics. Physics majors are not required to choose a concentration and a concentration does not add any formal requirements to the Physics major. Upon graduation, students receive a certificate of completion of a concentration.

Students seeking further advice on a given concentration should contact the professor whose name appears next to the respective title of each section below.

No more than one of the courses can be taken for CR/NC.

Within the chosen concentration below, complete at least four courses from the list or three courses plus a senior thesis.

A. APPLIED PHYSICS (HARI MANOHARAN)

Solid State—

- PHYSICS 172. Solid State Physics
- APPPHYS 270. Magnetism and Long Range Order in Solids
- MATSCI 195. Waves and Diffraction in Solids

Biophysics—

- APPPHYS 192. Introductory Biophysics

Lasers—

- EE 231. Introduction to Lasers
- EE 232. Laser Dynamics
- EE 268. Introduction to Modern Optics

Lab Methods—

- APPPHYS 207, 208. Laboratory Electronics, Analog and Digital
- APPPHYS 304. Lasers Laboratory

B. ASTROPHYSICS (ROGER ROMANI, SARAH CHURCH)

Requirements—

- PHYSICS 100. Introduction to Observational and Laboratory Astronomy
- PHYSICS 160. Introduction to Stellar and Galactic Astrophysics
- PHYSICS 161. Introduction to Extragalactic Astrophysics and Cosmology

Plus one elective from below or a senior thesis—

- PHYSICS 211. Continuum Mechanics
- PHYSICS 260. Introduction to Astrophysics and Cosmology
- PHYSICS 262. Introduction to Gravitation
- PHYSICS 312. Basic Plasma Physics; prerequisites are PHYSICS 210 and 220

C. BIOPHYSICS (SEB DONIACH)

- APPPHYS 136. Biology by the Numbers
- APPPHYS 192/292. Introductory Biophysics
- BIOC 202. Metabolic Biochemistry
- BIOPHYS 228. Computational Structure Biology
- BIO 141. Biostatistics
- BIO 132/232. Advanced Imaging Lab In Biophysics
- BIO 135/HUMBIO 182. Biological Clocks
- BIO 211. Biophysics of Sensory Transduction
- BIO 217. Neuronal Biophysics
- CS 273A. A Computational Tour of the Human Genome

It is recommended that Physics majors interested in pursuing a career in biophysics consider a minor in Biology.

D. GEOPHYSICS (SIMON KLEMPERER, GEOPHYSICS)

The Geophysics Department has revamped its offerings beginning 2010-11. The following requirements apply to students matriculating 2010-11 or later:

Requirements—

- GEOPHYS 110. Earth on the Edge
- GEOPHYS 120. Ice, Water, Fire
- GEOPHYS 150. Geodynamics

Plus one elective from below or a senior thesis—

- GEOPHYS 130. Introductory Seismology
- GEOPHYS 140. Remote Sensing
- GEOPHYS 170. Global Tectonics
- GEOPHYS 184. Journey to the Center of the Earth
- GEOPHYS 190. Near Surface Geophysics

Physics majors matriculating prior to 2010-11 who wish to complete a Concentration in Geophysics should consult Prof. Klemperer.

E. THEORETICAL PHYSICS (ANDREI LINDE)

- PHYSICS 152A,B. Introduction to Particle Physics
- PHYSICS 204. Seminar in Theoretical Physics
- PHYSICS 212. Statistical Mechanics
- PHYSICS 232. Quantum Mechanics
- PHYSICS 260. Introduction to Astrophysics and Cosmology
- PHYSICS 262. Introduction to Gravitation
- PHYSICS 330,331,332. Quantum Field Theory
- PHYSICS 351. Standard Model of Particle Physics and Beyond

- PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology
- PHYSICS 364. Advanced Gravitation

Notes to students taking this concentration:

1. Students should discuss the choice of courses with members of the Institute for Theoretical Physics and/or their major adviser.
2. Students may attend 330 after taking 130, 131 and 134. Prior study of special topics in quantum mechanics (232) may be helpful.

INDIVIDUALLY DESIGNED MAJOR PROGRAM IN TEACHING PHYSICAL SCIENCE

This major, a joint effort of the Department of Physics and the Stanford Teacher Education Program (STEP), is designed for students to prepare themselves as high school teachers of physics and general science. Students complete 47-49 units of Physics and related Mathematics courses, 40-43 units of course work in other sciences such as the life sciences, chemistry, and geosciences, and in general issues of science, and 9-15 units of concentration and depth courses. Total program units: 96-107. Students interested in this program should consult Professor Patricia Burchat (burchat@stanford.edu, 725-5771), and Professor Rachel Lotan, Director of the Stanford Teacher Education Program—Secondary in the School of Education (rlotan@stanford.edu).

CORE PHYSICS COURSES

Mechanics:	*Units*
PHYSICS 41. Mechanics	
PHYSICS 42. Mechanics Lab	
or PHYSICS 61. Mechanics and Special Relativity	
PHYSICS 62. Mechanics Lab	5
Heat:	
PHYSICS 45. Light and Heat	
PHYSICS 46. Light and Heat Lab	
or	
PHYSICS 65. Thermodynamics and Foundations of Modern Physics	
PHYSICS 67. Introduction to Laboratory Physics	5-6
Electricity and Magnetism:	
PHYSICS 43. Electricity and Magnetism	
PHYSICS 67. Introduction to Laboratory Physics	
or	
PHYSICS 63. Electricity, Magnetism, and Waves	
PHYSICS 64. Electricity and Magnetism Lab	
and	
PHYSICS 105. Analog Electronics (Lab)	8-9
Wave Motion:	
PHYSICS 107 Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis (WIM)	4
Modern Physics (for students who take 40 series):	
PHYSICS 70. Foundations of Modern Physics	4
Applications:	
PHYSICS 59. Current Research Topics	1
Mathematics (Physics departmental requirement):	
MATH 51,52,53. Linear Algebra, Multivariable Calculus, *and* Ordinary Differential Equations *and* a course in Statistics (choose one):	
STATS 110. Statistical Methods in Engineering and the Physical Sciences	
STATS 116. Theory of Probability	
STATS 141. Biostatistics	
STATS 166. Computational Biology	
STATS 191. Introduction to Applied Statistics	20
Total	47-49

ADDITIONAL SCIENCE BREADTH COURSES

Life Sciences—	
BIO 41. Genetics, Biochemistry, and Molecular Biology	
BIO 42. Cell Biology and Animal Physiology	
BIO 43. Plant Biology, Evolution and Ecology	
or	
HUMBIO 2A,B, 3A,B, 4A,B	15
Chemistry—	
CHEM 31A and B, or 31X. Chemical Principles	
CHEM 33. Structure and Reactivity	8
Geosciences—	
EARTHSYS 10. Introduction to Earth Systems	
PHYSICS 15. The Nature of the Universe	
or PHYSICS 16. Cosmic Horizon	
or PHYSICS 17. Black Holes	8
General Issues of Science—	
STS 101. Science, Technology, and Contemporary Society	
EDUC 180. Directed Reading in History of Science	
ENGR 103. Public Speaking and Presentation Development	9-12
Concentration and Depth Courses—	
3 courses (100 level or above) in a single area of concentration	9-15
Total units for general science	49-58
Total units for the Physical Science program	96-107

This individually designed major program in Physical Science includes all the elements of a Program of Subject Matter Preparation for Secondary Teachers of Physics and General Science that has been approved by the California Commission on Teacher Credentialing (CCTC). Students who complete the program are exempt from taking the CSET examination in Physics and General Science for admission to the Stanford Teacher Education Program (STEP) or any other accredited secondary teacher education program in California. Full details of the CCTC-approved program may be found at http://ed.stanford.edu/suse/programs-degrees/program-coterminal-step.html.

Note: the Stanford individually designed major program in Physical Science requires course work beyond the CCTC-approved program, specifically 9-15 units of depth courses in a field of concentration: Physics, Astrophysics, Biology, Chemistry, Earth Sciences, Human Biology, or Computational Mathematics. See the adviser in the Physics department or the School of Education for more details.

SENIOR THESIS

The department offers students the opportunity to complete a senior thesis:

1. Students must submit a Senior Thesis Application form once they identify a Physics project, either theoretical or experimental, in consultation with individual faculty members. Proposal forms are available from the undergraduate coordinator and must be submitted by November 19 of the academic year in which the student plans to graduate.
2. Credit for the project is assigned by the adviser within the framework of PHYSICS 205. Work completed in the senior thesis program may not be used as a substitute for regular required courses for the Physics major.
3. A written report and a presentation of the work at its completion are required for the senior thesis. By mid-May, the senior thesis candidate is required to present the project at the department's senior thesis presentations. This event is publicized and open to the general public. The expectation is that the student's adviser, second reader, and all other senior thesis candidates attend.

HONORS PROGRAM

A Bachelor of Science in Physics with honors is awared to students who satisfy these requirements:

1. The student completes a senior thesis.
2. The student completes their course work with an overall GPA of 3.30 or higher, and a GPA of 3.50 or higher in courses required for the Physics major.

MINOR IN PHYSICS

A minor is offered in either Physics or Astronomy. Students who take the 20 or 40 series at Stanford in support of their major may count those units towards the minor. Those who have fulfilled

Physics requirements at the 20 or 40 series level by enrollment at another accredited university, or through advanced placement credits, may count credits towards 21/22 and 23/24, or 41 and 43/44, respectively. 25/26, or 45/46 for a technical minor, must be taken at Stanford even if similar material has been covered elsewhere. With the 21/22/23/24 or 41/43/44 exception noted above, all courses for the minor must be taken at Stanford University for a letter grade, and a grade of 'C-' or better must be received for all units applied toward the minor. The minor declaration deadline is three quarters before graduation, typically the beginning of Autumn Quarter if the student is graduating at the end of Spring Quarter.

MINOR IN PHYSICS

An undergraduate minor in Physics requires a minimum of 27 units with the following course work:

Non-Technical—For students whose majors do not require the PHYSICS 40 or 60 series:

Subject and Catalog Number	*Units*
PHYSICS 21, 22, 23, 24, 25, and 26	12
Any combination of PHYSICS courses totaling 15 units or greater	15
Total	27

Technical—For students whose majors require the PHYSICS 40 or 60 series:

	Units
PHYSICS 41/42*, 43/44, 45/46 and PHYSICS 70	19
or	
PHYSICS 61/62*, 63/64, 65/67	16
at least three PHYSICS courses numbered 100 or above	9-12
Total	25-31

* PHYSICS 42 or 62 are required for the technical minor in Physics beginning 2011-12 and recommended in 2010-11.

MINOR IN ASTRONOMY

Students wishing to pursue advanced work in astrophysical sciences should major in physics and concentrate in astrophysics. However, students outside of physics with a general interest in astronomy may organize their studies by completing one of the following minor programs.

An undergraduate minor in astronomy requires the following courses:

Non-Technical—For students whose majors do not require the PHYSICS 40 series:

	Units
PHYSICS 21, 23, 25/26	10
PHYSICS 50 or 100 (Observatory Lab)	3-4
Choose two courses from the following:	
PHYSICS 15, 16, 17	6
Total	19-20 (9-10 in addition to the 20 series)

Technical—For students whose majors require the PHYSICS 40 series:

	Units
PHYSICS 41, 43, 45/46	13
PHYSICS 70	4
PHYSICS 100 (Observatory Lab)	4
Choose two courses from the following:	
PHYSICS 160,* 161,* EE 106*	6
Total	27 (14 in addition to the 40 series)

* With approval of the minor adviser and the chair of the Astronomy Course Program, 3 units of PHYSICS 169, Independent Study in Astrophysics, may be substituted for one course of astronomy (e.g., 160, 161, EE 106). This independent study can either be constituted as a directed reading program or participation in a research project. Students are also strongly encouraged to take the electricity and magnetism/optics lab of the appropriate Physics series (24, 44) for 1 additional unit.

DOCTOR OF PHILOSOPHY IN PHYSICS

The University's basic requirements for the Ph.D. are discussed in the "Graduate Degrees" section of this bulletin.

The minimum department requirements for the Ph.D. degree in Physics consist of completing all courses listed below, plus 290 and 294 and at least one quarter from each of two subject areas outside the student's primary area of research (among biophysics, condensed matter, quantum optics and atomic physics, astrophysics and gravitation, and nuclear and particle physics) chosen from courses with numbers above 232, except 290 and 294. The requirements in the following list may be fulfilled by passing the course at Stanford or passing an equivalent course elsewhere: 210 or 211, 212, 220, 221, 230, 231. A grade point average (GPA) of at least 3.0 (B) is required for courses taken toward the degree.

All Ph.D. candidates must have math proficiency equivalent to the following Stanford MATH courses: 106, 113, 114, 116, 131, 132.

Prior to making an application for candidacy, each student is required to pass a comprehensive qualifying examination on undergraduate physics. This closed book exam is given in the month of January following the student's arrival at Stanford. This is a written examination held over two days, covering particle mechanics, electricity and magnetism, quantum mechanics, statistical mechanics, thermodynamics, special relativity, and general physics. A thesis proposal must be submitted during the third year. In order to assess the direction and progress toward a thesis, an oral report and evaluation are required during the fourth year. After completion of the dissertation, each student must take the University oral examination (defense of dissertation).

Three quarters of teaching (including a demonstrated ability to teach) are a requirement for obtaining the Ph.D. in Physics.

Students interested in applied physics and biophysics research should also take note of the Ph.D. granted independently by the Department of Applied Physics and by the Biophysics Program. Students interested in astronomy, astrophysics, or space science should also consult the "Astronomy Course Program" section of this bulletin.

PH.D. MINOR IN PHYSICS

Minors in Physics must take at least six courses numbered 210 to 232 among the 20 required units. All prospective minors must obtain approval of their Physics course program from the Physics Graduate Study Committee at least one year before award of the Ph.D.

POLITICAL SCIENCE

Emeriti: (Professors) David B. Abernethy, Lucius J. Barker, Richard A. Brody, David Danielski, Charles Drekmeier, John A. Ferejohn, John W. Lewis, John Manley, James March, Hubert R. Marshall, Daniel Okimoto, Robert A. Packenham, Philippe Schmitter, Robert Ward, Hans N. Weiler; (*Senior Lecturer*) Elisabeth Hansot

Chair: Josiah Ober

Professors: David W. Brady, Joshua Cohen, Gary W. Cox, James D. Fearon (on leave), Morris P. Fiorina, Judith L. Goldstein (on leave), Stephen H. Haber, David J. Holloway, Shanto Iyengar, Simon D. Jackman, Terry L. Karl, Stephen D. Krasner, Jon A. Krosnick, David D. Laitin, Michael A. McFaul (on leave), Terry M. Moe, Josiah Ober, Jean C. Oi, Jack N. Rakove, Condoleezza Rice (on leave), Douglas Rivers, Scott D. Sagan, Kenneth A. Schultz, Gary M. Segura, Paul M. Sniderman, Michael R. Tomz, Barry R. Weingast

Associate Professors: Beatriz Magaloni, Rob Reich, Jonathan A. Rodden, Jeremy Weinstein

Assistant Professors: Lisa Blaydes, Justin Grimmer, Karen L. Jusko, Phillip Y. Lipscy, Jonathan Wand

Lecturers: Tammy Frisby, Erica R. Gould, Andrew R. Rutten, Joel Samoff, Bruce Sievers, James Steyer, Kathryn Stoner-Weiss, Patricia Young

Courtesy Professors: David P. Baron, Jonathan B. Bendor, Coit D. Blacker, Gerhard Casper, Martha Crenshaw, Larry Diamond,

Gerald A. Dorfman, Jean-Pierre Dupuy, James Fishkin, Lawrence Friedman, Keith Krehbiel, Debra M. Satz, Stephen J. Stedman

Courtesy Associate Professor: Ken Shotts
Courtesy Assistant Professor: Saumitra Jha
Visiting Professors: Josef Joffe, Abbas Milani
Visiting Associate Professor: Alice Miller
Acting Instructors: Michael Albertus, Roy Elis, Kieran Oberman, Margaret E. Peters
Department Offices: Encina Hall West, room 100
Mail Code: 94305-6044
Phone: (650) 723-1806
Web Site: http://polisci.stanford.edu

Courses offered by the Department of Political Science are listed under the subject code POLISCI on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN POLITICAL SCIENCE

The mission of the undergraduate program in Political Science is to provide students with a solid grasp of the American political system and other political systems within the context of global forces, international conflicts, social movements, ideological systems and diversity. Courses in the major are designed to help students gain competency in the primary subfields of political science including American and comparative politics, international relations, and the theory/philosophy of politics; to introduce students to a variety of research methodologies and analytical frameworks; and to develop students' written and oral communication skills. Students in the program have excellent preparation for further study in graduate or professional schools as well as careers in government, business, and not-for-profit organizations.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of political science.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of Political Science.

GRADUATE PROGRAMS IN POLITICAL SCIENCE

Admission—Prospective graduate students should see http://gradadmissions.stanford.edu for application materials. Applicants are required to submit a recent sample of their writing (not to exceed 35 pages) and to take the General Test of the Graduate Record Examination (GRE). Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL). The TOEFL requirements are waived for applicants who have recently completed two or more years of study at a university where all instruction is provided in English. For details concerning these tests, see the *Guide to Graduate Admission*, available at http://gradadmissions.stanford.edu. The application deadline is December 7th. Admission is offered for the Autumn Quarter only. The department expects all students to pursue a full-time program except for time devoted to teaching or research assistantships.

BACHELOR OF ARTS IN POLITICAL SCIENCE

To receive a B.A. in Political Science, a student must:

1. Submit an application for the Political Science major to the undergraduate administrator and declare on Axess. Forms are available in Encina Hall West, room 100, or at http://polisci.stanford.edu/bachelors. For additional information, come to the office or phone (650) 723-1608. Students must complete their major declaration no later than the end of Autumn Quarter of their junior year.
2. Complete 70 units including:
   a. 45 Political Science course units in the primary and secondary concentration combined. Each major should declare a primary concentration in one subfield and take at least 30 units in this concentration, including the introductory course for that subfield. The secondary concentration must be completed with at least 15 units, including the introductory course for that subfield. Subfields include:
      - International Relations (1, 110-119, 210-219, 310-319)
      - American Politics (2, 120-129, 220-229, 320-329)
      - Political Theory (3, 130-139, 230-239, 330-339)
      - Comparative Politics (4, 140-149, 240-249, 340-349)
      - Methodology (150-159, 350-359)

   b. A 5-unit methods requirement satisfied by STATS 60, ECON 102A, POLISCI 150A, 150B, 150C, 151A, or 151B.
   c. 20 additional Political Science units and/or cognate course units including no more than 5 units of directed reading. 10 units of ECON 1A and/or ECON 1B may substitute for two 5-unit POLISCI courses.
   d. No more than two 5-unit Stanford Introductory Seminar courses can be applied toward the 70-unit major requirement.
3. Introductory Courses: each student must take two from the following Political Science courses, one of which must be in the primary concentration, the other in the secondary concentration. These courses should be completed by the end of sophomore year.
   - POLISCI 1. Introduction to International Relations
   - POLISCI 2. Introduction to American National Government and Politics
   - POLISCI 3. Introduction to Political Philosophy
   - POLISCI 4. Introduction to Comparing Political Systems
   - POLISCI 151A. Doing Political Science
     - *or* POLISCI 151B. Data Analysis for Political Science
4. Demonstrate the capacity for sustained research and writing in the discipline. This requirement is satisfied by taking a Political Science course designated as a Writing in the Major (WIM) course and may be in any subfield of the major.
5. Take at least one 5-unit, 200 or 300-level undergraduate seminar in Political Science.
6. Students may petition a maximum of ten units towards the major. Transfer students are allowed to petition up to twenty units towards the major. A maximum of 15 units may be applied towards the concentrations and 5 towards other Political Science course units. All Stanford-in-Washington courses and transfer credit from outside of Stanford require petitions which must be reviewed and approved by the Director of Undergraduate Studies. Petitions should be submitted within one quarter of course completion, or within one quarter of declaring the major.
7. Directed reading and Oxford tutorial units also require a petition and may only be applied towards related course work units. These units may not be used in the concentrations, and no more than 10 combined units of directed reading and Oxford tutorial units may count toward the required 70 Political Science units. Cognate courses do not require a petition.
8. All courses for the major must be completed with a letter grade of 'C' or better.

COGNATE COURSES

- AFRICAST 107/207. Community Reconstruction and Development in Post-Apartheid South Africa
- AFRICAST 111/211. Education for All? The Global and Local in Public Policy Making in Africa
- AFRICAST 112/212. AIDS, Literacy, and Land: International Aid and the Problems of Development in Africa
- EASTASN 189K/289K. Comparative Politics Perspective of the Two Koreas since 1945
- ECON 1A,B. Introductory Economics A, B
- EDUC 260X. Understanding Statistical Models and their Social Science Applications (same as HRP 239, STATS 209)
- ETHICSOC 174A. Moral Limits of the Market (same as PHIL 174A, PHIL 274A)
- ETHICSOC 181M. The Ethics of Risk (same as PHIL 79)
- ETHICSOC 185M. Contemporary Moral Problems (same as PHIL 72)
- HISTORY 150A. Colonial and Revolutionary America
- HRP 239. Understanding Statistical Models and their Social Science Applications
- HUMBIO 171. The Death Penalty: Human Biology, Law, and Policy
- HUMBIO 172A,B. Children, Youth, and the Law
- IPS 206B. Organizations (same as PUBLPOL 204B)
- IPS 243. The History, Science, Technology, and Politics of Missile Defense
- INTNLREL140B. Theories of International Law (same as IPS 241A)
- INTNLREL 206. Palestinian Nationalism, Past and Present
- INTNLREL 207. Tribe, State, and Society in the Modern Middle East
- MS&E 193,193W,293. Technology and National Security
- PUBLPOL 102. Organizations and Public Policy (same as PUBLPOL 202)
- PUBLPOL 183. Philanthropy and Social Innovation
- REES 105. Central and East European Politics (same as REES 205)
- REES 320. State and Nation Building in Central Asia
- STATS 60. Introduction to Statistical Methods (same as PSYCH 10 and STATS 160)
- OSPBEIJ 47. Institutional Change in Reform China
- OSPBEIJ 66. Essentials of China's Criminal Justice System
- OSPBER 15. Shifting Alliances? The European Union and the U.S.
- OSPBER 115X. The German Economy: Past and Present
- OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU
- OSPCPTWN 35. Political Economy of AIDS
- OSPFLOR 61. Europe and U.S. Foreign Policy
- OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
- OSPFLOR 97. Human Rights, Justice and Terrorism: Is the World Community Prepared to Prevent a Catastrophe?
- OSPFLOR 106V. Italy: From Agrarian to Post-Industrial Society
- OSPKYOTO 24. Japan in Contemporary International Affairs
- OSPKYOTO 215X. The Political Economy of Japan
- OSPMOSC 72. Space, Politics, and Modernity in Russia
- OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration
- OSPOXFRD 13. Politics and Economics of the Euro Zone
- OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics
- OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective
- OSPOXFRD 35. Modern UK and European Government and Politics
- OSPOXFRD 62. Heretics to Headscarves
- OSPOXFRD 63. Locke and his Legacy
- OSPOXFRD 141V. European Imperialism and the Third World, 1870-1970
- OSPPARIS 32. Understanding French Politics
- OSPPARIS 57. Human Rights in Comparative Perspective
- OSPPARIS 122X. Challenges of Integration in the European Union
- OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France
- OSPSANTG 86. Global Issues, Local Politics, and American Foreign Policy
- OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century
- OSPSANTG 129X. Latin America in the International System
- OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective

HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research, write a thesis summarizing their findings, and make presentations of their work. During the process of research, analysis, and drafting, students work closely with a faculty adviser, a graduate student mentor, and their fellow students.

Applicants must have a minimum grade point average (GPA) of 3.5, and an adviser who is a member of the Academic Council. Students interested in pursuing honors should submit a paper application to the undergraduate administrator in Encina Hall West, room 100, by the first Friday of Spring Quarter. Once students are accepted into the program, they will be asked to apply for honors in Political Science on Axess. Applications can be obtained from the department website and from Encina Hall West, room 100.

Students pursuing honors must complete the following by the end of Spring Quarter of their junior year: Methods requirement (STATS 60, ECON 102A, POLISCI 150A,B,C, 151A, or 151B), WIM requirement, and a completed research paper from an advanced undergraduate seminar or directed reading. Students are required to enroll in POLISCI 299Q: Junior Research Seminar, in Spring Quarter of their junior year. This course is designed to help students understand the research process and map out a concrete time line for their thesis work.

Students who are accepted into the program should plan to make the thesis the focus of their senior year. They should enroll in 10-15 units of POLISCI 299A,B,C, which covers research and writing directed by the student's adviser.

To complete the honors program, students must:

1. Complete all requirements for the major.
2. Enroll in POLISCI 299Q during Spring Quarter of the student's junior year.
3. Enroll in at least 10 units of POLISCI 299A, B, or C, Senior Project. Students must take at least two quarters of Senior Project units.
4. Complete a thesis of honors quality, for a grade of 'B+' or better.

Students cannot apply units from the POLISCI 299Q, Junior Research Seminar, toward the 70-unit requirement for the major. However, students can apply up to 10 units from POLISCI 299A,B,C, Senior Project, toward the 70-unit requirement.

PRIZES

There are several annual prizes for undergraduate students: the Arnaud B. Leavelle Memorial Prize for the best paper in the History of Political Thought sequence (POLISCI 130A,B,C), a cash prize for the best thesis written in political theory, the Lindsay Peters, Jr., Memorial Prize for the outstanding student each year in

POLISCI 2, and Cottrell Prizes for outstanding students in POLISCI 1, 3, and 4.

MINOR IN POLITICAL SCIENCE

Students must complete their declaration of the minor on Axess no later than the end of the junior year.

To receive a minor in Political Science, a student must complete a minimum of 30 unduplicated units. All units must be in courses listed or cross-listed in the Department of Political Science, or Political Science cognate courses. A student may petition for a maximum of 5 units to count towards the minor. This includes directed readings and Stanford in Washington courses. Directed readings and Stanford in Washington courses may only count towards the last five related units for the minor.

All courses for the minor must be taken for a letter grade. Students must receive a minimum letter grade of 'C' in all courses for the minor.

Concentration—The student selects a primary subfield in which three courses are taken. One of these courses is the introductory course, the other two are at a more advanced level (numbered above 100). The concentration corresponds to one of the subfields the department already has in place, namely, American politics, comparative politics, international relations, and political theory.

Distribution—Three courses must be in the primary concentration, as specified above, for 15 units. An additional 10 units of intermediate and advanced courses (100 level or above) must be in two additional subfields. The final 5 units may be in any related subfield.

Petitioned courses— Transfer students can petition a maximum of 10 units towards the minor, while non-transfer students can petition a maximum of five units towards the major. All petitioned courses must be individually reviewed and approved by the Director of Undergraduate Studies. Students can download the petition forms from http://polisci/PoliSciMajors/MajorMinorPetition.pdf or pick them up from Encina Hall West, room 100. Students must submit petitions to the undergraduate administrator in Encina Hall West, room 100.

MASTER OF ARTS IN POLITICAL SCIENCE

The Political Science department does not offer a terminal M.A. degree. An M.A. degree may only be pursued in combination with a doctoral degree from another department within the University or with an advanced degree from one of the University's professional schools. Students interested in pursuing the M.A. should discuss the application requirements with the graduate administrator in Political Science.

Students from within the department and from other degree programs who have applied to the M.A. program may elect to take the M.A. degree in Political Science when they have met the following requirements:

1. Completion of at least three quarters of residency as a graduate student with 45 units of credit of which at least 25 units must be taken in Political Science graduate seminars of 300 level and above. Not more than 25 units of the 45-unit requirement may be taken in a single field.
2. At least two graduate seminars in each of two fields and at least one graduate seminar in a third field.
3. The remaining 20 units must come from courses numbered above 100. Of those 20 units, not more than 10 units of work from related departments may be accepted in lieu of a portion of the work in Political Science. Not more than 10 units may be taken as directed reading.
4. Courses must be numbered above 100.
5. A grade point average (GPA) of 2.7 (B-) or better must be attained for directed readings and all course work. No thesis is required.

The department does not offer a coterminal bachelor's and master's degree.

Political Science doctoral candidates may pursue master's degrees from other departments. Recent examples include but are not restricted to master's degrees in Statistics and Economics. Students interested in this option should consult the relevant sections of this Bulletin for both University and department requirements for master's degrees.

DOCTOR OF PHILOSOPHY IN POLITICAL SCIENCE

The University's basic requirements for the Ph.D. degree are discussed in the "Graduate Degrees" section of this bulletin.

Programs of study leading to the Ph.D. degree are designed by the student, in consultation with advisers and the Director of Graduate Studies, to serve his or her particular interests as well as to achieve the general department requirements. A student is recommended to the University Committee on Graduate Studies to receive the Ph.D. degree in Political Science when the following program of study has been completed:

1. The candidate for the Ph.D. degree must offer three of the following concentrations in political science: American politics, comparative politics, international relations, methodology, and political theory. Students concentrate on two of these areas by fulfilling, depending on the concentration, combinations of the following: written qualifying examinations, research papers, research design, or course work. The requirement for the third concentration may be satisfied by taking either a written examination in that area or by offering a minimum of 10 units with a grade point average (GPA) of 3.0 (B) or better in the third concentration from among the formal graduate-level courses in the five divisions of the department. The third concentration cannot be satisfied by courses taken as a requirement for a first or second concentration. A third concentration in theory requires two courses in addition to the five units necessary to fulfill the program requirement. A third concentration in methodology requires two courses in addition to the 10 units necessary to fulfill the program requirement. Completion of special concentrations may require more than 10 units of course work.
2. The Ph.D. candidate is required to demonstrate competence in a language and/or skill that is likely to be relevant to the dissertation research. The level of competence needed for successful completion of the research is determined by the student's adviser. All candidates must complete at least 10 units of statistical methodology or its equivalent. Previous instruction can be counted towards this requirement only if approved by the Director of Graduate Studies.
3. Every Ph.D. candidate must complete at least five units of graduate-level instruction in political theory.
4. By the start of the fourth quarter in residence, each graduate student submits to the student's adviser a statement of purpose. This statement indicates the student's proposed major concentrations of study, the courses taken and those planned to be taken to cover those fields, the student's plan for meeting language and/or skill requirements, plans for scheduling of comprehensive examinations and/or research papers, and, where possible, dissertation ideas or plans. This statement is discussed with, and must be approved by, the student's adviser. In the Autumn Quarter following completion of their first year, students are reviewed at a regular meeting of the department faculty. The main purposes of this procedure are, in order of importance: to advise and assist the student to realize his or her educational goals; to provide an incentive for clarifying goals and for identifying ways to achieve them; and to facilitate assessment of progress toward the degree.
5. Students must take the comprehensive exams in two major fields by the end of their second year in the program. Students are expected to have passed these examinations and to have faculty approval of their research paper by the end of their second year.
6. Upon completion of one research paper and two comprehensive exams in his or her two major concentrations, the student files an Application for Candidacy for the Doctoral Degree

which details program plans and records. The University and the department expect that students be advanced to candidacy by the completion of their sixth quarter as a full-time student. Each second-year student is reviewed and considered for admission to candidacy in a meeting of the faculty that is typically held during the tenth week of Spring Quarter. Since completion of two comprehensive exams and a research paper are prerequisites for admission to candidacy, students should plan their first- and second-year studies so that these requirements are satisfied by the time of the faculty review meeting. In particular, students should submit their research paper to the relevant faculty readers no later than the middle of Winter Quarter, since revisions of the paper are often required prior to obtaining faculty approval.

7. During the third year, a formal dissertation proposal must be submitted to and approved by the student's dissertation adviser and the Director of Graduate Studies. Dissertation proposals must be approved by the end of the third year.
8. A candidate for the Ph.D. in Political Science is required to serve as a teaching assistant (TA) in the department for a minimum of three quarters.
9. Doctoral candidates who apply for the M.A. degree are awarded that degree on completion of the requirements outlined in the description of the M.A. program.
10. The candidate must pass the University oral examination on the area of the dissertation at a time, after the passing of the written comprehensive examinations, suggested by the candidate's dissertation committee.
11. The candidate must complete a dissertation satisfactory to the dissertation reading committee.

PH.D. MINOR IN POLITICAL SCIENCE

Candidates in other departments which accept a minor in Political Science select two concentrations in political science in consultation with the Director of Graduate Studies and submit to her or him a program of study for approval. Written approval for the program must be obtained from the Director of Graduate Studies before application for doctoral candidacy. Students are required to complete at least 20 units in Political Science courses. Courses must be 300 level and above. Grades must be a GPA of 3.0 (B) or better. Candidates may be examined in their concentrations in the general oral examination by a member of the Department of Political Science, chosen in consultation with the Director of Graduate Studies.

OVERSEAS STUDIES COURSES IN POLITICAL SCIENCE

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 66. Essentials of China's Criminal Justice System. 5 units, Wang, GER:DB:SocSci, EC:GlobalCom

BERLIN

- OSPBER 115X. German Economy: Past and Present. 4-5 units, Klein, GER:DB:SocSci, EC:GlobalCom

FLORENCE

- OSPFLOR 106V. Italy: From an Agrarian to a Post-industrial Society. 5 units, Mammarella, GER:DB:SocSci, EC:GlobalCom

MOSCOW

- OSPMOSC 72. Space, Politics and Modernity in Russia. 5 units, Medvedev, GER:DB:SocSci, EC:GlobalCom
- OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, and Integration

OXFORD

- OSPOXFRD 35. Modern UK and European Government and Politics. 4-5 units, Cappocia, GER:DB:SocSci

PARIS

- OSPPARIS 32. Understanding French Politics. 4-5 units, Chamorel, GER:DB: SocSci

SANTIAGO

- OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective. 5 units, Micco, GER:DB:SocSci

WINTER QUARTER

BERLIN

- OSPBER 15. Shifting Alliances? The European Union and the US. 4-5 units, Brückner, GER:DB:SocSci, EC:GlobalCom

OXFORD

- OSPOXFRD 13. Politics and Economics of the Euro Zone. 5 units, Goldstein, GER:DB:SocSci
- OSPOXFRD 18. Making Public Policy: an Introduction to Political Philosophy, Politics and Economics. 4-5 units, McMahon, GER:DB:SocSci

PARIS

- OSPPARIS 57. Human Rights in Comparative Perspective. 4-5 units, Boussaguet, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 129X. Latin America in the International System. 4-5 units, GER:DB:SocSci

SPRING QUARTER

BERLIN

- OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU. 4-5 units, Brückner, GER:DB:SocSci, EC:GlobalCom

FLORENCE

- OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union. 5 units, Morlino, GER:DB:SocSci

KYOTO

- OSPKYOTO 215X. Political Economy of Japan. 4-5 units, Hayashi, GER:DB:SocSci

OXFORD

- OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective. 4-5 units, McMahon, GER:DB:SocSci

PARIS

- OSPPARIS 122X. Challenges of Integration in the European Union. 4-5 units, Strudel, GER:DB:SocSci

SANTIAGO

- OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century. 5 units, Correa, GER:DB:SocSci

PSYCHOLOGY

Emeriti: (Professors) Albert Bandura, Gordon H. Bower, Lyn K. Carlsmith, John H. Flavell, Albert H. Hastorf, Leonard M. Horowitz, Eleanor E. Maccoby, Roger N. Shepard, Claude Steele, Barbara Tversky, Philip G. Zimbardo
Chair: James L. McClelland
Professors: Laura L. Carstensen, Herbert H. Clark, Carol Dweck, Ian H. Gotlib, James J. Gross, John D. Krumboltz, Mark R. Lepper, Ellen M. Markman, Hazel R. Markus, James L. McClelland, Dale Miller, Lee D. Ross, Ewart A. C. Thomas, Brian Wandell, Jeffrey J. Wine
Professor (Research): Anthony Norcia
Associate Professors: Jennifer L. Eberhardt, Anne Fernald, Kalanit Grill-Spector, Brian Knutson, Benoit Monin, Jeanne L. Tsai, Anthony Wagner
Associate Professor (Teaching): Catherine Heaney
Assistant Professors: Lera Boroditsky, Michael Frank, Noah Goodman, Samuel M. McClure, Gregory M. Walton
Lecturers: Joseph Brown, Amie Haas, Bridgette Martin-Hard, Adrienne Lomangino
Courtesy Professors: William C. Dement, Gary H. Glover, Jon Krosnick, Tanya Luhrmann, William T. Newsome, Anne C. Petersen
Director, Bing Nursery School: Jennifer Winters
Department Offices: Jordan Hall, Building 420
Mail Code: 94305-2130
Department Phone: (650) 725-2400
Web Site: http://psychology.stanford.edu

Courses offered by the Department of Psychology are listed under the subject code PSYCH on the *Stanford Bulletin's* ExploreCourses web site.

The department, housed in Jordan Hall, maintains shop facilities and many computer-equipped laboratories. Bing Nursery School, located on campus at 850 Escondido Road, provides a laboratory for child observation, training in nursery school teaching, and research. It was constructed with funding from the National Science Foundation and a special grant from Mrs. Anna Bing Arnold and Dr. Peter Bing.

The department provides

- courses designed for the general student
- a major program leading to the degree of Bachelor of Arts, including options for honors and a specialization in one of four content area tracks
- an undergraduate minor program
- a coterminal master's degree program leading to the degree of Master of Arts
- programs of graduate study and research leading to the degree of Doctor of Philosophy
- a Ph.D. minor

Applications are not accepted for the master's degree except as noted below.

MISSION OF THE UNDERGRADUATE PROGRAM IN PSYCHOLOGY

The mission of the undergraduate program in Psychology is to introduce students to the corpus of data on, and explanations of, human nature and behavior. Through the study of abnormal behavior, aging, child development, cognitive processes, decision making, emotion, group behavior, infancy, language, learning and memory, personality, social perception, visual perception, and other related topics, students are introduced to the properties of sensory, cognitive, and affective systems, and of their interrelationships to the reciprocal effects of one person on another and to the effects on behavior of the physical, social, and cultural environment. The major provides student with preparation for professional careers in business, medicine, and counseling as well as for graduate work in psychology.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of Psychology.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of Psychology.

BACHELOR OF ARTS IN PSYCHOLOGY

Major Requirements—Students declaring a major in Psychology must complete a minimum of 70 units of course work in Psychology, 60 of which must be taken in the Psychology department. The remaining 10 units can be taken outside of the Psychology department but must be pre-approved by the student services office or faculty adviser. These courses should represent a coherent thematic focus. One way to achieve this focus is through a field of study. Courses taken to satisfy the 70-unit requirement must be taken for a grade of 'C-' or better (except for courses offered only on a satisfactory/no credit basis). Majors must take PSYCH 1, Introduction to Psychology, and PSYCH 10, Introduction to Statistical Methods. Advanced placement (AP) credit may no longer be used toward the Psychology major requirements. Beyond these two required courses, students must complete at least five of the following eleven core Psychology courses, with a minimum of two from each area A and B:

Area A Courses—

- BIO 20. Introduction to Brain and Behavior
- PSYCH 30. Introduction to Perception
- PSYCH 45. Introduction to Learning and Memory
- PSYCH 50. Introduction to Cognitive Neuroscience
- PSYCH 55. Introduction to Cognition and the Brain

Area B Courses—

- PSYCH 60. Introduction to Developmental Psychology
- PSYCH 70. Introduction to Social Psychology
- PSYCH 75. Introduction to Cultural Psychology
- PSYCH 80. Introduction to Introduction to Personality and Affective Science
- PSYCH 90. Introduction to Clinical Psychology
- PSYCH 95. Introduction to Abnormal Psychology

Students who declared a major in Psychology prior to the 2005-06 academic year may choose to adhere to the 55-unit major requirement, taking PSYCH 1 and 10, five core courses, and elective courses, totaling 55 units.

Students must take one Writing in the Major (WIM) course in Psychology, and should check the *Stanford Bulletin* yearly as these courses may change. The department also strongly recommends that all majors take at least one advanced seminar.

Students may count up to 10 units of research, independent study, and practica (including but not limited to PSYCH 194, 195, 281) toward the Psychology major. Students who are teaching assistants for a Psychology course or are enrolled in the senior honors program are allowed up to 15 units in independent study and research. Any units beyond the limit of 10 or 15 may be counted toward the 180 units required for graduation.

Students who are double majoring or completing a minor degree in another department may not overlap (double-count) courses, unless the overlapping courses constitute introductory skill requirements, such as PSYCH 10, Introduction to Statistical Methods. In this instance, while the course requirement would be satisfied, the units for the course can only be applied to one program of study, not both. Consult the student services office for further clarification.

Summer Quarter Psychology courses are not equivalent to courses given during the regular academic year and, while applicable toward the 70 units needed for the major, may not be used to fulfill the statistics requirement or a core course requirement. Additionally, a course taken during the Summer Quarter cannot be used to replace the grade of a non-Summer Quarter course, even if the title and units of the two courses are the same.

Beyond the Minimal Requirements—The following recommendations may be helpful to students who wish to plan a program which goes beyond the minimal requirements listed above:

1. Within the general major, the student may take advanced undergraduate or graduate courses, including seminars. The student may also take advantage of widespread opportunities for directed research, working closely with individual faculty and graduate students.
2. The student may apply to the senior honors program, described below.
3. The student may elect to pursue one of four fields of study: Cognitive Sciences; Health and Development; Mind, Culture, and Society; or Neuroscience, described below.

The training obtained from the pursuit of any of these options is valuable not only for students considering graduate work in psychology, but also for those thinking of professional careers outside of psychology in fields such as business, counseling, education, law, or medicine.

CREDIT FROM OUTSIDE THE DEPARTMENT

Psychology majors must complete at least 60 units of course work toward their major at Stanford within the Psychology department. Psychology minors may count no more than a total of 10 units credit from outside the department toward the minor. Both majors and minors, under extenuating circumstances, may use one course from outside the department to fulfill core course requirements. Additional courses may be used to fulfill the 70-unit major requirement, but may not be counted as core courses. Please see the student services office for further clarification.

Petition for transfer of credit is rarely granted. In cases where petitioning is necessary, there are two types of credit from outside the department: external transfer credit for courses taken at institutions other than Stanford and credit for courses in other Stanford departments. A student must have already declared Psychology as a major or minor in order to submit a petition for transfer credit. Stanford credit for courses completed at other institutions must have been granted by the External Credit Evaluation section of the Registrar's Office; those units may be applied toward the 180 units required for graduation. To have credit from outside the department evaluated to fulfill requirements toward the Psychology major or minor, students must complete an Undergraduate Petition form, available from the student services office, and submit it with a course syllabus. Students requesting external transfer credit must also submit a copy of the signed transcript from the External Credit Evaluation section of the Registrar's Office showing the number of Stanford units granted for the course. The Psychology department then evaluates external credit courses and courses from other Stanford departments to determine if they can be applied toward Psychology major or minor requirements.

FIELDS OF STUDY

Students in the major program, including those in the senior honors program, may elect to specialize in one of four fields of study: Cognitive Sciences; Health and Development; Mind, Culture, and Society; or Neuroscience. Fields of study consist of a coherent set of courses leading to advanced undergraduate or even graduate-level courses in an area. In the ideal case, the student who specializes would acquire an understanding of a range of psychological processes, as well as an appreciation of the significance of these processes in the chosen area of application. In this way, specialization could facilitate the student's preparation for a professional career in, for example, medicine, business, or counseling, as well as for graduate work in Psychology.

Specialization in a field of study is optional, although students who do not wish to complete all the requirements for a track may still want to use the track as a guideline for an integrated program in Psychology. Students who choose to complete a field of study must meet the requirements for the major plus the additional requirements designated for the field of study. Typically the courses required for a field of study include one or two required courses, four to six recommended courses in Psychology, one or two advanced seminars, and three or four courses in related disciplines. Psychology courses completed for the field of study count toward satisfying the major requirements. Courses from other departments listed for the field of study may count toward the 10 outside units for the major requirement, but must be pre-approved by the student services office or faculty adviser.

HONORS PROGRAM

The senior honors program is designed for exceptionally able Psychology majors who wish to pursue a year of intensive supervised independent research. Admission to the program is made at the end of the student's junior year on the basis of:

- excellent academic performance,
- previous research experience
- two letters of recommendations by faculty and/or graduate students

Applications are available late Spring Quarter and are to be turned in to the student services office with a current transcript and recommendations prior to the student's senior year.

Students interested in the program should involve themselves in research as early as possible and should acquire a broad general background in Psychology, including statistics, and a deep background in their chosen area. The honors program is particularly appropriate for students planning to go to graduate school in Psychology or in other social sciences, as well as in computer science, business, law, and medicine.

During Autumn Quarter of their senior year, honors program students participate in a weekly seminar and meet with their advisers to develop their experimental program and begin data collection. Winter and Spring quarters are devoted to completing the research, analyzing the data, and writing the thesis, which is submitted mid-May. Students give oral presentations of their projects at the annual Honors Convention. This convention is attended by undergraduates, graduate students, and faculty.

MINOR IN PSYCHOLOGY

Declaration—Students who wish to declare a minor field of concentration in Psychology must do so no later than the deadline for their application to graduate.

Requirements—Completion of a minimum of 35 units in Psychology is required for the minor, including PSYCH 1, Introduction to Psychology, and PSYCH 10, Introduction to Statistical Methods, or a comparable statistics course. Advanced placement (AP) credit may no longer be used towards the Psychology minor. The minor must include three of eleven core courses, with a minimum of one from each of two areas (A: BIO 20; PSYCH 30, 45, 50, 55; and B: 60, 70, 75, 80, 90, 95) and elective Psychology courses of at least three units each, totaling 35 units. Students who declared a Psychology minor prior to the 2002-03 academic year may choose any three of the eleven core courses. Students who declared a Psychology minor prior to the 2005-06 academic year may choose to complete seven total courses: PSYCH 1 and 10, three core courses, and two elective courses. Independent study, research, and practica cannot be counted toward the minor. Summer Quarter Psychology courses are not applicable toward the 35 units needed for the minor. All courses used to fulfill the requirements of the minor must be passed with a grade of 'C-' or better, except for courses offered only on a satisfactory/no credit basis. No more than 10 units of transfer credit may be counted toward the Psychology minor.

MASTER OF ARTS IN PSYCHOLOGY

The Department of Psychology offers a Master of Arts degree only to students concurrently enrolled in its Ph.D. program or to students currently pursuing Stanford B.A. or M.A. degrees. In exceptional cases, students concurrently enrolled in another doctoral or professional program at Stanford may also apply for the M.A. degree. Such applicants should consult with the student services office.

All applicants must satisfy University residency requirements for the degree and are responsible for consulting with their primary departments or the Financial Aid Office about the effects of the proposed program on their current funding. General University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

Coterminal Program—Stanford undergraduates who would like advanced training in Psychology may apply for a coterminal M.A. degree in Psychology. To do so, students should consult with the student services office. Along with a coterminal program application, applicants must submit:

1. a statement of purpose
2. a preliminary program plan specifying the courses in which they intend to enroll to fulfill degree requirements
3. at least two letters of recommendation from Stanford faculty members familiar with their academic work
4. a current Stanford undergraduate transcript
5. a written nomination by a member of the Psychology faculty willing to serve as the student's master's degree adviser

This program is limited in size and admission is selective. Applicants must have earned a minimum of 120 units towards graduation as shown on the undergraduate transcript. The department's deadline for the submission of an application to the coterminal program is traditionally in January.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

REQUIREMENTS

Students must complete at least 45 units of Psychology courses for the degree. (For coterminal degree students, course work for the master's degree may not duplicate courses taken for the undergraduate degree.) Of these 45 units, at least 27 must be in Psychology courses numbered 200 or above. Units from research, teaching, practica, independent study, and lab courses, such as PSYCH 258, 269, 275, 281, 282, and 297, may not be counted toward these 27 units. Two of the graduate courses of at least 3 units each (one from Area A and one from Area B below) are required. In addition, at least one upper division statistics course is required. The course must be approved by the student's adviser. It is recommended that all coterminal students enroll in PSYCH 196, Contemporary Psychology.

Courses to be counted toward the master's degree must be passed with a grade of 'B-' or better, unless the course is offered only on a satisfactory/no credit basis. Units from research, teaching, practica, independent study, and lab courses, such as PSYCH 258, 269, 275, 281, 282, and 297, may be counted toward the remaining required 18 units. Psychology courses numbered in the 100-level and courses from other Stanford departments may be used to satisfy the remaining 18 units. Courses specifically for undergraduates, such as undergraduate honors courses, and courses offered in the Summer Quarter may not be counted toward the master's program unit requirements.

Demonstration of competence in the design and execution of psychological research is also required for receipt of the master's degree. This demonstration entails completion of a master's thesis containing original research. If the student is currently doing a senior honors thesis, this honors thesis may be accepted as proof of research competence provided the honors thesis is judged to be master's level research by the student's adviser and the department's graduate program committee. If the student has completed an honors thesis in Psychology in the prior year, the student would be expected to continue independent research during the coterminal year and to submit this research in a written report which, together with the completed honors thesis, would constitute the master's thesis. All students are required to make an oral presentation of their research during the Spring Quarter, and to present their thesis or written report in June.

Applicants to the coterminal program must have an adviser in the department who agrees to supervise the student's research. Students in the program may be terminated if they do not have an adviser, or if they are not making satisfactory progress in research or course work.

Area A Courses—
PSYCH 202. Cognitive Neuroscience
PSYCH 205. Foundations of Cognition
PSYCH 210. Foundations of Memory
PSYCH 221. Applied Vision and Image Systems
PSYCH 228. Ion Transport
PSYCH 251. Affective Neuroscience
PSYCH 261. Emotion
PSYCH 261A. Learning and Cognition in Activity

Area B Courses—
PSYCH 211. Developmental Psychology
PSYCH 212. Social Psychology
PSYCH 213. Affective Science
PSYCH 215. Mind, Culture, and Society
PSYCH 217. Topics and Methods in Cultural Psychology
PSYCH 259. Emotions: History, Theories, Research
PSYCH 271. Applications of Social Psychology

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in Psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit their scores on the general Graduate Record Examination as part of the application. GRE subject scores are recommended.

General University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

In addition to fulfilling Stanford University requirements for the degree, the following departmental requirements are stipulated.

First-Year Course Requirements—During the first year of graduate study, the student must take PSYCH 207, Proseminar for First-Year Ph.D. Graduate Students, at least one approved graduate statistics course, and at least two core courses from the following list:

- PSYCH 202. Neuroscience
- PSYCH 205. Foundations of Cognition
- PSYCH 211. Developmental Psychology
- PSYCH 212. Social Psychology
  - *or* PSYCH 215. Mind, Culture, and Society
- PSYCH 213. Affective Science

Students in each area may be required to take up to two additional non-core graduate courses in their area of specialization.

The student is expected to spend at least half of the time in research from the beginning of the first year of graduate study to the completion of the Ph.D., taking no more than 10 units of course work each quarter. At the end of the first year of graduate study, the student must file with the department a written report of the first-year research activities.

Second Year Course Requirements—By the end of the second year of graduate study, the student should complete the core courses listed above and take a second approved graduate course in statistics.

Third-Year and Beyond—Students are expected to form a research committee, which must include the dissertation reading committee, before the initiation of the dissertation research. The research committee includes the dissertation adviser and consists of at least three faculty members, at least two of whom should be in the Psychology department. For University guidelines for the composition of the dissertation reading committee, see the "Graduate Degrees" section of this bulletin.

The research committee should meet no later than the last day of classes of Spring Quarter of the third year, and determines the timeline for further development of the dissertation research project. Subsequent meetings are triggered by the completion of one of two documents: a dissertation proposal (DP) or a conceptual analysis of the dissertation area (CADA). The timing and sequencing of the DP and CADA are developed by the student in consultation with the committee. As a general guide, one of the two preliminary elements (CADA or DP) should be completed by the end of the third Summer Quarter and the second should be completed by the end of the fourth Spring Quarter. Students are free to alter the membership of the committee at any time during the process, subject to consultation with the adviser.

The DP should be a description of the proposed research. The CADA provides a framework for the research topic of the dissertation, addresses the central issues within the specialty area, and reviews the pertinent literature.

Advanced Course or Minor Requirements—The candidate must complete 12 units of advanced graduate course work or a Ph.D. minor in another department. If a student waives the minor requirement in favor of the 12 advanced units, the student must fulfill the advanced course requirement by taking (a) non-core graduate courses required by a particular area, *or* (b) graduate-level courses in other departments comparable in quality to Psychology's graduate courses. If there is any question about comparability, the student should consult the adviser, student services, and, in some cases, the graduate program committee chair before taking the course.

Orals—The candidate must pass the University oral examination, which also serves as a dissertation defense. A committee is formed to review the oral examination, including the dissertation reading committee, an additional faculty member, and one oral examination committee chair from outside the Psychology department. The oral examination consists of a 40-45-minute presentation to the department of the completed dissertation research. Parents and friends are welcome to attend. Following the presentation, the student and the committee convene for a discussion of the dissertation and the presentation.

Dissertation Requirements—The candidate must complete a dissertation satisfactory to the dissertation reading committee prior to the oral examination. Minor revisions to formatting may be made after the oral examination.

Ph.D. candidacy expires five years after admission to candidacy at the end of the second year of study. Reapplication requires department reexamination.

STUDENT EVALUATIONS

First-Year Evaluation—It is the department's policy to evaluate the progress of each graduate student at the end of the first year of graduate study. As part of the procedure, each student is required to file with the department a report of the first-year research activities.

Students should discuss this report and the evaluation procedures with their adviser as early as possible in their first year. If the student fulfills the academic promise displayed upon entrance, he or she is invited to continue working towards the doctorate.

The first-year evaluation is primarily based on three factors:

1. quality of research carried out in the first year
2. performance in courses (especially required courses)
3. recommendations of the adviser (including a commitment on the part of that adviser to continue in that role).

Second-Year and Beyond Evaluation—A similar evaluation is conducted at the end of each year of graduate training involving the same criteria as the first year; however, the student is not required to submit a paper. Students who are not making satisfactory progress may be dropped from the program.

THE DOCTORAL TRAINING PROGRAM

As indicated by the requirements described above, a student concentrates in any one of several areas within psychology. Regardless of area, however, the training program places emphasis on the development of research competence, and students are encouraged to develop those skills and attitudes that are appropriate to a career of continuing research productivity.

Two kinds of experience are necessary for this purpose. One is the learning of substantial amounts of technical information. A number of courses and seminars are provided to assist in this learning, and a student is expected to work out a program, with his or her adviser, to attain this knowledge in the most stimulating and economical fashion.

A second aspect of training is one that cannot be gained from the courses or seminars. This is firsthand knowledge of, and practical experience with, the methods of psychological investigation and study. These methods include ways of behaving with the subjects being studied. Students are provided with whatever opportunities they need to reach those levels of competence representative of doctoral standing. Continuing research programs, sponsored by members of the faculty, offer direct opportunities for experience in fields represented by the faculty's many research interests.

Each student achieves competence in unique ways and at different rates. Each student and adviser share in planning a program leading to the objectives discussed. The student is expected to spend half of his or her time on research and takes no more than 10 units of course work per quarter. For further information please contact the student services office and the department graduate guide.

TEACHING REQUIREMENT

The department views experience in supervised teaching as an integral part of its graduate program. Regardless of the source of financial support, all students serve as teaching assistants for at least five Psychology courses during their graduate study. Of the courses, two must be PSYCH 1, Introduction to Psychology, or PSYCH 10, 252 or 253, Statistical Methods. Students are discouraged from participating in teaching during the first year of graduate study. Students typically progress from closely supervised teaching to more independent work. Some students may be invited to offer a supervised, but essentially independent, seminar during their final year of graduate study.

PSYCHOLOGY COLLOQUIUM

The Psychology Colloquium meets on most Wednesday afternoons at 3:45 p.m. Speakers from Stanford and other institutions present topics of current interest. Graduate students are expected to attend. Additional announcements may be found at http://www.stanford.edu/dept/psychology/colloquium.

PH.D. MINOR IN PSYCHOLOGY

Candidates for the Ph.D. degree in other departments may elect a minor in Psychology. To obtain a minor, the student must complete 20 units of course work at the graduate level in the Department of Psychology, excluding PSYCH 275 (graduate-level research). Crosslisted graduate courses can be used to satisfy this requirement. All courses counting toward the Ph.D. minor must be passed with a grade of 'B-' or better, unless the course is offered only on a credit/no credit basis.

PUBLIC POLICY

Director: Bruce M. Owen (Stanford Institute for Economic Policy Research)

Deputy Director: Gregory L. Rosston (Stanford Institute for Economic Policy Research)

Associate Director and Senior Lecturer: Geoffrey Rothwell (Economics, Public Policy)

Director of Undergraduate Capstone and Senior Lecturer: Mary Sprague (Public Policy)

Director of Graduate Practicum and Lecturer: Joe Nation (Public Policy)

Executive Committee: Laurence Baker (Medicine), Jonathan Bendor (Graduate School of Business), David Brady (Political Science, Hoover Institution, Graduate School of Business, SIEPR), Samuel Chiu (Management Science and Engineering), Joshua Cohen (Political Science, Philosophy, Law), Morris Fiorina (Political Science, Hoover Institution), David Kennedy (History, emeritus), Lawrence Goulder (Economics, SIEPR), David Grusky (Sociology), Stephen Haber (Political Science, Hoover Institution), Eric A. Hanushek (Hoover Institution, SIEPR), Deborah Hensler (Law), Sunil Kumar (Graduate School of Business), Roger Noll (Economics, emeritus, SIEPR), Leonard Ortolano (Civil and Environmental Engineering), Bruce Owen (SIEPR), Sean Reardon (Education), Lee Ross (Psychology), Gregory Rosston (SIEPR), Debra Satz (Philosophy), John B. Shoven (SIEPR, Economics)

Affiliated Faculty: Jonathan Bendor (Graduate School of Business), Jayanta Bhattacharya (Medicine), Coit Blacker (Freeman Spogli Institute for International Studies), Michael J. Boskin (Economics, Hoover Institution), Paul Brest (Law, emeritus), Jeremy Bulow (Graduate School of Business), Eamonn Callan (Education), Martin Carnoy (Education), John Cogan (Hoover Institution), Joshua Cohen (Political Science, Philosophy, Law), Christophe Crombez (Freeman Spogli Institute for International Studies), Larry Diamond (Freeman Spogli Institute for International Studies, Hoover Institution), Walter Falcon (Freeman Spogli Institute for International Studies, emeritus), Lawrence Friedman (Law), Lawrence Goulder (Economics, Freeman Spogli Institute for International Studies), Deborah Hensler (Law), Pamela Hinds (Management Science and Engineering), Daniel Ho (Law), Nicholas Hope (Stanford Center for International Development), Caroline Hoxby (Economics, Hoover Institution, SIEPR), Jakub Kastl (Economics), Daniel Kessler (Law, Hoover Institution, Graduate School of Business), Pete Klenow (Economics), Stephen Krasner (Political Science, Freeman Spogli Institute for International Studies, Hoover Institution), Jon A. Krosnick (Communication), Claire Lim (Graduate School of Business), Thomas MaCurdy (Economics, Hoover Institution), Robert McGinn (Management Science and Engineering; Science, Technology and Society), Milbrey McLaughlin (Education), Terry Moe (Political Science, Hoover Institution), Norman Nie (Political Science), Jean Oi (Freeman Spogli Institute for International Studies), Joan Petersilia (Law), James Phills (Graduate School of Business), A. Mitchell Polinsky (Law), Walter Powell (Education), Robert Reich (Political Science), Lee Ross (Psychology), Ken Shotts (Graduate School of Business), Samuel So (Medicine), Jeff Strnad (Law), Barton Thompson (Law, Woods Institute, Freeman Spogli Institute for International Studies), Michael Tomz (Political Science, SIEPR), Greg Walton (Psychology), Jonathan Wand (Political Science), Barry Weingast (Political Science, Hoover Institution), Robert M. White (Materials Science and Engineering), Frank Wolak (Economics, Freeman Spogli Institute for International Studies)

Lecturers: Laura Arrillaga (Graduate School of Business), Frank Benest (Public Policy), Ward Hanson (SIEPR), Tammy Frisby (Hoover Institution, Political Science), Dennis Gale (Urban Studies), Jonathan D. Greenberg (Law), Russell Hancock (Public Policy), Adrienne Jamieson (Bing Stanford in Washington), Anjini Kochar (SIEPR), Camille Landais (SIEPR, Economics), Jeffrey Lax (Hoover Institution), Eva Meyersson Milgrom (SIEPR, Sociology), Alyssa O'Brien (Program in Writing and Rhetoric), Nick Sanders (SIEPR), Mark Tendall (Economics), Patrick Windham (Public Policy)

Program Office: First Floor, SIEPR Gunn Building

Mail Code: 94305-6050

Program Phone: (650) 725-0109

Web Site: http://publicpolicy.stanford.edu

Email: publicpolicy@stanford.edu

Courses offered by the Public Policy Program are listed under the subject code PUBLPOL on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE UNDERGRADUATE PROGRAM IN PUBLIC POLICY

The mission of the undergraduate program in Public Policy is to expose students to the concepts and tools used in evaluating public policy options and outcomes, and to prepare students for entry-level positions in organizations concerned with such analysis. The focus is chiefly on domestic policy issues, applicable anywhere in the world. Courses in the major provide students with background in economics and qualitative methods, political science, law, philosophy, ethics, organizational behavior, and social psychology. Economics and quantitative analyses are central to but not sufficient for modern public policy analysis; political science, law, philosophy, organizational behavior, and psychology are among other necessary disciplinary perspectives. Political philosophy and ethics form the foundations of public policy. Political science offers insights to the decision making process and information needs of a democracy. Organizational behavior focuses on the decisions made outside the market environment in hierarchies, bureaucracies, and teams. Nearly all public policy is formulated as law, and economic analysis of legal rules and institutions is key to effective implementation of policy decisions. Seniors have a research capstone requirement consisting either of an honors thesis or participation in a team practicum, conducting applied policy research for an outside client, typically a local or regional agency. Students majoring in Public Policy are prepared for careers in business, law, and governmental agencies, or for further study in graduate or professional schools.

The Public Policy Program offers a Bachelor of Arts, an honors program, and a minor for undergraduates, as well as a coterminal M.A. in Public Policy.

LEARNING OUTCOMES

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Public Policy. Students are expected to demonstrate:

1. knowledge and understanding of Public Policy content material.
2. ability to communicate their ideas clearly and persuasively in written and oral forms.
3. ability to evaluate applied theoretical and empirical work in the discipline.
4. ability to apply skills and knowledge acquired in the curriculum to analyze policy issues and make policy recommendations.

GRADUATE PROGRAMS IN PUBLIC POLICY

University requirements for the master's degree are described in the "Graduate Degrees" section of this Bulletin.

Courses in the graduate program in Public Policy offer advanced skills necessary to assess the performance of alternative approaches to policy making and implementation, evaluating program effectiveness, understanding the political constraints faced by policy makers, and appreciating the conflicts in fundamental hu-

man values that often animate policy debate. After completing the graduate core curriculum, students apply these skills by focusing their studies in a two quarter, 10-unit practicum for the M.P.P., or a 5-unit master's thesis for the M.A. Students in the M.P.P. program also complete at least one concentration tailored to the student's primary degree program or the student's interests and skills.

The Graduate Program in Public Policy offers two master's degrees:

- Master of Public Policy (M.P.P.), a two-year program leading to a professional degree
- Master of Arts (M.A.), a one-year program not intended as a professional degree

The following joint degree programs, permitting students to complete requirements for two degrees with a reduced number of total residency units, are also offered:

- Juris Doctor with a Master of Public Policy (J.D./M.P.P)
- Juris Doctor with an M.A. of Public Policy (J.D./M.A.)
- Doctor of Philosophy in Economics, Education, Management Science and Engineering, Psychology, or Sociology with a Master of Public Policy (Ph.D./M.P.P)
- Master of Business Administration with a Master of Public Policy (M.B.A./M.P.P.)
- Master of Arts in International Policy Studies with a Master of Public Policy (M.A./M.P.P.)
- Master of Science in Management Science and Engineering with a Master of Public Policy (M.S./M.P.P.)

Requirements for the joint degrees differ from completing the two degrees separately. See the "Master's Degrees in Public Policy" section for more details.

BACHELOR OF ARTS IN PUBLIC POLICY

The core courses in the Public Policy Program develop the skills necessary to assess the performance of alternative approaches to policy implementation, evaluate the effectiveness of policies, understand the political objectives and constraints faced by policy makers, and appreciate the conflicts in fundamental human values that often animate the policy debate. After completing the core, students apply these skills by focusing their studies in one of several areas of concentration. The areas of concentration address specific fields of public policy, types of institutions, or a deeper development of the tools of policy analysis. Students design their own concentrations with the help of their faculty advisers and the approval of the program director. Students must submit a list of their proposed concentration course work and a brief written defense of its coherence in advance of taking concentration courses. Areas of concentration are not declared on Axess. They do not appear on the transcript or diploma.

Recent areas of concentration include, but are not limited to:

- Advanced Methods of Policy Analysis
- Design of Public Institutions
- Development and Growth Policies
- Education
- Environment, Resources, and Population
- Health Care
- International Policies
- Law and the Legal System
- Social Policy: Discrimination, Crime, Poverty

Completion of the Bachelor of Arts degree in Public Policy requires a minimum of 87 units of course work.

1. *Preparatory courses (44 units)*—POLISCI 2 or equivalent; ECON 1A, 1B, 50, 51, 102A, 102B; MATH 51; MS&E 180 or PSYCH 138. The U.S. Government and politics requirement can be fulfilled by taking POLISCI 2, by passing a diagnostic exam offered by the Public Policy program, or by receiving a score of at least 4 on the Advanced Placement exam in U.S. government and politics (which appears on the student's Stanford transcript). ECON 50, 51 and MATH 51 must be taken for a letter grade. A maximum of 10 units of the other preparatory courses may be taken as credit/no credit.
2. *Core courses*—A 25-unit sequence of 5-unit PUBLPOL courses (101, 102, 103B, C, or D, 104, and 106), which students should plan to complete by the end of junior year. All core courses must be completed for a letter grade.
3. *Concentration*—Majors must complete at least 15 units of course work in an area of concentration. This post-core course work must be approved by a faculty adviser and the director. Concentration courses must be completed for a letter grade.
4. *Capstone research requirement*—Seniors are required to demonstrate competency in applied policy research. This requirement is fulfilled either by an honors thesis or by participation in a team research project (Practicum) in which small student teams analyze real world policy problems faced by Bay Area agencies and produce a report for use by the client. A seminar for honors students is offered autumn quarter (PUBLPOL 200A, 3 units). The Practicum is offered both Winter and Spring quarters (PUBLPOL 200B and C, 5 units). The Capstone research requirement must be completed for a letter grade.
5. Students must complete the Public Policy core, concentration and the senior capstone requirement with an overall grade point average (GPA) of 2.3 (C+) or higher.
6. It is recommended that the major be declared by the end of sophomore year but no later than the end of Autumn Quarter of the junior year. Major declaration forms are available in the Public Policy Program office and on the web site.

The Public Policy Program encourages students to attend the Bing Stanford in Washington Program and to participate in appropriate Stanford internship programs, especially those available through the Haas Center for Public Service.

HONORS PROGRAM

The Public Policy Program offers students the opportunity to pursue honors work during the senior year. To graduate with honors in Public Policy, a student must:

1. Apply for admission to the honors program no later than the end of Spring Quarter of the junior year.
2. Complete the requirements for the B.A. in Public Policy and achieve an overall grade point average (GPA) of 3.5 in the following courses: the Public Policy core; concentration; Senior Capstone; PUBLPOL 199, Senior Research; and a course in applied econometrics (ECON 102C, ECON 103, ECON 104, STATS 202, PUBLPOL 303C, or POLISCI 150B). Students are encouraged to complete the applied econometrics course by the end of Spring Quarter of the junior year and take PUBLPOL 200A during Autumn Quarter. Courses not taken at Stanford are not included in calculating the GPA.
3. During Senior year, enroll in at least 8 but no more than 15 units of PUBLPOL 199, Senior Research, with the thesis adviser. Students need to contact the program office to have their thesis adviser listed as a 199 instructor. The honors thesis must demonstrate mastery of relevant analytical tools and address a policy issue. All PUBLPOL 199 units must receive a final grade of at least a 'B+.'
4. The honors thesis must be submitted to both the thesis adviser and the Public Policy Program office. In order to be considered for University and department awards, the final thesis must be submitted to the program office no later than the third Wednesday in May in both printed and electronic forms. All other theses must be submitted by the last Friday in May in both printed and electronic forms.

Students who intend to pursue honors work should plan their academic schedules so that most of the core courses are completed before the beginning of the senior year, and all of the core and concentration courses are completed by the end of Winter Quarter of senior year. This scheduling gives students both the time and the necessary course background to complete their honors thesis during Spring Quarter. In addition, prospective honors students are encouraged to enroll in PUBLPOL 197, Junior Honors Seminar,

during Winter or Spring Quarter; this course focuses on developing a research plan and the research skills necessary to complete an honors thesis.

To apply for honors, a student must submit a completed application to the Public Policy Program office with a brief description of the thesis. Applications are found online (http://publicpolicy.stanford.edu/undergraduate/honors) or in the program office. The student must obtain the sponsorship of a faculty member who approves the thesis description and agrees to serve as a thesis adviser. Students intending to write a thesis involving more than one discipline may wish to have two advisers, at least one of whom is affiliated with the Public Policy Program.

Graduation with honors requires that the thesis be approved by both the adviser and the program director. The role of the director is to assure that the thesis deals with an issue of public policy and satisfies the standards of excellence of the program. However, the grade for the honors thesis (PUBLPOL 199 units) is determined solely by the adviser.

Members of the affiliated faculty in Public Policy are available to provide assistance in selecting a thesis topic and adviser.

COTERMINAL M.A. IN PUBLIC POLICY

The coterminal M.A. in Public Policy is a structured program designed to impart the basic analytical tools of public policy analysis, or to permit public policy majors to specialize in an applied field of policy analysis. Most students will complete their M.A. in a fifth year at Stanford; occasionally students may be able to complete their B.A. and coterminal M.A. in the fourth year.

APPLICATION AND ADMISSION

There are three application deadlines for the 2010-11 academic year: November 16, 2010; February 22, 2011; and April 26, 2011. Seniors wishing to apply to the coterminal program must apply by the November or February deadlines.

To apply for admission to the Public Policy coterminal M.A. program, students should submit the following materials directly to the Public Policy office:

1. the coterminal application
2. 1-2 page statement of purpose
3. one page resume
4. a preliminary program proposal
5. a current unofficial undergraduate transcript
6. two confidential letters of recommendation from Stanford faculty members familiar with the student's academic work.

All applicants should have completed, or be currently enrolled in, required preparatory course work (MATH 51, POLISCI 2, ECON 1A, 1B, 50, 51, 52, 102A and 102B) prior to application.

University regulations govern both the coterminal M.A. degree application process and the requirements for the degree. Undergraduates with strong academic records may apply for admission upon completion of 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. The University requires that units for a given course may not be counted to meet the requirements of more than one degree; that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this Bulletin. For University coterminal degree program rules and University application forms, also see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

REQUIREMENTS

To graduate with a coterminal M.A. in Public Policy, students must:

1. Take all courses applied to the coterminal master's degree for a letter grade (with the exception of PUBLPOL 311, which is only offered C/NC). No units are counted for courses in which a student earns a grade less than B-. Courses offered only for C/NC or other non-letter grade system may be applied upon approval of a petition to the program director.
2. Achieve a cumulative grade point average (GPA) of 3.0 (B) or better for all courses taken towards the M.A.
3. Comply with all relevant University and program deadlines and policies.
4. Students seeking the coterminal M.A. in Public Policy follow one of two tracks (A or B) through the program, as described below.

TRACK A

For students who have completed, or will complete, the Public Policy core course curriculum. Track A consists of at least 45 units of course work:

1. 27 or more units in an area of concentration. There are five concentrations:
   - Health Policy
   - Education Policy
   - International Policy
   - Regulatory Policy
   - Environmental Policy

   Each concentration consists of a set of required core courses and a variety of electives. Students must present a coherent written study plan to support concentration course choices, designed in consultation with a faculty adviser and approved by the program director.
2. 4 or 5 units of applied econometrics (ECON 102C, ECON 103, ECON 104, STATS 202, PUBLPOL 303C, or POLISCI 150B)
3. PUBLPOL 302A. Introduction to American Law
4. Year-long attendance and participation in PUBLPOL 311. Colloquium. Students enroll in one quarter of their choosing.
5. Completion of a 10-unit practicum or a faculty-supervised internship
6. All 45 units must be taken in upper division (100-level) courses, and at least 25 of those units must be at the graduate level (200-level and above).
7. Track A students must also complete ECON 52, which does not count toward the 45 units.

TRACK B

For students who will not complete the Public Policy core curriculum. Track B consists of at least 45 units of core subjects in the analysis of public policy.

1. The following preparatory courses are required, but do not count toward the 45-units:
   - ECON 1A, 1B, 50, 51, 52, 102A, 102B
   - MATH 51
   - POLISCI 2 or equivalent
2. The following core courses are required and do count toward the required 45 units:
   - PUBLPOL 201. Politics and Public Policy *or* PUBLPOL 304A. Politics and Collective Action *or* PUBLPOL 214. Collective Choice
   - PUBLPOL 301A. Microeconomics
   - PUBLPOL 202. Organizations and Public Policy *or* MS&E 180. Organizations: Theory and Management *or* PUBLPOL 317. Comparing Institutional Forms
   - PUBLPOL 307. Justice
   - PUBLPOL 301B. Cost-Benefit Analysis and Evaluation
   - PUBLPOL 302A. Introduction to American Law
   - ECON 102C, ECON 103, ECON 104, STATS 202, PUBLPOL 303C, *or* POLISCI 150B
   - PUBLPOL 206. Economics of Legal Rules and Institutions *or* 302B. Introduction to Economic Analysis of Law *and* 302C. Advanced Topics in Law and Economics
   - PUBLPOL 305A. Judgment and Decision Making *or* PUBLPOL 305B. Public Policy and Social Psychology
3. Year-long attendance and participation in PUBLPOL 311, Colloquium. Students enroll in one quarter of their choosing.
4. Students should petition additional advanced policy skills courses to meet the 45-unit degree requirement. All 45 units

must be taken in upper division (100+ level) courses and at least 23 of those units must be taken at the graduate level (200-level and above).

ADVISING

Coterminal M.A. students must meet with their faculty adviser upon acceptance to the program. Advisers must confirm that the courses proposed are likely to be taught during the applicable period, or that appropriate substitute courses are available. Public Policy student services will verify scheduling of courses.

FINANCIAL AID

The Public Policy Program does not provide financial assistance to coterminal M.A. students. For information on student loans and other sources of support, please consult the Stanford Financial Aid Office. Students who enter public service employment with local, state, or federal agencies, schools, or certain non-for-profit organizations may obtain forgiveness for educational loans, based on years of public service employment.

MASTER'S DEGREES IN PUBLIC POLICY

The program offers two master's programs in Public Policy. The Master in Public Policy (M.P.P.) is a two-year professional degree and the Master of Arts in Public Policy (M.A.) is a one-year non-professional degree.

At this time, only currently-enrolled students in other Stanford graduate programs or applicants to those programs may apply for either of the Public Policy master's programs. All Public Policy master's programs require at least one year of study at Stanford beyond the requirements for the other joint or dual degree.

1. Public Policy Joint Degrees. Students enrolled in or applying to the Law, Education, Business, or Humanities/Social Science schools or departments are eligible to apply for Public Policy joint degrees.
   - Juris Doctor and Master of Public Policy (J.D./M.P.P.)
   - Juris Doctor and Master of Arts of Public Policy (J.D./M.A.)
   - Doctor of Philosophy in Education and Master of Public Policy (Ph.D./M.P.P.)
   - Doctor of Philosophy in Economics and Master of Public Policy (Ph.D./M.P.P.)
   - Doctor of Philosophy in Management Science & Engineering and Master of Public Policy (Ph.D./M.P.P.)
   - Doctor of Philosophy in Psychology and Master of Public Policy (Ph.D./M.P.P.)
   - Doctor of Philosophy in Sociology and Master of Public Policy (Ph.D./M.P.P.)
   - Master of Business Administration and Master of Public Policy (M.B.A./M.P.P.)
   - Master of Arts in International Policy Studies and Master of Public Policy (M.A./M.P.P.)
   - Master of Science in Management Science & Engineering and Master of Public Policy (M.S./M.P.P.)

   For further information, see the "Joint Degree Programs" section of this bulletin and the University Registrar's site.
2. Master of Public Policy (M.P.P.) and Master of Arts in Public Policy (M.A.) Dual Degrees

   Any other Stanford graduate student (i.e., not covered in '1' above) is eligible to apply for a dual degree, either the M.P.P. or the M.A. in Public Policy, in addition to the degree program in which they are currently enrolled.

PREREQUISITES

Graduate students in Public Policy are expected to be literate in mathematics and economics at the Stanford equivalent of MATH 51 and ECON 50 before beginning the curriculum. A no-credit refresher course in mathematics and economics is offered in the two weeks preceding the start of Autumn Quarter.

ADMISSIONS

Applications for graduate study in Public Policy are accepted only from students currently enrolled in any Stanford graduate degree program or from external applicants seeking a joint degree. External applicants for joint degrees must apply to the department or school offering the other graduate degree (i.e., Ph.D., M.A., M.S., M.B.A., or J.D.), indicating an interest in the joint degree program; applicants admitted to the other degree program are then evaluated for admission to the M.P.P. or M.A. program. Students currently enrolled in any Stanford graduate program may, with the consent of that program, apply either for the applicable joint degree program or for the dual M.P.P. or M.A. degree. Applications are reviewed and accepted on a rolling basis but must be received by the Public Policy Program office no later than April 15, 2011.

REQUIREMENTS

1. *Core Curriculum—*
   All core courses must be taken for a letter grade and must be completed with an overall grade point average (GPA) of 3.0 or better.
   - PUBLPOL 301A. Microeconomics
   - PUBLPOL 301B. Cost-Benefit Analysis and Evaluation
   - PUBLPOL 302A. Introduction to American Law
   - PUBLPOL 302B. Introduction to Economic Analysis of Law
   - PUBLPOL 302C. Advanced Topics in Law and Economics
   - PUBLPOL 303A. Foundations of Statistical Inference
   - PUBLPOL 303B. Econometrics
   - PUBLPOL 304A. Politics and Collective Action *or* PUBLPOL 214. The Logic of Collective Choice
   - PUBLPOL 202. Organizations and Public Policy *or* PUBLPOL 317. Comparing Institutional Forms
   - PUBLPOL 305A. Judgment and Decision Making
   - PUBLPOL 305B. Public Policy and Social Psychology
   - PUBLPOL 306. Writing and Rhetoric for Policy Audiences (M.P.P. students only)
   - PUBLPOL 307. Justice
2. *Colloquium*—Year-long participation in the weekly colloquium (PUBLPOL 311) is required for all first-year M.P.P. and M.A. students, and strongly encouraged for second-year students. One unit of credit is given, for which students may register in any quarter.
3. *Practicum (M.P.P. students only)*—Completion of the two quarter practicum course, PUBLPOL 309 (10 units, Autumn and Winter quarters), and presentation of a report in which interdisciplinary student teams analyze real world policy issues for an outside client.
4. *Concentration (M.P.P. students only)*—Advanced course work in a specialized field, chosen from the approved list of concentration courses with the prior approval of the student's faculty adviser and the program director.
5. *Master's Thesis (M.A. students only)*—All M.A. students must submit a 5-unit master's thesis, written under the guidance of an adviser who is a member of the Public Policy affiliated faculty on a topic approved in advance by the program director. Students give the program office the name of their thesis adviser during Autumn Quarter and enroll in PUBLPOL 310 during a quarter of their choosing. The 5 units may be spread over multiple quarters, and an 'N' (continuing course) grade is given during any quarters prior to Spring. The thesis must be submitted to the Public Policy Program office in both electronic and printed form no later than the last Friday in May. The final grade for PUBLPOL 310 is the M.A. thesis grade, which is determined solely by the thesis adviser.

M.P.P. AND M.A. DEGREE REQUIREMENTS

1. All graduate degree candidates must submit a Master's Degree Program Proposal to the Public Policy office by the end of Au-

Autumn Quarter and must amend this proposal formally if plans for meeting the degree requirements change.
2. Public Policy students are never required to repeat a course which duplicates material they have already mastered. Students may, by petition, substitute a different course for a core requirement whose material would be duplicative. This flexibility does not reduce the unit requirements for any degree.
3. M.P.P. degree students are not permitted to enroll in PUBLPOL 309. Practicum without having completed the following Core Courses: PUBLPOL 301A, 301B, 302B, 302C, 303A, 303B, 306.

PUBLIC POLICY JOINT DEGREE REQUIREMENTS

1. A joint degree is regarded by the University as distinct from either of its component degrees, and requirements for the joint degree generally differ from the sum of the requirements for the individual degrees.
2. Up to a maximum of 45 units, or one year, of the University residency requirement can be credited toward both degree programs (i.e., the joint degree requirements may contain up to 45 units less than the sum of the individual degree unit requirements). For example, a J.D./M.P.P. has a four-year residency requirement, one year less than the sum of the requirements for the separate degrees. This recognizes that there is a subject matter overlap between the fields comprising the joint degree.
3. The Public Policy Program strives to encourage an intellectual, professional, and social community among its students. For this reason, joint degree students are expected to devote one year of full-time study at Stanford (usually the second) entirely to the Public Policy Program, rather than spacing Public Policy courses throughout their graduate careers. Unavoidable scheduling conflicts involving joint degree students may be mitigated by substitution of equivalent courses approved in advance by petition.
4. Joint degree students are expected to have and to consult regularly with an academic adviser. The adviser is generally a member of the faculty of both of degree programs. The program director is available to make adviser recommendations.
5. In order to take advantage of the reduced residency requirement, joint M.P.P. students must define their area of concentration from among courses offered in their non-Public Policy program.

MINORS IN PUBLIC POLICY

The Public Policy Program offers a minor that is intended to provide students with interdisciplinary training in applied social sciences. Students who pursue the minor are required to take the courses listed below for a total of 35 units in Public Policy and its supporting disciplinary departments. Because University rules prohibit double-counting courses, the requirements for a minor differ according to the student's major requirements. Courses for the minor must be completed for a letter grade.

For students whose major department or program requires no courses in economics and political science, the requirements for a Public Policy minor are:

Subject and Catalog Number	*Units*
ECON 1A,B, 50, 51	20
POLISCI 2*	5
PUBLPOL 101	5
PUBLPOL 104	5

For students who are Economics majors or who satisfy a major requirement by taking ECON 50, but have taken no courses in political science, the requirements for a Public Policy minor are:

ECON 51	5
POLISCI 2*	5
PUBLPOL 101	5
PUBLPOL 102	5
PUBLPOL 103B, C *or* D	5
PUBLPOL 104	5
PUBLPOL 106	5

* The U.S. government and politics requirement can be fulfilled by taking POLISCI 2, passing a diagnostic exam offered by the Public Policy program, or by receiving a score of at least 4 on the Advanced Placement exam in U.S. government and politics (which appears on the Stanford transcript).

For students who are Political Science majors or who satisfy a major requirement by taking POLISCI 2 but no courses in Economics, the requirements for a Public Policy minor are:

ECON 1A,B, 50, 51, 102A	25
PUBLPOL 104	5
PUBLPOL 106	5

For Sociology majors, the requirements for a Public Policy minor are:

ECON 1A,B, 50, 51, 102A	25
PUBLPOL 103B, C *or* D	5
PUBLPOL 104	5

For students who major in another interdepartmental program such as International Relations and who satisfy major requirements by taking ECON 50, POLISCI 2, and an introductory course in statistics such as ECON 102A or STATS 60, the requirements for a Public Policy minor are:

ECON 51, 102B	10
PUBLPOL 101	5
PUBLPOL 102	5
PUBLPOL 103B, C *or* D	5
PUBLPOL 104	5
PUBLPOL 106	5

OVERSEAS STUDIES COURSES IN PUBLIC POLICY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BEIJING

- OSPBEIJ 024. China's Economic Development. 5 units, Rozelle, GER:DB:SocSci

PARIS

- OSPPARIS 124X. Building the European Economy: Economic Policies and the Challenges Ahead. 5 units, Jacques Le Cacheux, GER:DB:SocSci
- OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S. -- a Comparison. 4-5 units, Fessler, GER:DB:SocSci, EC:GlobCom

WINTER QUARTER

MADRID

- OSPMADRID 32. Health Care Systems Design: Spain, Europe, and the United States. 4 units, Baker, GER:DB:HUM

OXFORD

- OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics and Economics. 4-5 units, Robert McMahon, GER:DB:SocSci

SPRING QUARTER

CAPETOWN

- OSPCPTWN 40. Education in the Post-Apartheid City. 4 units, Bardroodien, Aslam Fataar

FLORENCE

- OSPFLOR 24. Economics in the European Setting. 3 units, Eric Bettinger

- OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the "New" European Union. 5 units, Morlino, GER:DB:SocSci

PARIS

- OSPPARIS 33. The Economics of Climate Change: Policies in Theory and in Practice in the EU and the US. 5 units, Christian de Perthuis, Benoit Leguet, GER:DB:SocSci, EC:GlobalCom

SANTIAGO

- OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies. 5 units, Staff, GER:DB:SocSci

RELIGIOUS STUDIES

Emeriti: (Professors) Arnold Eisen, Bernard Faure, René Girard, Edwin M. Good, Robert C. Gregg, Van Harvey, David S. Nivison
Chair: Hester G. Gelber
Professors: Carl W. Bielefeldt (on leave), Hester G. Gelber, Paul Harrison, Thomas Sheehan, Steven Weitzman, Lee Yearley
Associate Professors: Shahzad Bashir, Charlotte Fonrobert, Brent Sockness
Assistant Professor: Behnam Sadeghi (on leave)
Senior Lecturers: Linda Hess, Barbara Pitkin
Lecturers: Zachary Baker, Kirsti Copeland, Sarah Horton, David Kangas, Irene Lin, Azim Nanji, Yuhan S.-D. Vevaina, Candace West
Visiting Professors: Stephen R. Bokenkamp, Paul Crowley, Griffith Foulk
Affiliated Faculty: Vincent Barletta (Iberian and Latin American Cultures), Jean-Pierre Dupuy (French and Italian)
Department Offices: Building 70
Mail Code: 94305-2165
Phone: (650) 723-3322
Web Site: http://stanford.edu/dept/relstud

Courses offered by the Department of Religious Studies are listed under the subject code RELIGST on the *Stanford Bulletin's* ExploreCourses web site.

MISSION OF THE DEPARTMENT

The field of Religious Studies brings a variety of disciplinary perspectives to bear on the phenomena of religion for the purpose of understanding and interpreting the history, literature, thought, social structures, and practices of the religious traditions of the world. Comprised of a dozen regular faculty with particular strengths in the study of Buddhism, Christianity, Islam, and Judaism, it enrolls about thirty graduate students (mostly doctoral) and roughly as many undergraduate majors, minors, and joint majors.

Religious Studies works closely with several related programs at Stanford: the Department of Philosophy, with which it offers a joint undergraduate major; the Ho Center for Buddhist Studies; the Taube Center for Jewish Studies; the Abbasi Program in Islamic Studies; the McCoy Center for Ethics in Society; and the Program in Medieval Studies.

While some undergraduates continue their study of religion in a graduate or professional program, most pursue meaningful and successful careers in business, government, the nonprofit sector, and medicine. In this respect, Religious Studies is an ideal interdisciplinary major in the liberal arts. Graduates of the department's doctoral program generally pursue academic careers and are routinely placed in the best universities and colleges in the country.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of the subject matter of and methods used in the study of religion.
2. skill in reading and interpreting religious texts critically.
3. ability to conduct and present research within the discipline.

These learning outcomes are used both to evaluate students and to assess the department's undergraduate program.

UNDERGRADUATE PROGRAMS IN RELIGIOUS STUDIES

The department offers a Bachelor of Arts major, minor, and honors program in Religious Studies, and a joint major with the Philosophy Department in Religious Studies and Philosophy. Undergraduate courses in Religious Studies are designed to engage students existentially and to assist them in thinking about intellectual, ethical, and sociopolitical issues in the world's religions. The department's faculty seek to provide tools for understanding the complex encounters among religious ideas, practices, and communities, and the past and present cultures that have shaped and been shaped by religion. Courses therefore expose students to: leading concepts in the field of religious studies such as god(s), sacrifice, ritual, scripture, prophecy, and priesthood; approaches developed over the past century, including the anthropological, historical, psychological, philosophical, and phenomenological, that open religion to closer inspection and analysis; and major questions, themes, developments, features, and figures in the world's religious traditions. The department encourages and supports the acquisition of languages needed for engagement with sacred texts and interpretive traditions as well as study abroad at Stanford's overseas centers where religions can be observed and experienced in the culture of their origin.

GRADUATE PROGRAMS IN RELIGIOUS STUDIES

The graduate mission of the department is to provide students with an interdisciplinary setting of study within which to focus on their respective areas of specialization. The department offers an M.A. and a Ph.D. degree in Religious Studies.

BACHELOR OF ARTS IN RELIGIOUS STUDIES

SUGGESTED PREPARATION FOR THE MAJOR

There is no prescribed route or prerequisite to the major; students typically find themselves majoring after taking courses in the department and becoming acquainted with department faculty. Students contemplating the major or joint major are invited to consult with the Director of Undergraduate Studies. The undergraduate student services associate in Building 70 can also field questions regarding the declaration procedure within the department.

DEGREE REQUIREMENTS

The curriculum for majors is designed to move students sequentially from foundational courses, through deeper investigations, culminating in integrative research courses. Thus, the introductory sequence is designed to lead to courses which build on this foundation with topics including: particular traditions such as Judaism or Buddhism; comparative studies such as nonviolence in Hinduism and Buddhism, or Muslim and Christian interpretations of scripture; specific topics such as mysticism, gender and religion, or theodicy; and distinctive approaches such as the philosophy of religion or ritual studies. Majors complete their careers with integrative courses that afford opportunity for research and consolidation of the knowledge and skills gained earlier.

A Bachelor of Arts in Religious Studies requires 60 units of course work. At least 44 units are to be taken in courses numbered

above 100. Ten units out of the 60 may be taken for the grade of C/NC.

REQUIRED COURSES

1. At least 8 of the 60 units must be courses at the introductory level. Students may satisfy this requirement by taking either:
   a. IHUM 68A,B. Ultimate Meanings (Winter/Spring sequence), or
   b. one course in each of the following categories: introduction to religious traditions (courses numbered 11-50) and introductory topics in the study of religion (courses numbered 51-99). In consultation with the Undergraduate Director, one Stanford Introductory Seminar in Religious Studies may be applied to this introductory requirement.
2. At least 29 units are to be taken in intermediate lecture and seminar courses numbered 100-289. Of these, at least two seminars are required from courses numbered above 200. With approval of the Undergraduate Director, language courses related to the student's program of study (such as Arabic, Biblical Hebrew, New Testament Greek, Chinese, or Japanese), but not counted towards the University language requirement, may be counted among these 29 units.
3. 15 units in integrative courses:
   a. Majors' Seminar: RELIGST 290. Theories of Religion (5 units; Winter Quarter of junior year; fulfills WIM requirement; letter grade only)
   b. Senior Essay or Honors Thesis Research: RELIGST 297 (3-5 units; minimum 5 units; up to 10 units over two quarters; graded 'N' until completion of essay or thesis)
   c. Senior Majors' Colloquium: RELIGST 298 (5 units; Spring Quarter; grading option S/NC)
   d. completion of either a senior essay or honors thesis. See below concerning the difference between these options.
4. Each student, in consultation with his/her adviser, works out a focus of study centering either on a particular religious tradition or on a theme or problem that cuts across traditions such as ritual, ethics, scripture, or gender.
5. Students focusing on one religious tradition must take at least 8 units in one or more religious traditions outside their concentration.

SENIOR ESSAY

A 25-30 page essay on a topic chosen by the student and approved by the adviser upon receipt of a student's proposal by the end of the third quarter prior to expected graduation. The character and content of the essay, which is meant to allow the student to call into play knowledge and skills learned in the course of the major, may take several forms. For example, a student may return to a subject studied earlier but now pursued in more depth or from a new perspective, research a recent or new topic of interest in the field, or offer a carefully framed critical assessment of what has been learned in the major based on review of influential sources, theories, and methods of studying religion. The senior essay is read and graded by the student's adviser and one other member of the Religious Studies faculty.

HONORS THESIS

A 40-80 page research paper on a topic chosen by the student and approved by the adviser upon receipt of a proposal in the fourth quarter prior to expected graduation. The paper, supported by mastery of primary and secondary scholarship, advances a well-reasoned, supportable thesis. Writers of honors theses must have a grade point average (GPA) of 3.5 in Religious Studies courses, and at least 3.2 overall, and are expected to have already demonstrated success in writing research papers. The honors thesis is read and graded by the student's adviser and one other member of the Religious Studies faculty. Theses earning a grade of 'B+' or above receive honors.

COGNATE COURSES

The following courses in other departments/programs have been approved by the Chair as fulfilling requirement 2 above.

CLASSGEN 18. Greek Mythology
POLISCI 149S. Islam and the West

MAJOR IN RELIGIOUS STUDIES AND PHILOSOPHY

The departments of Religious Studies and Philosophy jointly nominate for the B.A. in Religious Studies and Philosophy those students who have completed a major in the two disciplines. See a description of this joint major in the "Philosophy" section of this bulletin, or in the guidelines available from the undergraduate director of either department.

MINOR IN RELIGIOUS STUDIES

A Religious Studies minor is a complement to many majors throughout the University. Students contemplating the minor are invited to consult with the Director of Undergraduate Studies. The undergraduate student services associate in Bldg. 70 can also field questions regarding the declaration procedure within the department.

Requirements—A minor in Religious Studies requires a minimum of 30 graded units. Students are encouraged to focus their program of study either in a religious tradition or in a theme that cuts across traditions. In consultation with their advisers, students may design the minor in Religious Studies to complement their major. The minor must be declared no later than the last day of the quarter, two quarters before degree conferral.

Required Courses for the Minor—

1. Two introductory courses. To satisfy this requirement, students take either:
   a. IHUM 68A,B. Ultimate Meanings (Winter/Spring sequence), or
   b. one course in each of the following categories: introduction to religious traditions (courses numbered 11-50) and introductory topics in the study of religion (courses numbered 51-99). In consultation with the Undergraduate Director, one Stanford Introductory Seminar in Religious Studies may be applied to this introductory requirement.
2. At least 22 units in courses at the intermediate and advanced level (above 100), including at least one 200-level seminar.
3. Diversity requirement: Students may not take all courses in one religious tradition.
4. One course in directed reading (RELIGST 199) may count towards the minor.
5. With approval of the Undergraduate Director, one language course related to the student's program of study (such as Arabic, Biblical Hebrew, New Testament Greek, Chinese, or Japanese), but not counted towards the University language requirement, may be counted toward the minor.
6. Courses from other departments may not count towards the minor. (*Exception:* language courses covered by point 5.)

MASTER OF ARTS IN RELIGIOUS STUDIES

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin. The department offers a one-year terminal M.A. program. Students can also earn their M.A. degree as part of their coterminal degree program. The M.A. program serves two groups of students: a) those who wish to prepare for a doctoral program in religious studies and b) those who wish to further deepen their knowledge in an area in which they have acquired some expertise during their undergraduate work.

DEGREE REQUIREMENTS

The following requirements are in addition to the University's basic requirements.

The student completes at least 45 units of graduate work at Stanford beyond the B.A. degree, including either RELIGST 290, Majors Seminar, or, with consent of instructor, RELIGST 304A or B, Theories and Methods. Residence may be completed by three quarters of full-time work or the equivalent.

The student's plan of courses is subject to approval by the Graduate Director. No field of specialization is expected, but students may focus work in particular areas. Advanced and graduate courses in other departments may be taken (see below). No thesis is required; a thesis, if elected, may count for as many as 9 units.

Each student demonstrates reading knowledge of at least one foreign language.

DOCTOR OF PHILOSOPHY IN RELIGIOUS STUDIES

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. The Ph.D. in Religious Studies signifies special knowledge of an interdisciplinary field of study and potential mastery of an area of specialization within it. The faculty of the department have established certain fields of study in which the department's strengths and those of other Stanford departments cohere. They are: Buddhist studies, Islamic studies, Jewish studies, and modern religious thought, ethics, and philosophy. Students who wish to specialize in other fields must obtain early approval by the faculty. Each of these areas of specialization follows a shared structure of study.

DEGREE REQUIREMENTS

The following requirements are in addition to the University's basic requirements.

1. *Residence*—Each student completes three years (nine quarters) of full-time study, or the equivalent, in graduate work beyond the B.A. degree, and a minimum of 135 units of graduate course work (excluding the dissertation).
2. *Required Courses*—The 135 units of graduate course work must include the following:
   RELIGST 304A. Theories and Methods
   RELIGST 304B. Theories and Methods
   RELIGST 391. Pedagogy
   RELIGST 399. Recent Works in Religious Studies
   The remainder of the course work is individually designed, in consultation with the adviser.
3. *Languages*—Each student demonstrates a reading knowledge of two foreign languages, including French or German. One of those language requirements should be fulfilled by the time of advancing to candidacy at the end of the second year. Competence in the second language must be demonstrated at the time of the qualifying examination. Each student also demonstrates reading knowledge of other ancient or modern languages necessary for the field of study, area of specialization, and dissertation topic.
4. *Candidacy*—At the end of each academic year, the department's faculty recommend second-year students for candidacy on the basis of all relevant information, and especially on the student's candidacy dossier that includes the approved declaration of an area of specialization, certification for one foreign language, and two substantial papers written for courses during the previous two years. Students are required to take RELIGST 391 and RELIGST 399 prior to candidacy.
5. *Paper-in-Field*—During the third year, under the supervision of their advisers, students prepare a paper suitable for submission to an academic journal in their field. The paper is read and approved by at least two faculty members in the department. Students are encouraged to register for RELIGST 392 while working on the paper.
6. *Teaching Internship*—At least one teaching internship under the supervision of faculty members is undertaken at a time negotiated with the Graduate Director. Students receive academic credit for the required internship, which is a part of academic training and not of employment.
7. *Qualifying Examination*—To qualify for writing a dissertation, the student must pass a comprehensive examination in the chosen field and the area of specialization, typically during the first quarter of their fourth year. The student must complete the second language requirement before taking the qualifying examination. The qualifying examination is normally conducted by a committee of at least three Academic Council members of the department, one of whom is the adviser. One faculty member may be from outside the department with permission of the Director of Graduate Studies.
8. *Dissertation*—The dissertation contributes to the humanistic study of religion and is written under the direction of the candidate's dissertation adviser and at least two other members of the Academic Council. The University Oral examination is a defense of a completed draft of the dissertation.
   a. *Dissertation Proposal*—Candidates submit their dissertation proposal in consultation with their advisers. It is read by a committee of at least three faculty, of whom one is the adviser (as chair) and the two others are members of the Academic Council. One non-departmental faculty member may be included.
   b. *Dissertation Committee*—The dissertation committee is formed after acceptance of the dissertation proposal. It is normally composed of the dissertation adviser and at least two Academic Council members of the Religious Studies department. One non-departmental faculty member may serve as a reader when approved by the Director of Graduate Studies.
9. *University Oral Examination*—This examination, required by the University of Ph.D. students, is a defense of a completed draft of the dissertation. The composition of the examination committee is set by University regulation: five or more faculty, normally all of whom are members of the Academic Council, one of whom must be outside the department to serve as chair of the committee. Normally, the examining committee includes all qualified members of the dissertation committee.

PH.D. IN RELIGIOUS STUDIES AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Religious Studies and Humanities. AAt this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

PH.D. MINOR IN RELIGIOUS STUDIES

Candidates for the Ph.D. in other departments may select a Ph.D. minor in Religious Studies.

*Requirements—T*he minor requires at least 24 units in Religious Studies at the 200 level or above. Four of the 24 units should be in RELIGST 304 A,B, Theories and Methods.

Required Courses for the Minor—
RELIGST 304A *or* B. Theories and Methods

Optional Courses for the Minor—
The student should choose any of the courses offered in the department at the 200 level or above, for the equivalent of at least 24 units. Other courses can be chosen in consultation with the Graduate Director.

OVERSEAS STUDIES COURSES IN RELIGIOUS STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

SPRING QUARTER

BERLIN

- OSPBER 68. Protestant Reformation. 4 units, Barbara Pitkin; GER:DB:Hum.
- OSPBER 69. Theology in Dark Times: The Churches Under Hitler. 4 units, Brent Sockness; GER:DB:Hum.

KYOTO

- OSPKYOTO 17R. Religion and Japanese Culture. 4-5 units, Catherine Ludvik, GER:DB:Hum, EC:GlobalCom

MADRID

- OSPMADRD 38. Spanish Catholicism: Religion, Mysticism, Architecture, Art. 3 units, Thomas Sheehan.
- OSPMADRD 51. The Meaning of Life: Art, Poetry, Philosophy. 3 units, Thomas Sheehan.

RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

Director: Robert Crews (History)
Professors: Lazar Fleishman (Slavic Languages and Literatures), Gregory D. Freidin (Slavic Languages and Literatures), David J. Holloway (History, Political Science), Nancy S. Kollmann (History), Michael A. McFaul (Political Science, on leave), Norman Naimark (History, on leave), Aron Rodrigue (History), Gabriella Safran (Slavic Languages and Literatures), Nancy B. Tuma (Sociology), Steven J. Zipperstein (History)
Associate Professors: Shahzad Bashir (Religious Studies), Robert Crews (History), Monika Greenleaf (Slavic Languages and Literatures), Amir Weiner (History)
Assistant Professors: Vera Gribanova (Linguistics), Branislav Jakovljevic (Drama), Pavle Levi (Film Studies), Bissera Pentcheva (Art History), Edith Sheffer (History), Nariman Skakov (Slavic Languages and Literatures)
Senior Lecturers: Rima Greenhill (Slavic Languages and Literatures), Katherine Jolluck (History)
Lecturers: Jelena Batrinic (History), Julie Draskoczy (Slavic Languages and LIteratures), Eugenia Khassina (Slavic Languages and Literatures), Jack Kollmann (Center for Russian, East European and Eurasian Studies), Gail Lapidus (Center for Russian, East European and Eurasian Studies), Alma Kunanbaeva (Anthropology), Asya Perelstvaig (Linguistics), Kathryn Stoner-Weiss (Political Science, and Senior Fellow at FSI), Patricia Young (Political Science)
Courtesy Professor: Coit Blacker (Political Science)
Visiting Professors: Alan Timberlake (Slavic Languages and Literatures), Viktor Zhivov (Slavic Languages and Literatures)
Visiting Associate Professor: Ewa Domanska (Anthropology)
Affiliates: Michael B. Bernstam (Hoover Institution), Lera Boroditsky (Psychology), Margaret Brandeau (School of Engineering), Chaim Braun (Freeman Spogli Institute for International Studies), Martin Carnoy (School of Education), Robert Conquest (Hoover Institution), John B. Dunlop (Hoover Institution), Timothy Garton Ash (Hoover Institution), Paul Gregory (Hoover Institution), Siegfried S. Hecker (School of Engineering), Kenneth Jowitt (Hoover Institution), Terry L. Karl (Political Science), David Laitin (Political Science), Douglas Owens (School of Medicine), Bertrand Patenaude (Hoover Institution), William J. Perry (School of Engineering), Dmitri Petrov (Biology), Pavel Podvig (Freeman Spogli Institute for International Studies), Condoleezza Rice (Political Science), Jeffrey Richardson (Freeman Spogli Institute for International Studies), Karen Rondestvedt (Stanford Libraries), Geoffrey Rothwell (Economics), Nancy Ruttenburg (English), Anatol Shmelev (Hoover Institution), Maciej Siekierski (Hoover Institution), Mitchell Stevens (School of Education and Sociology), Ilya Strebulaev (Graduate School of Business), Allen S. Weiner (School of Law)
Center Offices: Encina West, Room 203
Mail Code: 94305-6045
Phone: (650) 723-3562
Web Site: http://CREEES.stanford.edu

Courses offered by the Center for Russian, East European and Eurasian Studies are listed under the subject code REES on the *Stanford Bulletin's* ExploreCourses web site.

The Center for Russian, East European and Eurasian Studies (CREEES) coordinates the University's teaching, research, and extracurricular activities related to the former Soviet Union and Eastern Europe, and administers a one-year interdisciplinary M.A. graduate degree program. Information on the center's degree programs and other activities is available at http://CREEES.stanford.edu. CREEES and its degree programs are directed by the CREEES Steering Committee, composed of faculty members associated with the Center. The program draws on the strengths of nationally recognized area faculty and research affiliates and significant library and archival collections at Stanford. The Center is a U.S. Department of Education Title VI National Resource Center for Russia, East Europe, and Eurasia.

UNDERGRADUATE PROGRAMS IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

The Center for Russian, East European and Eurasian Studies no longer offers an undergraduate minor.

Students interested in a minor should consult the Director of Undergraduate Studies in the Department of Slavic Languages and Literatures which offers the following relevant minors:

- Russian, East European and Eurasian Studies
- Russian Language
- Russian Language, Literature and Culture
- Russian Culture

Slavic Theme House — Slavianskii Dom (SlavDom), at 650 Mayfield Ave., is an undergraduate residence which houses 50 students and offers a wide variety of opportunities to expand knowledge, understanding and appreciation of Russia and the nations of East Europe, the Caucasus and Central Asia.

Overseas Studies Programs — Undergraduates interested in the study of languages, history, culture and social organization of the countries of Russia, Eurasia and East Europe may apply to study at the Stanford centers in Moscow and Berlin. Information about these programs is available at the Bing Overseas Studies Program at http://bosp.stanford.edu.

GRADUATE PROGRAMS IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

The center offers an M.A. in Russian, East European and Eurasian Studies. The center also offers a coterminal M.A. in Russian, East European and Eurasian Studies.

Financial Aid—Subject to funding, CREEES may have a limited number of Foreign Language and Area Studies (FLAS) fellowships for U.S. citizens or permanent residents. Additional financial aid may also be available from CREEES. Applicants to the M.A. program have priority in the annual FLAS competition; in recent years CREEES has also awarded FLAS fellowships to students enrolled in the School of Education and the School of Law. Consult the CREEES associate director for further information about the application and award process. Applications for FLAS fellowships can be obtained at http://CREEES.stanford.edu/grants/.

Doctoral Progams—Since the University does not offer a Ph.D. in Russian, East European and Eurasian Studies, students wishing to pursue a REEES-related doctoral program must apply to one of the departments offering a Ph.D. with an emphasis on Russia, Eurasia, or Eastern Europe, such as the departments of History, Political Science, or Slavic Languages and Literatures.

MINOR IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

UNDERGRADUATE MINOR IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

The Center for Russian, East European and Eurasian Studies no longer offers an undergraduate minor.

Students interested in a minor should consult the "Minors in Slavic Languages and Literatures" section of this bulletin which describes the following relevant minors:

- Russian, East European, and Eurasian Studies
- Russian Language
- Russian Language, Literature, and Culture
- Russian Culture

MASTER OF ARTS IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

CREEES offers a one-year interdisciplinary master's degree program in Russian, East European and Eurasian Studies for students with a strong prior language and area studies background. The program structure allows students the flexibility to pursue their particular academic interests, while providing intellectual cohesion through a required core curriculum that addresses historical and contemporary processes of change in the Russian Federation, Eastern Europe, the Caucasus, and Central Asia. This core curriculum consists of three core courses and REES 200, Core Seminar Series. The program may be taken separately or coterminally with a B.A. degree program. The interdisciplinary M.A. program typically serves three types of students:

1. Those who intend to pursue careers and/or advanced degrees in such fields as business, education, government, journalism, or law, and who wish to establish competence in Russian, East European and Eurasian studies.
2. Those who intend to apply to a Ph.D. program involving Russian, East European and Eurasian studies and who need to enhance their academic skills and credentials.
3. Those who are as yet undecided on a career but who wish to continue an interest in Russian, East European and Eurasian studies.

ADVISING

The advising structure is two-tiered: each M.A. candidate works with the CREEES associate director who advises on the program of course work and monitors the student's progress toward completing the degree. Candidates are also assigned a faculty adviser from the Academic Council faculty, who provides intellectual and academic guidance.

ADMISSION

Applicants apply electronically; see http://gradadmissions. stanford. edu for a link to the electronic application and general information regarding graduate admission. In addition, prospective applicants may consult with the CREEES associate director regarding the application process.

To qualify for admission to the program, the following apply:

1. Applicants must have earned a B.A. or B.S. degree, or the equivalent.
2. Applicants must have completed at least three years of college-level Russian language study or the equivalent prior to beginning the program. Other languages of Eastern Europe, Central Asia, and the Caucasus may be accepted on a case-by-case basis.
3. Applicants whose native language is not English are ordinarily expected to take the Test of English as a Foreign Language (TOEFL) and have the results sent to Graduate Admissions, Office of the University Registrar.
4. All applicants must take the General Test of the Graduate Record Examination and have the results sent to Graduate Admissions, Office of the University Registrar.
5. Applicants must submit a writing sample in English on a topic in Russian, East European, or Eurasian studies.

The deadline for submission of applications for admission and for financial aid is January 11, 2011. Admission is normally granted for Autumn Quarter, but requests for exceptions are considered.

The successful applicant generally demonstrates the following strengths: requisite foreign language study, significant course work in Russian, East European and Eurasian studies in multiple disciplines, outstanding grades in previous academic work, strong writing skills, high GRE scores (particularly verbal and analytical writing), study or work experience in the region, strong letters of recommendation, and a persuasive statement of purpose explaining why and how the program fits the applicant's academic and career goals.

DEGREE REQUIREMENTS

Candidates for the M.A. degree must meet University requirements for an M.A. degree as described in the "Graduate Degrees" section of this bulletin.

The M.A. program in REEES can ordinarily be completed in one academic year by a well-prepared student; longer periods of study are permitted.

Requirements to complete the interdisciplinary M.A. degree are principally ones of distribution, with the exception of three required core courses and a core seminar, as described below. Each student, with the advice of the CREEES associate director, selects courses according to the student's interests, needs, and goals.

All students in the M.A. REEES program must complete a minimum of 48 academic credit units within the following guidelines.

1. *Core courses:* students must complete three core courses. Each year, four to six courses, typically from the History, Political Science, and Slavic Languages and Literatures departments, are designated as M.A. core courses; students may select three of these to meet the core course requirement. Courses selected as core courses examine subject areas of fundamental importance within modern Russian, East European and Eurasian Studies, and address questions of research, methodology, and current scholarship.
2. *Core seminar:* REES 200, Current Issues in Russian, East European and Eurasian Studies, is required of all students in the M.A. program for a total of three academic quarters. The goal of this course is to survey current methodological and substantive issues in Russian, East European and Eurasian studies, acquaint students with Stanford resources and faculty, and present professional development and career options.
3. *Interdisciplinary course work:* a minimum of five graduate courses in Russian, East European and Eurasian studies must be completed and distributed among at least three disciplines. All course work applied to the 48-unit minimum must deal primarily with Russian, Eurasian, or East European studies.
4. *Language study*: students in the program are expected to study Russian or another language of Eastern Europe, Central Asia or the Caucasus. Credit towards the 48-unit minimum (maximum 3 units per quarter, 9 units total) is allowed for advanced language work; in the case of Russian, advanced is defined as third-year Russian language instruction and above. Similar standards apply for other languages.
5. All course work qualifying for the 48-unit minimum (except REES 200) must have a letter grade of 'B' or higher. ('B-' does not count for degree credit, nor does 'S' or 'CR'.)
6. All courses counting towards the 48-unit minimum must be approved by the CREEES associate director, who ensures that planned course work satisfies requirements towards the degree. The CREEES director and steering committee determine the requirements.

Core Courses for 2010-11—

ARTHIST 107A/307A. St. Petersburg: A Cultural Biography (History, Architecture, Urban Planning and the Arts)

HISTORY 204E/307E. Origins of Totalitarianism
HISTORY 322. Early Modern Russia in European Context
REES 320. State and Nation Building in Central Asia
SLAVGEN 166/266. Transcending (Meta)Physical Borders: Russian Cinema since 1964
SLAVGEN 195/295. Russian Theater

Pre-approved courses which may be counted for the M.A. degree in 2010-11—
ANTHRO 147A. Folklore, Mythology, and Islam in Central Asia
ANTHRO 148A/248A. Nomads of Eurasia: Culture in Transition
ARTHIST 106. Byzantine Art and Architecture, 300-1453 C.E.
ARTHIST 208. Hagia Sophia
COMPLIT 219. Dostoevsky and His Time
HISTORY 125. 20th-Century Eastern Europe
HISTORY 137/337. The Holocaust
HISTORY 138A. Germany and the World Wars
HISTORY 185B. Jews in the Modern World
HISTORY 224A/424A. Soviet Civilization
HISTORY 224B/324B. Modern Afghanistan
HISTORY 227/327. East European Women and War in the 20th Century
HISTORY 236A/336A. Nations and Nationalism in East-Central Europe
HISTORY 236D/336D. Cold War Europe
HISTORY 238K/328K. Resistance and Collaboration in Hitler's Europe During World War II
POLISCI 140C. The Comparative Political Economy of Post-Communist Transitions
POLISCI 241L. Democracy and the Market in Eastern Europe
RELIGST 125. Authority of the Past in Islamic Thought
SLAVGEN 145/245. Age of Experiment: From Pushkin to Gogol
SLAVGEN 146/246. The Age of the Great Russian Novel: History and Other Theories of Time
SLAVGEN 147/247. The Age of War and Revolution: A Survey of Russian Literature and Culture, 1900-1950s
SLAVGEN 148/248. Dissent and Disenchantment: A Survey of Literature and Culture, 1953 to Present
SLAVGEN 169/269. Slavic Folklore and Folklore Theory
SLAVLIT 179/279. Literature from Old Rus' and Medieval Russian
SLAVLIT 188/288. Russian Poetry
SLAVLIT 203. Academic Russian
SLAVLIT 211. Introduction to Old Church Slavic
SLAVLIT 224. The Russian Postmodern Novel
SLAVLIT 232. Formalism/Semiotics/Bakhtin: Key Texts
SLAVLIT 272. Osip Mandelstam and the Modernist Paradigm

Additional 2010-11 courses which may be counted for the M.A. degree (with approval) —
ANTRHO 338A. Biohumanities: Continental Philosophy and the Human and Social Sciences
ARTHIST 411. Animacy, Performance, Presence in Medieval Art
COMPLIT 122. Literature as Performance
DRAMA 167/267. Avant Garde Theater
DRAMA 300A. Critical Styles I
FILMSTUD 102. Theories of the Moving Image
FILMSTUD 116/316. International Documentary
FILMSTUD 137/337. European New Wave Cinemas
HISTORY 284/384. The Ottoman Turks in Comparative Perspective: The Inner Life of a Eurasian Empire
HISTORY 299X. Design and Methodology for International Field Research
INTNLREL 122A. The Political Economy of the European Union
IPS 211. The Transition from War to Peace: Peacebuilding Strategies
IPS 219. Intelligence and National Security
IPS 221 International Organizations and Institutions
IPS 241. International Security in a Changing World (Same as POLISCI 114S)
IPS 280. Transitional Justice, International Criminal Tribunals, and the International Criminal Court
LINGUIST 167. Languages of the World
MS&E 193/293. Technology and National Security
POLISCI 141. The Global Politics of Human Rights
POLISCI 210R. International Conflict: Management and Resolution (Same as IPS 250)
POLISCI 214R/314R. Challenges and Dilemmas in American Foreign Policy
POLISCI 242P. The Comparative Politics of Corruption
POLISCI 314D. Democracy, Development, and the Rule of Law (Same as IPS 230)
POLISCI 314S. Decision Making in U.S. Foreign Policy (Same as IPS 314S)
POLISCI 337S. Seminar on Liberation Technologies
RELIGST 222B. Sufism Seminar
RELIGST 224B/324B. Unveiling the Sacred: Explorations in Islamic Religious Imagination
RELIGST 236/336. European Reformations
SOC 109/209. The Sociology of Terrorism
SOC 341W. Workshop: Inequality

Other courses may be counted towards the M.A. by special arrangement with the instructor and the CREEES associate director.

A description of the M.A. program is also available on the web at http://CREEES.stanford.edu/academic/graduate-masters.html and by request from the Center for Russian, East European and Eurasian Studies.

COTERMINAL MASTER'S PROGRAM IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

To qualify for a coterminal M.A. degree in Russian, East European, and Eurasian Studies, besides completing University requirements for the B.A. degree, a student must:

1. Submit a coterminal application for admission to the program no later than the quarter prior to the expected completion of the undergraduate degree, normally Winter Quarter prior to Spring Quarter graduation. Students with advanced placement and transfer credit must apply at least four quarters before the expected master's degree conferral date. The deadline for all coterminal applications to the M.A. program in Russian, East European, and Eurasian Studies is January 11, 2011.
2. Include in the application a program which outlines, by quarter, the schedule of courses the student plans to complete toward the M.A. degree. The student should seek the advice of the CREEES associate director in drafting this schedule. The application also should include:
   a. a current Stanford transcript
   b. a one-page statement of purpose
   c. two letters of recommendation from Stanford professors
   d. a writing sample
3. Applicants must have a grade point average (GPA) of at least 3.0 (B). Coterminal applicants must take the general test of the Graduate Record Examination and have the results sent to Graduate Admissions, Office of the University Registrar.
4. Complete 15 full-time quarters or the equivalent, or three quarters in full-time residence after completing 180 units; and complete, in addition to the 180 units required for the bachelor's degree, a minimum of 48 units for the master's degree.

The same courses may not be counted to meet both undergraduate and graduate requirements, and no courses taken before the junior year may be used to meet the course requirements for the master's degree.

For M.A. degree requirements, see the "Master of Arts in Russian, East European, and Eurasian Studies" section of this bulletin.

SCIENCE, TECHNOLOGY, AND SOCIETY

Emeriti: James Adams (Management Science and Engineering, Mechanical Engineering), Alex Inkeles (Sociology), Walter Vincenti (Aeronautics and Astronautics)

Director: Robert McGinn (Management Science and Engineering; Science, Technology and Society)

Program Committee: Stephen Barley (Management Science and Engineering), Mark Granovetter (Sociology), Hank Greely (Law), Ursula K. Heise (English), Brad Osgood (Electrical Engineering), Eric Roberts (Computer Science), Scott Sagan (Political Science), Rebecca Slayton (Science, Technology and Society), Fred Turner (Communication), John Willinsky (Education)

Lecturers: John Downer, Rebecca Slayton

Affiliated Faculty and Staff: Stephen Barley (Management Science and Engineering), Barton Bernstein (History), Scott Bukatman (Art and Art History), Thomas Byers (Management Science and Engineering), Jean-Pierre Dupuy (French), Hank Greely (Law), Ursula K. Heise (English), Martin Hellman (Electrical Engineering, Emeritus), Sarah Jain (Anthropology), Clifford Nass (Communication), Brad Osgood (Electrical Engineering), Jessica Riskin (History, on leave), Eric Roberts (Computer Science), Scott Sagan (Political Science), Michael Shanks (Classics, Anthropology), Fred Turner (Communication), John Willinsky (Education), Gavin Wright (Economics)

Mail Code: 94305-2120

Phone: (650) 723-2565

Web Site: http://sts.stanford.edu

Courses offered by the Program in Science, Technology, and Society are listed under the subject code STS on the *Stanford Bulletin's* ExploreCourses web site.

Technology and science are activities of central importance in contemporary life, intimately bound up with society's evolving character, problems, and potentials. If scientific and technological pursuits are to further enhance human well-being, they and their effects on society and the individual must be better understood by non-technical professionals and ordinary citizens as well as by engineers and scientists. Issues of professional ethics and social responsibility confront technical practitioners. At the same time, lawyers, public officials, civil servants, and business people are increasingly called upon to make decisions requiring a basic understanding of science and technology and their ethical, social, and environmental consequences. Ordinary citizens, moreover, are being asked with increasing frequency to pass judgment on controversial matters of public policy related to science and technology in society. These circumstances require education befitting the complex sociotechnical character of the contemporary era.

Science, Technology, and Society (STS) is a program devoted to understanding the natures, consequences, origins, and shaping of technological and scientific activities in modern and contemporary societies. Students in STS courses study science and technology in society from a variety of perspectives in the humanities and social sciences. To provide a basic understanding of technology and science, STS majors are also required to achieve either literacy (B.A.) or a solid grasp of fundamentals (B.S.) in some area of engineering or science.

STS courses may be used, individually or in groups, for purposes such as:

1. To satisfy University General Education Requirements (GER)
2. To satisfy the Technology in Society Requirement of the School of Engineering
3. To comprise parts of student-designed concentrations required for majors in fields such as Human Biology and Public Policy
4. To satisfy the requirements of the STS honors program complementing any major
5. To satisfy requirements for majors in STS
6. To satisfy requirements for a minor in STS

STS courses are particularly valuable for undergraduates planning further study in graduate professional schools (for example, in business, education, engineering, law, journalism, or medicine) and for students wishing to relate the specialized knowledge of their major fields to broad technology and science-related aspects of modern society and culture.

UNDERGRADUATE MISSION STATEMENT

The mission of the Science, Technology and Society (STS) Program is to provide Stanford undergraduates with intellectually stimulating education that will prepare them for life in the contemporary era, one in which science and technology are pervasive and potent forces for transformative social change. To that end, STS courses explore the evolving natures and interrelationship of science and technology, influences of science and technology on different kinds of societies, how societies manage and otherwise shape their scientific and technological endeavors and products, and ethical, social, cultural, and policy issues raised by scientific and technological innovations in contemporary societies. STS faculty believe that probing study of this vital subject matter provides an innovative form of liberal arts and pre-professional education, one that helps STS students fulfill their future civic and professional roles in an informed, responsible manner.

STS is an interdisciplinary and multidisciplinary program. STS students learn to critically analyze the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental systems. To a set of core STS courses promoting such learning, Program majors add structured sets of pertinent disciplinary courses in the humanities, social sciences, natural sciences, and engineering. Every STS major completes a capstone project in her or his final year, either an Honors Thesis or a Senior Paper. The capstone project is an integrative research endeavor incorporating prior STS coursework. The Program prepares its majors for successful careers in business, law, medicine, education, engineering, public policy, and public service, for masters-level work in selected humanistic, social scientific, and engineering disciplines, and for doctoral work in STS and related academic areas.

LEARNING OUTCOMES

The program expects undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. These outcomes are evaluated through course work and by assessing each student's senior paper, a 20-to-30-page research product that uses STS concepts and primary evidence to analyze an STS-relevant question, reach a conclusion, and discuss the limitations and significance of the research. Students are expected to demonstrate:

1. knowledge of core concepts, approaches, and issues of the STS field.
2. ability to use STS intellectual resources to analyze and illuminate issues of science and technology in society.
3. ability to critically evaluate and effectively utilize scholarship and empirical evidence in the field of STS.
4. ability to clearly and persuasively communicate about STS issues to a general audience, orally and in writing.

UNDERGRADUATE PROGRAMS IN SCIENCE, TECHNOLOGY, AND SOCIETY

Degree programs in STS are curricula devoted to understanding the nature and significance of technology and science in modern society. Majors analyze phenomena of science and technology in society from ethical, aesthetic, historical, economic, and sociological perspectives. In addition, students pursuing the B.A. degree study a technical field in sufficient depth to obtain a grasp of basic concepts and methods, and complete a structured concentration on a theme, issue, problem, or area of personal interest related to science and technology in society. Those seeking the B.S. degree

complete at least 50 structured units in technology, science, and/or mathematics. The particular technical courses chosen reflect the student's special interest in issue areas of science and technology in society.

BACHELOR OF ARTS IN SCIENCE, TECHNOLOGY, AND SOCIETY

REQUIREMENTS

1. *STS Core* (eight courses)—
   a. Interdisciplinary Foundational course: STS 101 or 101Q
   b. Disciplinary Analyses (five courses with at least one in each category):
      1. Philosophical/Ethical/Aesthetic Perspectives: STS 110, 112, 114; COMM 131; ENGLISH 176
      1. Historical Perspectives: STS 128; CLASSGEN 123, 133; ECON 116; HISTORY 31/131, 41A/141A, 140A, 208A; POLISCI 116
      2. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ECON 113; MS&E 181, 185, 193; POLISCI 114S, 116; SOC 114
   c. Advanced courses (one course in each category):
      1. Disciplinary Analysis: STS 210; CS 181; COMM 168/268; ECON 224, 225, 226; FRENGEN 265; EDUC 358X; HISTORY 243G; ME 214/314; SOC 115
      2. STS 200. Senior Colloquium
2. *Technical Literacy* (five courses)—
   a. CS 105 or 106A or equivalent; and
   b. A four-course sequence (minimum of 12 units) in a field of engineering or science (sample sequences available in the STS office); *or*
   c. Four of the following Engineering Fundamentals courses: ENGR 10, 14, 15, 20, 25, 30, 31, 40, 50, 50M, 60, 62, 70A (see course descriptions in the "School of Engineering" section of this bulletin).
3. *Thematic Concentration* (minimum of 20 units, at least five courses, one each from among those designated on the appropriate concentration course list as foundational and advanced). Thematic concentrations are organized around an STS-related problem or area. The following themes have been pre-certified as declarable fields of concentration on Axess:
   - Interactions of Technology and Science with Aesthetics
   - Development
   - History and Philosophy
   - Information and Society
   - Public Policy
   - Social Change
   - Work and Organizations.

   These concentration themes appear on the transcript but not on the diploma.

   Course lists for these thematic concentrations areas are available in the STS office. A student choosing one of the certified topics may include one or more courses not on the corresponding course list if they are germane to the concentration, meet the student's special interests, and are approved by the STS director and thematic concentration adviser.

   Alternatively, subject to program approval, the student may choose to design a unique thematic concentration topic and course package. A self-designed thematic concentration is not declared on Axess.

   Each thematic concentration, certified or self-designed, requires the signature of an appropriate faculty adviser. See the program director or student services specialist for details.
4. STS majors not writing an honors thesis must produce an original, 20-25 page senior paper on an STS topic of personal interest. Intended as a capstone experience, each student's senior paper is evaluated by an STS faculty committee and placed in the student's permanent STS major file.

HONORS PROGRAM

STS offers students an opportunity to achieve honors through in-depth study of the interaction of science and technology with society. The honors program is open to students majoring in any field, including STS. Students accepted for this program carry out an honors research project, typically beginning in the Winter or Spring Quarter of junior year and finishing by May of senior year. Students who want their projects to be considered for University awards must complete their theses by early May. STS projects usually involve researching and writing an original scholarly essay, although occasionally students have chosen to produce a technical artifact or carry out some other work that itself represents original, creative thinking. When an honors project results in a work other than an essay, the student must also submit an accompanying scholarly exegesis of the work in question. Past honors projects are on file in the STS office library.

ADMISSION

Application for admission to the STS honors program is typically made during the last quarter of the student's junior year. By the end of that quarter, interested students must have a plan for completing all courses required to satisfy honors requirements 1-3 listed below. Students requiring a major research grant should enroll in STS 190, Junior Honors Seminar, in Winter Quarter of the junior year. Work done in STS 190 will enable submission of a research grant proposal that meets the University deadline in early April. Each student seeking admission to the honors program must submit a research proposal to the Honors Director, Rebecca Slayton (rslayton@stanford.edu), including the name of at least one potential thesis adviser. For proposal parameters, see the document *STS Honors Program*, available in the STS office and on the STS web site. Students are also encouraged to apply to join the STS contingent at the Bing Honors College in early September to get a running start on their theses. See http://ual.stanford.edu/OO/honors/BingHonors.html for further details.

REQUIREMENTS

1. *Course Work*—Non-STS majors must complete requirements 1 and 2 of the STS minor and either STS 190 and/or the Bing Honors College. STS majors must complete the STS core. Students pursuing STS honors must also sign up for STS 290 A,B,C, Senior Honors Seminar, in each quarter of the senior year for which the students are on campus. STS majors pursuing honors are not required to enroll in STS 200, Senior Colloquium, or to write a separate senior paper. The minimum GPA for courses taken to meet these requirements is 3.4.
2. *The Honors Project*—An original critical essay or investigative project with accompanying explanatory essay on an STS topic of general importance. To earn honors, students must earn at least a 'B' on the completed thesis.
3. *STS Honors Day*—All students present their research projects at a special public event in early June of the senior year.

If all these requirements are met, the designation "Honors Program in Science, Technology, and Society" is affixed to the student's permanent record and appears in the Commencement program.

COGNATE COURSES

The following cognate courses offered by other departments may be used to fulfill STS major, minor, and honors requirements:

1. *Disciplinary Analysis: Philosophical/Ethical/Aesthetic Perspectives*—
   - COMM 131: Media Ethics and Responsibility
   - ENGLISH 176: Science Fiction
2. *Disciplinary Analysis: Historical Perspectives*—
   - CLASSGEN 123. Urban Sustainability
   - CLASSGEN 133. Invention of Science
   - ECON 116. American Economic History
   - HISTORY 31/131: Science, Technology and Art: The Worlds of Leonardo

- HISTORY 41A/141A. Emergence of Medicine
- HISTORY 140A. The Scientific Revolution
- HISTORY 208A. Science and Law in History
- POLISCI 116. History of Nuclear Weapons

3. *Disciplinary Analysis: Social Science Perspectives*—
   - ANTHRO 82. Medical Anthropology
   - ANTHRO 180. Science, Technology, and Gender
   - COMM 120. Digital Media in Society
   - COMM 169. Computers and Interfaces
   - ECON 113. Economics of Innovation
   - ENGR 145. Technology Entrepreneurship
   - MS&E 181. Issues in Technology and Work for a Post-Industrial Economy
   - MS&E 185. Global Work
   - MS&E 193/193W. Technology and National Security
   - POLISCI 114S. International Security in a Changing World
   - POLISCI 116. History of Nuclear Weapons
   - PUBLPOL 194. Technology Policy
   - SOC 114. Economic Sociology
4. *Disciplinary Analysis, Level II Courses*—
   - CS 181. Computers, Ethics, and Public Policy
   - COMM 168/268. Experimental Research in Advanced User Interfaces
   - ECON 224. Science, Technology, and Economic Growth
   - ECON 225. Economics of Technology and Innovation
   - ECON 226. U.S. Economic History
   - EDUC 358X. Developments in Access to Knowledge and Scholarly Communication
   - FRENGEN 265. The Problem of Evil in Literature, Film, and Philosophy.
   - HISTORY 243G.Tobacco and Health in World History
   - ME 214/314. Good Products, Bad Products
   - SOC 115. Topics in Economic Sociology

BACHELOR OF SCIENCE IN SCIENCE, TECHNOLOGY, AND SOCIETY

The student pursuing the B.S. degree must complete the STS Core (see requirement 1 in "Bachelor of Arts in Science, Technology, and Society" above) and a structured package of at least 50 units of technical courses intended to enable students to understand socially significant technical phenomena in some field of engineering or science. Introductory courses in mathematics or physics (for example, MATH 19 or PHYSICS 19) are not normally counted as parts of this technical depth component.

The B.S. candidate follows one of two models in fulfilling the minimum 50-unit technical depth requirement:

1. *Focused Depth*—at least seven courses amounting to at least 25 units in a single field of science or engineering, with the remaining units (except for at most two stand-alone courses) grouped in sequences of at least three courses each in other fields of science or engineering. For example, a focused depth package might contain eight mechanical engineering, three physics, three mathematics, and three computer science courses, and one course each in electrical engineering and chemistry. At least four of the seven courses in the focused depth area must be advanced, that is, not normally taken in the first year of study in that field.
2. *Clustered Depth*—two or more clusters of at least five courses and 15 units each in different fields of science or engineering, with at most two stand-alone courses, and remaining courses, if any, in sequences of three or more courses. For example, a clustered depth package might contain five-course clusters in computer science, electrical engineering, and physics, three courses in civil engineering, and one course each in biology and chemical engineering. At least two courses in each cluster area must be advanced.

   It is recommended that B.S. majors complete CS 106A or equivalent.
3. Each STS major not writing an honors thesis must produce an original, 20-25 page senior paper on an STS topic of personal interest. Intended as a capstone experience, each student's senior essay is evaluated by an STS faculty committee and placed in the student's permanent STS major file.

COGNATE COURSES

For a list of cognate courses offered by other departments that can be used to satisfy requirements for the B.S. in Science, Technology, and Society, see the "Bachelor of Arts in Science, Technology, and Society" section of this bulletin.

MINOR IN SCIENCE, TECHNOLOGY, AND SOCIETY

Students planning careers in many technical and non-technical fields, including business, education, engineering, science, law, medicine, and public affairs, are faced with important STS issues in their professional practice. Therefore, a minor in STS is likely to prove practically valuable as well as intellectually stimulating.

Requirements—The STS minor requires completion of six courses satisfying the following requirements:

1. *Foundational Course:* STS 101 or 101Q
2. One disciplinary analysis course from each of the following categories:
   a. Philosophical/Ethical Perspectives: STS 110, 112, 114, 115; COMM 131; ENGLISH 176
   b. Historical Perspectives: STS 128; CLASSGEN 123, 133; ECON 116; HISTORY 31/131, 41A/141A, 140A, 208A; POLISCI 116
   c. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ENGR 145; MS&E 181, 185, 193; POLISCI 114S, 116; PUBLPOL 194; SOC 114
3. Two advanced courses, from one or two of the following categories and building on courses taken under requirements 1 and 2:
   a. Philosophical/Ethical/Aesthetic Perspectives: STS 210; CS 181; ME 214/314
   b. Historical Perspectives: ECON 224, 226; HISTORY 243G
   c. Social Science Perspectives: COMM 168/268; ECON 224, 226; EDUC 358X; SOC 115
4. At least one of the courses taken under requirements 1 to 3 should incorporate a weekly small-group discussion.
5. With at most one exception, all courses taken to satisfy STS minor requirements must be taken for a letter grade where available. The exception cannot be STS 101 or STS 101Q.
6. The six courses taken under requirements 1-3 should be chosen so as to realize a measure of intellectual coherence and interrelatedness.

Note—Students wishing to use a course not listed above to satisfy one of the requirements for a minor in STS may petition to do so. For details, inquire at the STS office, Building 200, Room 19.

COGNATE COURSES

For a list of cognate courses offered by other departments that can be used to satisfy requirements for the minor in Science, Technology, and Society, see the "Bachelor of Arts in Science, Technology, and Society" section of this bulletin.

OVERSEAS STUDIES COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

- OSPBER 34. Science and Technology in Nazi Germany. 5 units, David Holloway, GER:DB: SocSci

FLORENCE

- OSPFLOR 38. Water Resources Engineering in Italy: An Historical Perspective. 4-5 units, Leonard Ortolano, GER:DB:EngrAppSci
- OSPFLOR 134F. Modernist Italian Cinema. 5 units, Ermelinda Campani, GER:DB:Hum

WINTER QUARTER

FLORENCE

- OSPFLOR 45. Harmony: Ancient Science in the Italian Renaissance. 3-5 units, Reviel Netz. GER:DB: Hum

SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank, Richard D. Schupbach, Joseph A. Van Campen
Director: Gabriella Safran
Chair of Graduate Studies: Monika Greenleaf
Chair of Undergraduate Studies: Nariman Skakov
Professors: Lazar Fleishman, Gregory Freidin, Gabriella Safran
Associate Professor: Monika Greenleaf
Assistant Professor: Nariman Skakov
Courtesy Professor: Nancy Ruttenberg
Senior Lecturer: Rima Greenhill
Lecturer: Eugenia Khassina
Department Offices: Building 240, Room 102
Mail Code: 94305- 2006
Phone: (650) 723-4438
Email: slavic@stanford.edu
Web Site: http://slavic.stanford.edu

Courses offered by the Department of Slavic Languages and Literatures are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes SLAVGEN (Slavic General), SLAVLANG (Slavic Language), and SLAVLIT (Slavic Literature).

The department supports coordinated study of Russian language, literature, literary and cultural history, theory, and criticism. The department's programs may also be combined with the programs in Russian, East European and Eurasian Studies, Jewish Studies, Film Studies (Russian and East-European film), modern Russian theater, International Relations, Stanford's Overseas Studies, Special Languages Program, and the Honors Program in Interdisciplinary Studies in Humanities (now administered through the Individually Designed Majors Program in the Dean's Office of Humanities and Sciences).

A full undergraduate program provides a choice of several tracks leading to a B.A. (with a major or a minor) or to a B.A. with honors. The department offers a full graduate program leading to an M.A. in Russian and a Ph.D. in Slavic Languages and Literatures. Stanford undergraduates are eligible to apply to the department for a coterminal B.A./M.A. degree. Students in the department's Ph.D. program are required to choose among minor programs in other national literatures, linguistics, Russian, East European, and Eurasian Studies, Jewish Studies, art and music history, theater, or film studies; they may design their own minor, choose the related field option, or participate in the Graduate Program in Humanities leading to the joint Ph.D. degree in Slavic Languages and Literatures and Humanities. Students already enrolled in the joint program with ISH are permitted to complete that degree program; no new students are being accepted.

The department runs a colloquium series, which brings distinguished speakers to Stanford, and organizes international conferences and symposia; and since 1987 maintains, a continuing publication series, *Stanford Slavic Studies*. Along with the Center for Russian, East European and Eurasian Studies, the department offers qualified undergraduates summer grants (on a competitive basis) for intensive Russian language instruction in accredited programs in Russia and the U.S.

Improving cultural understanding is a critical part of the department's mission, and the department offers a full range of courses at all levels, including Freshman and Sophomore Seminars devoted to Russian literature, music and visual arts that do not require specialized knowledge, and advanced research seminars for graduate students. The Slavic theme house, Slavianskii Dom, serves as an undergraduate residence for many students in the program and often hosts program-related activities. Undergraduates may also choose to study in Moscow through the Stanford Overseas Studies Program. The undergraduate program has attracted students seeking careers in journalism, business, international relations, law, and human rights, as well as academia. Russian is still the lingua franca over the vast territory of the former Soviet Union, and a good command of this language offers a gateway to Eurasia's diverse cultures, ethnicities, economies, and religions, including Buddhism, Judaism, and Islam.

Stanford students are in a privileged position in relation to Russian and, more broadly, East European and Eurasian Studies, because of Stanford's faculty resources that are without peer in the U.S. Green Library and the Hoover Institution libraries and archives hold the premier Russian and East European collections, which undergraduates and graduate students use in their research. Department students master a difficult language and a rich and challenging literature, and are rewarded by gaining entry into a unique, powerful, and diverse civilization that defined major trends in the past century and plays an increasingly significant role in the world today.

MISSION OF THE UNDERGRADUATE PROGRAM IN SLAVIC LANGUAGES AND LITERATURES

The mission of the undergraduate program in Slavic Language and Literatures is to expose students to a variety of perspectives in Russian language, history, culture, literature, and philosophical thought. The program offers three tracks. Courses in the Russian Language and Literature track focus on the linguistic and philological study of literature, as well as the history of Russian literature. The Russian Language, Culture, and History track guides students through a comprehensive interdisciplinary study of Russian literature and culture in a historic context. The Russian and Philosophy track provides students with a background in the Russian language and literary tradition with emphasis on philosophical thought. The Slavic Language and Literature major prepares students for future careers in business, government agencies, teaching, and graduate school programs and professional schools.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.
2. critical thinking skills using Russian literary materials.
3. analytical writing skills and close reading skills.
4. skills in active listening and productive communication.
5. a language proficiency in Russian or another Slavic language.

SLAVIC THEME HOUSE

Slavianskii Dom, at 650 Mayfield Avenue, is an undergraduate residence that offers opportunities for students to expand their

knowledge, understanding, and appreciation of Russia, Eastern Europe, and Eurasia.

BACHELOR OF ARTS IN SLAVIC LANGUAGES AND LITERATURES

The department offers two fields of study for undergraduate majors: Russian Language and Literature; and Russian Language, Culture, and History. These fields of study are declared on Axess and appear on the transcript but not on the diploma. The department also offers a degree option in Russian and Philosophy. This option is not declared on Axess and does not appear on the transcript or the diploma.

Writing in the Major—Undergraduates are required by the University to pass at least one writing-intensive course in their field of concentration in order to graduate. Majors in any Slavic track may satisfy the writing requirement by passing SLAVGEN 145 or SLAVGEN 146.

RUSSIAN LANGUAGE AND LITERATURE

The Russian Language and Literature field of study is designed for those students who wish to gain command of the Russian language and to study the nation's literary tradition. Emphasis is placed on the linguistic and philological study of literature, as well as the history of Russian literature and related media in the broader context of Russian culture. Students may explore historically related literary traditions (for example, English, French, German), as well as other related fields. The Russian Language and Literature field of study also welcomes students with an interest in Russian and Slavic linguistics.

Majors who concentrate in Russian Language and Literature must earn a grade point average (GPA) of 2.0 (C) or better in order to receive credit toward the major.

Prerequisites—Completion of SLAVLANG 1, 2, 3, or the equivalent, as determined by the results of the department placement examination.

Requirements—Candidates for the B.A. degree with a Russian Language and Literature field of study must complete an additional 56 units according to the following distribution:

Russian Language—A minimum of 12 units from: SLAVLANG 111, 112, 113, 177, 178, 179, 181, 182, 183. Russian majors' language skills will be evaluated by their language teachers or the Chair of Undergraduate Studies (CUS) at the end of their final quarter of language study.

Russian Literature—The 20-unit core literature sequence consisting of:

- SLAVGEN 145. Age of Experiment
- SLAVGEN 146. The Great Russian Novel
- SLAVGEN 147. The Age of Revolution
- SLAVGEN 148. Dissent and Disenchantment
- SLAVLIT 188. Russian Poetry, or another poetry course offered by the Slavic Department

Electives—Students must take 24 units of electives embracing at least two of the following categories. These courses are chosen in consultation with the department's director of undergraduate studies. With department consent, work in related academic fields may be applied toward the degree requirements. Students who have completed IHUM 28A,B, Poetic Justice: Order and Imagination in Russian Culture, with a grade of 'B' or better may count these 10 units towards elective courses required for the major.

1. Russian language or linguistics; courses for 2010-11 include:
   - SLAVLIT 179/279. Old Russian
   - SLAVLIT 203. Academic Russian
   - SLAVLIT 211. Old Church Slavic
2. Russian literature; courses for 2010-11 include:
   - SLAVLIT 188. Russian Poetry
   - SLAVLIT 224. Russian Postmodern Novel
3. Historically related literatures

Capstone—Students must designate a 200-level course taken in their junior or senior year as a capstone course. Before graduation, skills in writing, textual analysis, and discussion will be evaluated by the CUS based on work submitted for the capstone course.

RUSSIAN LANGUAGE, CULTURE, AND HISTORY

The Russian Language, Culture, and History field of study is for students who want to obtain command of the Russian language and to pursue a broad, interdisciplinary study of Russian literature and culture in an historical context. Emphasis is on the relation of the Russian literary tradition to other arts, including film, as well as the disciplines that have enriched the historical understanding of Russian literature: history, anthropology, communications, art history, political science, and sociology. Majors in the Russian Language, Culture, and History field of study must earn a GPA of 2.0 (C) or better in order to receive credit toward the major.

Prerequisites—Completion of SLAVLANG 1, 2, 3, or the equivalent, as determined by the results of the department placement examination.

Requirements—Candidates for the B.A. degree with a Russian Language, Culture, and History field of study must complete an additional 56 units according to the following distribution.

Russian Language—A minimum of 12 units from: SLAVLANG 111, 112, 113, 177, 178, 179, 181, 182, 183. Russian majors' language skills will be evaluated by their language teachers or the CUS at the end of their final quarter of language study.

19th-Century Russian Literature and History—A minimum of 12 units chosen from the following courses or the equivalent; students must choose one course from Slavic and one course from History:

- SLAVGEN 145, 146
- A pre-revolutionary Russian history course

20th-Century Russian Literature and History—A minimum of 12 units chosen from the following or the equivalent; students must choose one course from Slavic and one course from History.

- SLAVGEN 147 or 148
- A post-revolutionary Russian history course
- History 22N, 20Q, 120-129, or 220-229 will satisfy the history requirements. Contact the Director of Undergraduate Studies with questions.

Electives—In order to complete the basic degree requirements, students must take 24 additional units of course work embracing at least two of the following categories. These courses are chosen in consultation with the undergraduate director. With department consent, work in related academic fields (for example, anthropology, communications, political science, religion, sociology) may apply toward the degree requirements. Students who have completed IHUM 28A, B, Poetic Justice: Order and Imagination in Russian Culture, with a grade of 'B' or better may count these 10 units towards elective courses required for the major.

1. Russian language or linguistics; courses for 2010-11 include:
   - SLAVLIT 179/279. Old Russian
   - SLAVLIT 203. Academic Russian
   - SLAVLIT 211. Old Church Slavic
2. Russian literature; courses for 2010-11 include:
   - SLAVLIT 188. Russian Poetry
   - SLAVLIT 224. Russian Postmodern Novel
3. Russian history

Capstone—Students must designate a 200-level course taken in their junior or senior year as a capstone course. Before graduation, skills in writing, textual analysis, and discussion will be evaluated by the CUS based on work submitted for the capstone course.

COGNATE COURSES

Units earned for completion of the following cognate courses may be applied to unit requirements for the departmental major. Other courses may also be applied toward unit requirements, with the approval of the department.

- ANTHRO 148A/248A. Nomads of Eurasia
- HISTORY 20A/120A. Russian Civilization from Beginnings to the Enlightenment
- HISTORY 20Q. Russia in the Early Modern European Imagination
- HISTORY 22N. Crime, Punishment and Rebellion in Early Modern Russia
- HISTORY 24S. The Soviet Union through Western Eyes: Workers' Paradise and Evil Empire
- HISTORY 123. Reform and Revolution in Modern Russia, 1856-2009
- HISTORY 125. 20th-Century Eastern Europe
- HISTORY 221A. Men, Women, and Power in Early Modern Russia, 1500-1800
- HISTORY 221B. The Woman Question in Modern Russia
- HISTORY 223F/323F. The Nationality Question in the Russian Empire and the Soviet Union
- HISTORY 227/327. East European Women and War in the 20th Century
- HISTORY 229/329. Poles and Jews
- HISTORY 321A. Classics of Russian Historiography
- POLISCI 140C. The Comparative Political Economy of Post-Communist Transitions
- REES 200. Current Issues in Russian, East European, and Eurasian Studies
- SOC 15N. The Transformation of Socialist Societies

RUSSIAN AND PHILOSOPHY

The Russian and Philosophy option offers students the opportunity to gain a command of the Russian language and literary tradition, while gaining a background in philosophical thought, broadly construed. They take courses alongside students in other departments participating in the program in Philosophical and Literary Thought, with administrative staff in the DLCL. This option is not declared on Axess. Majors who concentrate in Russian and Philosophy must earn a grade point average (GPA) of 2.0 (C) or better in order to receive credit toward the major. Courses in other departments may not, in general, be counted toward the Russian language, Russian literature, and elective requirements, but may be counted toward the other requirements.

Prerequisites—Completion of SLAVLANG 1, 2, 3, or the equivalent, as determined by the results of the department placement examination.

Requirements—Candidates for the B.A. degree with a concentration in Russian and Philosophy must complete an additional 67 units according to the following distribution:

Russian Language—A minimum of 12 units selected from: SLAVLANG 111, 112, 113, 177, 178, 179, 181, 182, 183.

Russian Literature—A minimum of 16 units of Russian literature, including the following:

- SLAVGEN 145 *and* 146
- SLAVGEN 147 *or* 148
- SLAVLIT 187 *or* 188

Electives—At least 12 units of electives in Russian language and literature, chosen in consultation with the undergraduate director.

Philosophy and Literature Gateway Course (4 units)—SLAVGEN 181 (same as PHIL 81).

Philosophy Writing in the Major (5 units)—PHIL 80; prerequisite: introductory philosophy course.

Philosophy Core—12 units, including the following:

- Value Theory: a course in the PHIL 170 series
- Theories of Mind, Language, Action: a course in the PHIL 180 series
- History of Philosophy: a course from the PHIL 100-139 series

Related Course—An upper-division course of special relevance to philosophy and literature. A list of approved courses is available from the program director.

Capstone Seminar— One capstone seminar must be taken in the student's senior year. This year's capstone seminars are:

- COMPLIT 154/GERLIT 154. Heidegger on Hölderlin
- PHIL 173A. Aesthetics: Metaphor across the Arts

HONORS PROGRAM

Majors in any track or option with a grade point average (GPA) of 3.3 (B+) or better in their major courses are eligible to participate in the department's honors program. Prospective honors students must choose a senior thesis tutor from among the department's regular faculty in their junior year and may enroll for 2 units of credit in SLAVLIT 189B in Spring Quarter of the junior year to conduct preliminary research and draft an honors proposal under the guidance of their tutor. In addition to the program requirements above, students must also complete the following:

1. Majors who propose a senior project in literature must take a course in literary or cultural theory, such as SLAVLIT 200 (Proseminar in Literary Theory and Study of Russian Literature); this requirement may also be fulfilled by enrollment in DLCL 189 or, with approval of the thesis adviser, in an advanced course related to the area of the student's expected research. Students concentrating in Russian Language, Culture, and History, and pursuing a project in cultural history, must take a course in literary or cultural theory, a graduate seminar in the area of their topic, or DLCL 189, a 5-unit seminar that focuses on researching and writing the honors thesis. DLCL 189 is taken in Autumn Quarter of the senior year. Students concentrating in Russian Language and Literature who propose a senior project in Russian language select their course in consultation with the Director of Undergraduate Studies.
2. SLAVLIT 189A, taken for 5 units of credit while composing the thesis during Winter Quarter. Students who did not enroll in a 189B course in the junior year may enroll in SLAVLIT 189B in Spring Quarter of the senior year while revising the thesis, if approved by the thesis adviser.
3. To qualify for honors, the candidate must receive a grade of 'B' or better on the thesis or project completed during this period. A total of 10-12 units may be awarded for completion of honors course work, independent study, and the finished thesis.

OVERSEAS STUDIES

The department encourages interested students to consider studying abroad at the Stanford Center in Moscow. Some of the courses offered in Moscow taken there may be applied toward the major. For more information on the Moscow program see the "Overseas Studies" section of this bulletin or contact the Overseas Studies office, Sweet Hall, Ground Floor.

MINORS IN SLAVIC LANGUAGES AND LITERATURES

The Department of Slavic Languages and Literatures offers four undergraduate minor options in Slavic Languages and Literature.

The minor is designed for students who, while pursuing a major in another program, seek a comprehensive introduction to Russian culture through Russian language courses, or a combination of minimal proficiency in Russian and courses in the history of Russian culture, or courses on Russian literature in translation and, depending on the student's interest, other forms of the country's cultural expression and social institutions. Students seeking a Slavic minor are encouraged to take advantage of the Bing Overseas Studies Program in Moscow. Students who have chosen one of the minor programs in Russian may use 5 units of IHUM 28A,B credit towards their electives.

MINOR IN RUSSIAN LANGUAGE

Prerequisites—The minor option in Russian Language requires completion of SLAVLANG 51, 52, 53, or a demonstrated equivalent competence, as determined by the departmental Russian language placement examination.

Requirements—Candidates for the B.A. degree with a minor option in Russian Language must complete 24 units of Russian language and literature courses according to the following distribution: 12 to 15 units selected from SLAVLANG 111, 112, 113, 177, 178, 179, 181, 182, 183; the remaining 9-12 units should be chosen from SLAVGEN 145, 146, 147, 148; SLAVLIT 187, 188; other monograph courses offered by the department, or, with the approval of the department's undergraduate adviser, courses in history, politics, linguistics, or other relevant programs.

MINOR IN RUSSIAN LANGUAGE, LITERATURE, AND CULTURE

Prerequisites—The minor option in Russian Language, Literature, and Culture requires completion of SLAVLANG 1, 2, 3, or the equivalent, as determined by the departmental Russian language placement examination.

Requirements—Candidates for the B.A. degree with the minor option in Russian Language, Literature, and Culture must complete 28 units according to the following distribution:

A minimum of 16 units of courses on literature and culture including two from the SLAVGEN 145, 146, 147, 148 sequence (Russian Literature in English Translation), or one from the SLAVGEN 145, 146, 147, 148 sequence and one from the SLAVLIT 187, 188 sequence; and at least one monograph course focusing on a single author.

12 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department's undergraduate adviser, in other relevant programs dealing with Russian culture, politics, society, and history.

MINOR IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

The Slavic department's undergraduate minor in Russian, East European and Eurasian Studies offers students the opportunity to choose courses offered by the Center for Russian, East European and Eurasian Studies (subject code REES) in various departments for their minor.

Requirements—Candidates for the B.A. degree with the minor option in Russian, East European, and Eurasian Studies must complete 28 units according to the following distribution:

1. Two core courses: one on Russia and one on Eastern Europe or Eurasia, to be chosen by the student from an annual list of qualifying courses issued by CREEES for their M.A. students.
2. At least four additional REES courses, totaling at least 20 units.
3. The student's core and additiona courses must include 9units of course work in the Slavic Department, either literature courses or Russian language in the third year or above. Courses must be distributed among at least three disciplines, such as Slavic, History, Political Science, Anthropology, Art and Art History, Economics, Religious Studies, and Sociology. The Slavic Chair of Undergraduate Studies (CUS) determines which courses qualify for the minor.
4. A capstone experience in CREEES, including, but not limited to, one of the following:
   a. a departmental seminar course for advanced undergraduates.
   b. directed reading and research with a Stanford faculty member or a CREEES-approved resident or visiting scholar.
   c. participation in the Stanford Overseas Studies Program in Moscow or Berlin.

Foreign Language—The Slavic/REEES minor has no language requirement, but students are strongly encouraged to attain working competence in Russian or another relevant language. Courses at the third-year level or above in Russian or another language of Central Asia, the Caucasus, or Eastern Europe may be counted towards the Slavic/REEES minor, up to a maximum of 3 units per academic quarter, 9 units total.

Additional Information—Courses counting towards the Slavic/REEES minor may not be counted towards the student's major. Courses taken at Stanford overseas campuses in Moscow and Berlin may count towards the REEES minor, with the approval of the Slavic CUS; at least three courses for the minor must be taken in residence at Stanford.

Approval of Slavic CUS—Students interested in pursuing the Slavic/REEES minor should consult the Slavic Chair of Undergraduate Studies. The minor is declared online using the Axess system. Students declaring the Slavic/REEES minor must do so no later than three quarters prior to their intended quarter of degree conferral. Approval of minor declarations and certification of requirements are made by the Slavic Chair of Undergraduate Studies.

MINOR IN RUSSIAN CULTURE

Candidates for the B.A. degree with the minor option in Russian Culture must complete 36 units according to the following distribution: a minimum of 20 units of courses on literature and culture selected from the SLAVGEN 145, 146, 147, 148 sequence (Russian Literature in English Translation), and two courses focusing on a single author. In addition, one course in Russian history. HISTORY 22N, 20Q, 120-129, or 220-229 satisfy the requirements. No knowledge of Russian is required.

Electives—11 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic department's undergraduate adviser, in other relevant programs dealing with Russian history, politics, society, and culture.

The deadline for minor declarations in all options is no later than the last day of the third quarter before degree conferral.

MINOR IN LITERATURE AND MINOR IN MODERN LANGUAGES

The Division of Literatures, Cultures, and Languages offers two undergraduate minor programs, the minor in Literature and the minor in Modern Languages. These minors draw on literature and language courses offered in this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about these minors and their requirements.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN SLAVIC LANGUAGES AND LITERATURES

The department allows a limited number of undergraduates to work for coterminal B.A. and M.A. degrees in Slavic Languages and Literatures with a concentration in Russian. In addition to University requirements for the B.A. degree, the student must:

1. Submit an application for admission by January 31 of the senior year. Applicants must meet the same general standards as those seeking admission to the M.A. program. Applicants must submit: an application for admission; a written statement of purpose; a transcript; and three letters of recommendation, at least two of which should be from members of the Department of Slavic Languages and Literatures faculty.
2. Meet all requirements for both the B.A. and M.A. degrees. Applicants must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 225 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three graduate-level courses.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and Uni-

versity application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF ARTS IN SLAVIC LANGUAGES AND LITERATURES

University requirements for the M.A. degree are discussed in the "Graduate Degrees" section of this bulletin.

Admission—The requirements for admission to the master's degree program in Russian are:

1. A B.A. (or its equivalent) from an accredited college or university.
2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work in an area of specialization.
3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

The applicant's previous academic training in Russian language and literature normally serves as an indication of competence. Accordingly, the department does not ordinarily consider applications from students who have not had at least three years of college Russian and some undergraduate training in Russian literature of the 19th and 20th centuries. Before registering for the first quarter's work in the department, entering graduate students are required to take placement examinations in Russian. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Course work in third-year Russian and below carries no credit toward either the M.A. or the Ph.D. degree.

Course Requirements—Candidates for the M.A. who are not also candidates for the Ph.D. should plan course work that ensures adequate preparation for the M.A. final examination at the end of the third quarter of work. Ph.D. candidates should attempt to include as many of the department's basic course offerings as possible in the first-year program to ensure sufficient time to complete the M.A. thesis during the fifth quarter of registration. In any case, course work should be planned in consultation with the graduate adviser, whose approval of the overall course load is required.

Candidates for the M.A. must complete a program of 45 units, of which 36 units must be selected from courses given by the department. The other 9 units may, with approval of the candidate's adviser, be selected from courses in related fields. Of the 36 units in the department, a minimum of 9 may be in language and a minimum of 9 in literature. The remaining 18 units may be distributed in accordance with the needs and interests of the student, and with the advice and approval of the department adviser.

No credit toward the M.A. degree is allowed for first- or second-year courses in non-Slavic languages required for the Ph.D. degree.

The M.A. Thesis—A requirement for candidates for a Ph.D., the M.A. thesis represents a complete article-length research paper (6-9,000 words) that, in both form and substance, qualifies for submission to English-language professional publications in the Slavic field. The M.A. thesis must be submitted to the thesis adviser no later than the fifth quarter and approved no later than the sixth quarter of registration.

Final Examination—Students not enrolled in the Ph.D. program may either submit an M.A. thesis or take a final examination. In the latter case, regardless of the area of specialization, the student must demonstrate in a written examination: (1) command of the phonology, morphology, syntax, and lexicology of contemporary Standard Russian sufficient to teach beginning and intermediate courses at the college level; (2) an ability to read contemporary Standard Russian sufficient to assist students studying contemporary Russian poetry or literary prose; and (3) sufficient familiarity with Russian literature of either the 19th or 20th century to successfully handle survey courses dealing with the chosen period of specialization. The examination should be taken at the end of the final quarter of required course work.

DOCTOR OF PHILOSOPHY IN SLAVIC LANGUAGES AND LITERATURES

University requirements for the Ph.D. are discussed in the "Graduate Degrees" section of this bulletin.

Students enrolled in the Ph.D. program in Slavic Languages and Literatures are expected to fulfill the following requirements while meeting the program's deadlines in the course of their progress towards the degree:

1. *Minor or Related Fields*—During the course of study, students must develop substantial expertise in a field contiguous to the area of specialization. A candidate may elect to present a full minor or, in consultation with the graduate adviser, develop a special program in a related field, preferably no later than the second quarter of enrollment.
   a. *Related Field*—A student is required to complete a sequence of basic courses (12 units) in a chosen discipline outside the Department of Slavic Languages and Literatures. The choice of patterns is one of the following:
      1. a sequence of three courses in one West European literature, selected in consultation with the adviser, *or*
      1. three basic courses in comparative literature chosen in consultation with the Director of Graduate Studies (DGS), *or*
      2. a sequence of three courses in another department, selected in consultation with the DGS.
   b. *Minor*—Students electing a minor should take a minimum of 20 units in graduate-level courses in the minor department or fulfill the minor requirements established by that department. Students considering minors should consult with their adviser, the Director of Graduate Studies, the chair of Slavic Languages and Literatures, and the chair of the minor department.
   c. Students who have already enrolled in the Graduate Program in the Humanities to fulfill the department's "minor or related field" requirement may continue in this program (see "Interdisciplinary Program in Humanities" in this bulletin under the DLCL).
2. *Admission to Candidacy*—Candidates should read carefully the general regulations governing the degree, as described in the "Graduate Degrees" section of this bulletin. The department faculty make the decision to advance students to candidacy on the basis of the student's overall progress and promise in the sixth quarter of registration. The candidate by that time must have demonstrated commitment to graduate studies by completing a minimum of 21 content courses (not counting Summer Quarter) with a grade point average (GPA) of 3.3 or better. These must include 14 seminars in the Slavic Department. The candidate must submit a complete draft of an M.A. thesis approved by the thesis adviser and two readers selected by the candidate from among the department's faculty. The M.A. thesis represents a complete article-length research paper (6,000-9,000 words) that qualifies in both form and substance for submission to an English language professional publication in the Slavic field. The deadline for the M.A. thesis approval is the second week of the sixth quarter of registration. Failure to meet these requirements results in termination of enrollment for the Ph.D. Following such termination, the student who has fulfilled all of the M.A. requirements may be given the opportunity to take the M.A. written examination in the history of Russian literature. If successful, the student is then awarded the M.A. degree In exceptional cases, the written examination requirement may be waived at the discretion of the DGS and the chair of the department.
3. *Proficiency Test*—Administered for all entering graduate students, this test determines whether the student's knowledge of Russian language and literature falls below the department's standard. Students who fail to meet the standard in this test are asked to complete appropriate courses in the first year of graduate study.

4. *Course Requirements*—In consultation with the chair of graduate studies, students are expected to take 18 units of credit each quarter of their first year, 10 units each funded summer, and 10 units each quarter thereafter. They are expected to reach 135 units and attain TGR status in the winter of their fourth year. Entering graduate students must enroll in SLAVLIT 200.
5. *Foreign Languages*—A candidate must demonstrate reading knowledge of French or German, plus another language useful for the student's area of concentration, by passing written examinations, or receiving a grade of 'A-' or better in a qualifying class with the consent of the DGS.
6. *Examinations*—A candidate must pass the departmental general qualifying examinations, which has written and oral parts. These must be scheduled early in the seventh quarter of enrollment (preferably a day or two before the beginning of academic instruction). The written part covers the history of Russian literature from the medieval period through the twentieth century. The departmental oral qualifying examination follows no later than two weeks after completion of the written exams. The oral examination committee consists of four faculty members and may include one member representing the student's "minor or related field." (The rest must be drawn from among the Slavic Department faculty.) The student makes a 20-minute presentation, following an academic conference format, and based possibly on the student's M.A. thesis. Each examiner questions the student on the presentation and related topics in the history of Russian literature and the minor or related field. Following the departmental examinations, a candidate must pass a University oral examination, consisting of a defense of a doctoral dissertation prospectus covering content relevant to the area of study, rationale for the proposed investigation, and strategy to be employed in the dissertation research. The prospectus defense is expected to be scheduled at the end of the ninth and in any case, no later than the beginning of the tenth quarter of registration. Note: Ph.D. examinations are scheduled by the graduate student in consultation with the DGS.

Continuation—Continuation in the Ph.D. program is contingent on fulfilling the following criteria: for first-year students, a high quality of performance in course work (decided by department evaluation); for second-year students, satisfactory academic progress, including an M.A. thesis, which should be completed and approved by the second week of the sixth quarter of registration.

Course Work, Breadth Requirements, and Overall Scheduling—

The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements will result in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.

1. Candidates for the Ph.D. degree are free to select course work to suit their individual program of study. However, candidates must do so in consultation with their advisor (DGS or principal dissertation advisor) and are held responsible for all of the areas covered by the general examinations, regardless of whether they have registered for the department's offerings in a given field. For this reason, it is strongly recommended that before taking Ph.D. examinations, students complete seminar-level work directly related to the following broad areas:
   a. Russian poetry
   b. the Russian novel
   c. 20th-century Russian literature
   d. 19th-century Russian literature (the Age of Pushkin and after)
   e. 18th-century Russian literature (the early 1700s to the Age of Pushkin)
   f. medieval Russian literature
   g. a monograph course on a major Russian author
   h. theory of literature relevant to the major field

   The department's general qualifying examinations must be taken early in the first quarter of the third year of study; they may be taken during the second year if the student and the adviser feel this is appropriate. During the two quarters following the departmental general qualifying examinations (the departmental oral examination must be scheduled no later than two weeks after the written part of the exam), the student should be concerned primarily with preparation for the University oral examination (dissertation and prospectus defense), which should take place at the end of the third quarter of the third year or, at the latest, early in the tenth quarter of registration. The fourth and fifth years should be devoted to research, including on-site research in Russia or other relevant area, and writing leading to completion of the Ph.D. dissertation.
2. Students possessing the equivalent of the Stanford M.A. are normally expected to adhere to the schedule for the second, third, and fourth years of work outlined under item 1 above.
3. Students in the Ph.D. program are required to do five quarters of teaching within the funding period, including three quarters of first-year Russian and one quarter as a teaching assistant of literature for a faculty member, usually for one of the survey courses in translation: SLAVGEN 145, 146, 147, 148. Students are required to take a one quarter TA training course, DLCL 201, during their second year.

Non-Slavic Language Requirements—Credit toward either the M.A. or the Ph.D. degrees is not given for first-year courses in languages. It is assumed that, on entering the program, the student has a reading knowledge of either German or French. The reading examination in German or French must be passed by the end of the first year of study. The reading examination in the second language of choice must be passed by the end of the second year of study. Both language examinations must be passed before the candidate takes the University oral examination, that is, before the end of the third year.

PH.D. IN SLAVIC LANGUAGES AND LITERATURES AND HUMANITIES

The department participated in the Graduate Program in Humanities leading to a Ph.D. degree in Slavic Languages and Literatures and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES and may be viewed on the *Stanford Bulletin's* ExploreCourses web site.

SOCIOLOGY

Emeriti: (Professors) Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, Alex Inkeles, Seymour M. Lipset, James G. March, John W. Meyer, W. Richard Scott, Nancy B. Tuma, Morris Zelditch Jr.
Chair: Andrew Walder
Professors: Karen Cook, Paula England, Mark Granovetter, David Grusky, Michael T. Hannan, Douglas McAdam, Susan Olzak, Cecilia Ridgeway, Gi-Wook Shin, C. Matthew Snipp, Andrew Walder, Xueguang Zhou
Associate Professors: Shelley Correll, Michael Rosenfeld
Assistant Professors: Corey Fields, Tomás Jiménez, Monica McDermott, Paolo Parigi, Cristobal Young
Acting Assistant Professor: Rebecca L. Sandefur
Courtesy Professors: Glenn Carroll, Michele Landis Dauber, Larry Diamond, Clifford J. Nass, Walter Powell, Francisco Ramirez
Courtesy Associate Professors: Prudence Carter, Daniel McFarland, Sean Reardon, Jesper Sorensen, Mitchell Stevens
Courtesy Assistant Professor: Christine Min Wotipka
Lecturers: Patricia Chang, Annemette Sorensen, Szonja Szelenyi
Consulting Professor: Ruth Cronkite
Visiting Associate Professors: Eva-Maria Meyersson Milgrom, Patricia Thornton
Department Offices: Building 120, Room 160
Mail Code: 94305-2047
Phone: (650) 723-3956
Web Site: http://sociology.stanford.edu

Courses offered by the Department of Sociology are listed under the subject code SOC on the *Stanford Bulletin*'s ExploreCourses web site.

Sociology seeks to understand all aspects of human social behavior, including the behavior of individuals as well as the social dynamics of small groups, large organizations, communities, institutions, and entire societies. Sociologists are typically motivated both by the desire to better understand the principles of social life and by the conviction that understanding these principles may aid in the formulation of enlightened and effective social policy. Sociology provides an intellectual background for students considering careers in the professions or business. Students may pursue degrees in sociology at the bachelor's, master's, or doctoral levels. The department organizes its courses by areas of study to assist students in tailoring their education and research to their academic interests and career goals.

MISSION OF THE UNDERGRADUATE PROGRAM IN SOCIOLOGY

The mission of the undergraduate program in Sociology is to provide students with the skills necessary to understand and address social problems and inequalities in global, institutional, and interpersonal social relations. At its core, the curriculum in the major is rooted in social theory and the scientific method. Sociology majors are given opportunities to develop a broad understanding of core sociological theories and the methodological skills used to evaluate human behavior and social organizations. Sociology provides an intellectual background for students considering careers in business, social services, public policy, government service, international nongovernmental organizations, foundations, or academia.

The Sociology major consists of a core curriculum plus elective courses intended to provide breadth of exposure to the variety of areas encompassed by sociology.

LEARNING OUTCOMES

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of sociology.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of sociology.

GRADUATE PROGRAMS IN SOCIOLOGY

The Department of Sociology offers three types of advanced degrees:

- the Doctor of Philosophy
- the coterminal Master of Arts in Sociology which is restricted to currently enrolled Stanford undergraduates
- the Master of Arts in Sociology which is available to Stanford students who are currently enrolled in other advanced degree programs

The department does not have a terminal M.A. program for external applicants.

AREAS OF STUDY

The Department of Sociology specializes in four areas of study, allowing students to tailor their education and research to their academic interests and career goals. The four areas of study supported by the department are:

ORGANIZATIONS, BUSINESS, AND THE ECONOMY

Focus is on the arrangements which societies construct for the provision of material goods or services. A formal organization which provides goods or services for profit and sells them through a market is called a business, and the economic system is capitalism. Social needs are also met through government and not-for-profit organizations, such as garden clubs, hospitals, prisons, and the Red Cross; some private and social needs are met outside of organizations, such as health care provided by family members and exchange of favors among friends. Courses stress the factors that determine whether needs that people define are met through markets or non-market allocation, through organizations, or by other means. They also investigate the environmental and technical factors that shape organization structure, the determinants of how efficiently organizations operate, and the interpersonal processes that shape individual behavior within organizations. Careers related to this field include management and administration in business or public settings, management consulting and analysis, and legal studies related to corporations, organizations, and business.

SOCIAL MOVEMENTS, COMPARATIVE POLITICS, AND SOCIAL CHANGE

Focus is on the emergence, reproduction, and change of political systems and institutions, especially on why and how different political systems and social movements appear in different times and places, and how differences in political regimes and economic systems influence attempts to change these systems. The origins and significance of national and transnational social movements, transition to democracy, including revolution, nationalism, and other forms of collective action, in creating and sustaining these changes analyzed across countries and over time. Careers that are relevant to this field include law, public policy, government service, nonprofit and international nongovernmental organizations, business organizations (especially those with international interests), consulting, and managerial jobs.

SOCIAL PSYCHOLOGY AND INTERPERSONAL PROCESSES

Focus is on the social organization of individual identity, beliefs, and behavior, and upon social structures and processes which emerge in and define interpersonal interactions. Processes studied include social acceptance and competition for prestige and status, the generation of power differences, the development of intimacy bonds, the formation of expectation states which govern perform-

ance in task oriented groups, and social pressures to constrain deviance. Foundation courses emphasize the effect of social processes on individual behavior and the analysis of group processes. This field provides training for careers with a significant interpersonal component, including advertising and marketing, business, education, law, management, medicine and health, or social work.

SOCIAL INEQUALITY

Focus is on forms of social inequality, including fields such as: the shape and nature of social inequalities; competition for power; allocation of privilege; production and reproduction of social cleavages; and consequences of class, race, and gender for outcomes such as attitudes, political behavior, and life styles. Many courses emphasize changes in the structure of social inequalities over time, and the processes which produce similarities or differences in stratification across nations. Topics include educational inequality, employment history, gender differences, income distributions, poverty, race, and ethnic relations, social mobility, and status attainment. Careers related to this field include administration, advertising, education, foreign service, journalism, industrial relations, law, management consulting, market research, public policy, and social service.

BACHELOR OF ARTS IN SOCIOLOGY

To declare a major in Sociology, students must email the Sociology student services office once they have declared in Axess; see http://www.stanford.edu/dept/soc/contact/index.html for contact information. It is recommended that new majors schedule a meeting with their assigned faculty adviser promptly after declaring the major.

Major Requirements—To graduate with a B.A. in Sociology, students must complete a minimum of 60 units of course work in the major. Units applied to the major must be taken for a letter grade (except for independent study or directed reading), and a grade point average (GPA) of 2.0 (C) or better must be achieved. Related course work from other departments may fulfill part of this requirement; such work must be pre-approved by the Sociology student services office and a faculty adviser and may not exceed 15 units.

CORE CURRICULUM FOR ALL SOCIOLOGY MAJORS

Students are required to complete a minimum of 40 units of core and foundation course work as detailed below.

CORE COURSES REQUIRED FOR THE MAJOR

The following core courses (25 units) are required of majors. It is recommended that students complete SOC 181B, SOC 180A, and SOC 180B in this order.

1. SOC 170. Classics of Modern Social Theory
2. SOC 181B. Sociological Methods: Statistics, or another introductory statistics course such as STATS 60, PSYCH 10, or equivalent
3. SOC 180A. Foundations of Social Research
4. SOC 180B. Evaluation of Evidence
5. SOC 200. Junior/Senior Seminar for Majors. It is recommended that students take this course in Spring Quarter of the junior year or Autumn Quarter of the senior year. This course fulfills the Writing in the Major (WIM) requirement. Students considering honors are encouraged to enroll in SOC 202, Preparation for Honors Thesis, in the junior year; see "Honors Program" below.

FOUNDATION COURSES REQUIRED FOR THE MAJOR

In addition to core courses, students pursuing the B.A. in Sociology must complete at least three foundation courses (15 units). To ensure breadth of course work, each foundation course must represent a different area of study. For detailed information about Sociology concentration areas, see section on areas of study. Foundation courses, classified by area of study, are as follows:

Organizations, Business, and the Economy

SOC 114. Economic Sociology
SOC 160. Formal Organizations

Social Movements, Comparative Politics, and Social Change—

SOC 110. Politics and Society
SOC 118. Social Movements and Collective Action
SOC 130. Education and Society

Social Psychology and Interpersonal Processes—

SOC 120. Interpersonal Relations
SOC 121. The Individual in Social Structure: Foundations in Sociological Social Psychology

Social Inequality—

SOC 140. Introduction to Social Stratification
SOC 149. The Urban Underclass

In addition to the 40 units required in core and foundation course work, students pursuing the Sociology major must complete 20 elective units of Sociology course work. Students may choose their elective courses according to personal interest; however, students are encouraged to complete some course work at the 200-level. Sociology majors are encouraged to participate in directed research or undertake independent research with Sociology faculty. Students who wish to engage in more in-depth study in a specific area may do so by focusing on course work within an area of study.

HONORS PROGRAM

Sociology majors who wish to complete an independent scholarly project under the direction of a faculty member are encouraged to apply for admission to the department's honors program. Admission to the program requires a grade point average (GPA) of 3.5 or higher in courses taken within the major, and an overall GPA of 3.3 (B+) or higher in all undergraduate course work. Applicants are required to identify a Sociology faculty member to advise on the research and writing of the essay. With the approval of the director of the undergraduate studies committee, students may work with faculty advisers in other departments.

The honors project is typically initiated when a student enrolls in SOC 202, Preparation for Honors Thesis, or SOC 200, Junior/Senior Seminar. Students undertaking an honors project are encouraged to enroll in SOC 202 or 200 in the junior year. Students begin designing their honors project in connection with this seminar and in consultation with the seminar leader. If the student is admitted to the program, the honors project is completed during the senior year.

To apply to the honors program, students must complete the application form available from the Sociology student services office or from the department's web site. This form requires the faculty adviser's endorsement, a brief description of the proposed project, and a copy of the student's unofficial undergraduate transcript. Applicants must submit the completed application to the Sociology student services office no later than the fourth quarter before graduation, typically Spring Quarter of the junior year.

Honors students may earn up to 12 independent study units for work leading to completion of the required honors thesis, excluding units associated with the Junior/Senior Seminar. Completion of honors in Sociology requires: (1) completion of all requirements for the major; and (2) completion of a thesis of honors quality (a grade of 'A-' or higher). The thesis is due on or before the beginning of the End-Quarter period in the student's final quarter before graduating. If the thesis adviser is a faculty member outside the department, the thesis must be submitted to both that sponsor and to the Sociology student services office, who coordinates appointment of a departmental reader to evaluate the paper. Both the honors adviser and the reader must agree that the paper merits honors. In every case, two copies of the final paper must be submitted; one is retained by the department and becomes a part of the department's permanent collection. If a grade of 'A-' is not earned, the thesis credit counts toward meeting the standard major requirements.

MINOR IN SOCIOLOGY

Students must complete a minimum of 35 units in Sociology for the minor. Courses must be taken for a letter grade, and a minimum grade point average (GPA) of 2.0 (C) must be achieved. Students are encouraged to complete a course in sociological theory, such as SOC 170, and to obtain exposure to one of the areas of study. Students who wish to declare a minor in Sociology must do so no later than the deadline for their application to graduate. Related course work from other departments may fulfill a minor requirement. All course substitutions must be pre-approved by the Sociology student services office and the Undergraduate Program Director; a student may not exceed 5 substitution units for the minor.

Course requirements for a minor in Sociology are as follows:

	Units
SOC 1. Introduction to Sociology	5
SOC 180A. Foundations of Social Research, and/or SOC 180B. Evaluation of Evidence	5
Two foundation courses; see foundation courses required for the major above	10
Additional course work in the department (100- or 200-level courses)	15
Total course work required	35

COTERMINAL MASTER OF ARTS IN SOCIOLOGY

Stanford undergraduates, regardless of undergraduate major, who wish to pursue an M.A. in Sociology may apply for the coterminal master's program. The coterminal M.A. in Sociology is a flexible, self-designed program. Most students complete their M.A. in a fifth year at Stanford; occasionally students are able to complete their B.A. and coterminal M.A. in the fourth year.

Application and admission—Undergraduates must be admitted to the program and enrolled as a graduate student for at least one quarter prior to their B.A. conferral. A cumulative GPA of at least 3.5 in previous undergraduate work is required for admission; GRE test scores are required. It is highly recommended that applicants have completed at least one Sociology course at the 100 level with a grade of 'B' or better. The department accepts applications once a year; the application deadline is February 15th for admission in the Spring quarter immediately following. There are no exceptions to this deadline. All application materials are submitted directly to the Sociology graduate student services office. To apply for admission to the Sociology coterminal M.A. program, students must submit the coterminal application and the following: (1) a 2-5 page statement of purpose; (2) a preliminary program proposal that specifies at least 45 units of course work relevant to the degree program with at least 40 units in Sociology; (3) a current unofficial undergraduate transcript; (4) two letters of recommendation from Stanford faculty familiar with the student's academic work; and (5) GRE scores. The department does not fund coterminal M.A. students.

Program requirements—Coterminal M.A. students are required to take 45 units of course work during their graduate career; 40 of these units must be in Sociology courses. Students who wish to engage in more in-depth study in a specific area may do so by focusing on course work within an area of study. All units for the coterminal M.A. must be taken at or above the 100 level; advanced-level course work is encouraged and a minimum of 20 units must be taken at the 200 level. Students who wish to take courses outside the department must seek prior approval from the Sociology student services office; coterminal master's students are limited to 5 units from outside of the department; outside courses must be taken in other Social Science departments. Students may transfer a maximum of 10 units from their undergraduate career; to be eligible for transfer, courses must have been taken in the two quarters preceding admission to the M.A. program. All units applied to the coterminal master's degree must be taken for a letter grade and an overall grade point average (GPA) of 3.0 (B) or better is required for the degree. Because research methods are an important component of graduate training in the social sciences, coterminal students are encouraged to take SOC 180A, Foundations of Social Research, and 180B, Evaluation of Evidence, in sequence when possible. These methods courses provide skills for research opportunities within the department and in academic or professional careers. Coterminal M.A. students should meet with their assigned faculty adviser upon acceptance to the program.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/pdf/CotermApplic.pdf. For detailed information regarding the Sociology coterminal M.A. and how to apply, see http://www.stanford.edu/dept/soc/coterminal/index.html.

MASTER OF ARTS FOR CURRENT GRADUATE STUDENTS IN SOCIOLOGY

The M.A. degree in Sociology is available to current Ph.D. candidates in Sociology and to students in advanced degree programs (Ph.D., J.D., M.D.) from other Stanford departments and schools.

For the M.A. degree, students must complete a minimum of 45 units of Sociology course work with a grade point average (GPA) of 3.0 (B) or better. All 45 units must be taken in courses taught by Sociology faculty. Students must enroll in SOC course offerings; crosslisted offerings are not accepted. All courses must be taken for a letter grade if possible. Workshop, research, directed reading, and independent study units do not count towards the M.A.

University regulations pertaining to the M.A. are listed in the "Graduate Degrees" section of this bulletin.

Students who wish to engage in more in-depth study in a specific area may do so by focusing on course work within an area of study.

No thesis is required.

While formal application to the M.A. program is not required, applicants from outside of the Sociology department must submit to the Sociology student services office:

1. a completed Graduate Authorization Petition form, available electronically through Axess for submission to the Office of the University Registrar
2. a completed Program Proposal for an M.A. form
3. a short statement of purpose

Sociology Ph.D.s typically receive their M.A. in their second or third year of graduate study. Interested students from other degree programs should visit the department's web site here at http://www.stanford.edu/dept/soc/doctoral/magrads.html.

DOCTOR OF PHILOSOPHY IN SOCIOLOGY

The Ph.D. curriculum and degree requirements are designed to provide students with the knowledge and skills to become proficient scholars and teachers. Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty and the following actions may take place: the grade stands and the student's academic performance is monitored to ensure that satisfactory progress is being made; the grade stands and the student is required to revise and resubmit the work associated with that course; or the student may be required to retake the course. The following program requirements apply to students who entered the Ph.D program in 2010-11; students admitted prior to 2010 should consult the department or the Bulletin from their year of admission for requirements specific to their cohort.

Students must complete the following department requirements for the Ph.D. degree in Sociology:

1. Students must enroll in SOC 305, Graduate Proseminar, in Autumn Quarter of the first year; the course provides an introduction and orientation to the field of sociology, and to the de-

partment and faculty. One unit of credit is given for this course; grading is on a satisfactory/no credit basis.

2. Students are required to complete 45 units of course work in Sociology in the first academic year, then 15 units of Sociology course work in the second academic year. Course work excludes workshop, independent study, and directed reading units.
3. Students must take two sociological theory courses. One course should be in sociological theory (SOC 370A or 370B or equivalent), and the second course should be on the development of theory and research design (SOC 372 or equivalent).
4. Each student must complete a series of required courses in methodology as well as one elective from a list of approved courses. Students with little background in statistics are encouraged to take SOC 281B or an equivalent statistics course such as STATS 60 or PSYCH 10.
5. Students must complete four broad survey courses to demonstrate command of a range of sociological literatures. Each year the department specifies which courses meet this requirement, and will undertake to ensure that an adequate selection of such courses is offered. A list of courses that generally fulfill this requirement is listed in the requirements section below. Students should consult with their advisor to ensure that the combination of courses selected to meet this requirement exhibits sufficient breadth. This requirement is normally completed by the end of the second year of residency and must be met by the end of the third year of residency.
6. Beginning in year two, doctoral students are required to enroll in at least one workshop each quarter. Sociology workshops are offered for 1-2 units on a credit/non-credit basis only and attendance is required to receive course credit. The Graduate Studies Director may approve a student's petition to attend a workshop when enrollment is prohibited by unit constraints; such attendance is not noted on the transcript. A list of approved workshops that fulfill this requirement is listed in the requirements section below.
7. There are two qualifying examinations. The first examination is taken immediately before the Fall Quarter of the second year of residence. The examination will cover two fields of the student's choosing, and will be based on standard faculty-generated reading lists for each field. Students will write one essay on each subject area, and will have one week to write and submit their essays. The second examination is a longer critical essay that focuses on a reading list devised by the student jointly with their faculty advisor, due by May 15 of the second year in residence. Students may petition to submit a research paper in lieu of the critical essay. Both examinations will be graded by two faculty members, and the grades on these qualifying exams are an important component of the decision to advance a student to candidacy.
8. Students must complete three quarters of teaching apprenticeship in departmental courses, or in other courses by approval. Work as either a teaching assistant (TA) under the supervision of a faculty member or as a teaching fellow (TF) fulfills this requirement. Students are required to take SOC 300, Workshop: Teaching Development, in Spring Quarter of the first year. In addition, students are encouraged to take advantage of department and University teacher training programs. Students for whom English is a second language are expected to acquire sufficient facility in English to be an effective teacher.
9. As partial preparation for becoming an accomplished researcher, each student must complete three quarters of research experience, working under the supervision of one or more faculty members, including regular, emeritus, and affiliated faculty. The experience may involve paid (or unpaid) work as a Research Assistant (RA). With the approval of the Director of Graduate Studies, research experience may be acquired by involvement in research projects outside the department. It is recommended that students complete their research requirements early in their graduate program; the requirement must be completed by the end of the fourth year of residency.
10. In preparation for a career of writing scholarly papers, each student must complete a research paper in the third year of residency. This third-year paper may be on any sociological topic, and may address theoretical, empirical, or methodological issues. The paper is expected to reflect original work and be of publishable quality. A two-person committee that includes the primary advisor evaluates the paper. Although the reading committee is usually comprised of two regular faculty members in the department, emeritus and other faculty outside of the department may serve as a committee member with prior approval. The two readers of the third-year paper committee will provide a review that speaks to (1) whether the paper is publishable and whether the student should therefore invest in attempting to publish it, and (2) what types of revisions, insofar as the paper is publishable, that the student should be pursuing to ready the paper for publication. These comments will be reported to the Director of Graduate Studies. Additionally, the committee should set up a meeting with the student to discuss these reviews before the end of the Spring Quarter. To ensure that students are making adequate progress on their paper, students are required to provide a first draft of the paper to readers by April 1st. The final deadline for paper submission is May 15th.
11. Students are required to present at least two papers at a major professional meeting (e.g., ASA) in their first five years of graduate study.
12. Each student must complete and defend a doctoral dissertation. At the choice of the student (and in consultation with her or his advisor), the dissertation requirement may be met either by (1) submitting the usual book-length document of the sort now required, or (2) submitting three independent papers. The papers may address the same topic, but should be written as stand-alone, single-authored papers in standard journal format (i.e., AJS or ASR). None of these papers may overlap substantially with one another, and none of them may be co-authored. (The main criterion in judging "substantial overlap" is whether any standard journal, such as AJS, would regard the papers as too similar to publish both.) The dissertation must be submitted to all committee members at least 30 days in advance of the defense date. The dissertation defense serves as the Oral Examination required by the University. Assessment of satisfactory completion is determined by the student's doctoral committee members. All students are invited to present their dissertation findings at an informal department colloquium.

The faculty are responsible for providing students with timely and constructive feedback on their progress toward the Ph.D. In order to evaluate student progress and to identify potential problem areas, the department's faculty reviews the academic progress of each first-year student at the beginning of Winter and Spring quarters and again at the end of the academic year. The first two reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. The review at the end of Spring Quarter is more thorough; each student's performance during the first year is reviewed and discussed. Possible outcomes of the spring review include: (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period of probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. Students leaving the program at the end of the first year are usually allowed to complete the requirements to receive an M.A. degree, if this does not involve additional residence or financial support. All students are given feedback from their advisers at the end of their first year of graduate work, helping them to identify areas of strengths and potential weakness.

At the end of the second year of residency, students who are performing well, as indicated by their coursework, performance on qualifying examinations, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded an M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for the fall quarter of the student's third year.

At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

REQUIREMENTS

SURVEY COURSES

Students must complete four courses from an approved list. This list is updated and circulated to students at the start of each academic year. *Note:* class offerings rotate; not all approved survey courses are offered every year. The following courses typically fulfill the survey course requirement:

- 310. Political Sociology
- 314. Economic Sociology
- 316. Historical and Comparative Sociology
- 318. Social Movements and Collective Action
- 320. Foundations of Social Psychology
- 322. Social Interaction, Social Structure, and Social Exchange
- 323. Sociology of the Family
- 336. Sociology of Law
- 339. Gender Meanings and Processes
- 340. Social Stratification
- 342B. Gender and Social Structure
- 345. Comparative Race and Ethnic Relations
- 347. Race and Ethnicity in Social Institutions
- 357. Immigration and Assimilation
- 358. Sociology of Immigration
- 360. Foundations of Organizational Sociology
- 363A. Seminar on Organizational Theory

RESEARCH METHODS

Students are also expected to complete one elective from a list of approved courses that is updated and circulated at the start of each academic year. Students are required to enroll in 384, Sociology Methodology IV: New Models and Methods, in their first or second year of the program.

- 281B. Statistics (not required but recommended for students with little statistical background)
- 381. Sociological Methodology I: Introduction
- 382. Sociological Methodology II: Multivariate Regression
- 383. Sociological Methodology III: Models for Discrete Outcomes
- 384. Sociology Methodology IV: New Models and Methods
- 385A. Research Practicum I
- 385B. Research Practicum II

The following course requirements apply to students who entered the Ph.D program in 2004-05 or earlier.

- 281B. Statistics (recommended for students with little statistical background)
- 381A. Sociological Methodology I: Computer Assisted Data Analysis
- 382. Sociological Methodology II: The General Linear Model
- 383. Sociological Methodology III: Advanced Models for Discrete Outcomes
- 388. Advanced Models for Analysis of Tabular Arrays
  - *or* 389. Mixed Method Research Design

THEORY

- 370A. Sociological Theory: Social Structure, Inequality, and Conflict
  - *or* 370B. Sociological Theory: Social Interaction and Group Processes
- 372. Theoretical Analysis and Design

WORKSHOPS

- 311A,B,C. Workshop: Comparative Studies of Educational and Political Systems
- 312W. Workshop: Political Sociology, Social Movements, and Collective Action
- 315W. Workshop: Economic Sociology and Organizations
- 317W. Workshop: Social Networks
- 321W. Workshop: Social Psychology and Social Structure
- 338W. Workshop: Sociology of Law
- 341W. Workshop: Inequality
- 350W. Workshop: Migration, Race, Ethnicity and Nation
- 361W. Workshop: Networks and Organizations
- 368W. Workshop: China Social Science
- 374A,B,C. Research Workshop: Philanthropy and Civil Society

PH.D. MINOR IN SOCIOLOGY

Sociology offers a minor for currently enrolled doctoral students in other Stanford departments and schools. Students must complete a minimum of 30 graduate-level units with a grade point average (GPA) of 3.0 (B) or better. All 30 units for the minor are to be in courses taught by Sociology faculty. Students must enroll in the SOC course offerings (not cross-listed sections). There is one exception: 5 units may be taken in a statistics or methods course taught in another department. All units must be taken for a letter grade. Workshop, research, directed reading, or independent study units do not count towards the Ph.D. Minor. The program must be approved by a Sociology adviser and filed with the Sociology student services office. While there is not a formal application process, candidates must submit a short statement of purpose (2 pages), and a completed Application for Ph.D. Minor to the Sociology student services office. The Application for Ph.D. Minor must have all Sociology or other courses to be applied to the minor listed, including course number, units, and final grades.

JOINT PROGRAMS IN SOCIOLOGY WITH THE SCHOOL OF LAW

The School of Law and Department of Sociology conduct joint programs leading to either a combined J.D. degree with an M.A. degree in Sociology or to a combined J.D. degree with a Ph.D. in Sociology.

Law students interested in pursuing an M.A. in Sociology apply for admission to the Department of Sociology during the first year of Law school. Once admitted to the Department of Sociology, the student must complete standard departmental master's degree requirements as specified in this bulletin. Applications for the joint J.D./M.A. degree program must be approved by both the department and the Law school. Faculty advisers from each program participate in the planning and supervising of the student's academic program.

The J.D./Ph.D. degree program is designed for students who wish to prepare themselves for research or teaching careers in areas relating to both legal and sociological concerns. Students interested in the joint degree program must be admitted to both the School of Law and the Department of Sociology. Interest in the joint degree program must be noted on each of the student's applications. Alternatively, an enrolled student in either the Law School

or the Sociology department may apply to the other program, preferably during their first year of study.

Upon admission, students are assigned a joint program faculty adviser who assists the student in planning an appropriate program and ensuring that all requirements for both degrees are satisfied. The faculty adviser serves in this capacity during the student's course of study regardless of whether the student is enrolled in the School of Law or the Sociology department.

J.D./Ph.D. students may elect to begin their course of study in either the School of Law or the Department of Sociology. Students must be enrolled full-time in the Law school for the first year of Law school, and must enroll full time in the graduate school for the first year of the sociology program. After that time, enrollment may be in the graduate school or the Law school, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the Ph.D. degrees. Up to 81 quarter (54 semester) hours of approved courses may be counted toward both degrees, but no more than 36 quarter (24 semester) hours of courses that originate outside the Law school may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the Law school but count toward the Law degree, the Law school credits permitted under Section 17(1) of the Law School Regulations for cross-registration in other schools or departments of Stanford University are reduced on a unit-per-unit basis, but not below zero. Students must complete the equivalent of 183 quarter units to complete both degrees. Tuition and financial aid arrangements normally are through the school in which the student is currently enrolled.

For more information, see the Sociology web site at http://sociology.stanford.edu, and the Law School web site on the J.D./Ph.D. at http://www.law.stanford.edu/program/degrees/joint/sociology.

OVERSEAS STUDIES COURSES IN SOCIOLOGY

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

MADRID

- OSPMADRD 61. Society and Cultural Change: The Case of Spain. 5 units, Antonio Muñoz

OXFORD

- OSPOXFRD 59. Soccer and English Society. 5 units, Robert Sinclair

WINTER QUARTER

BERLIN

- OSPBER 66. Theory from the Bleachers: Reading German Sports and Culture. 3 units, Wolf Junghanns

CAPETOWN

- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan

FLORENCE

- OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon. 5 units, Khaled Fouad Allam, GER:DB:SocSci, EC:GlobalCom

OXFORD

- OSPOXFRD 117W. Gender and Social Change in Modern Britain. 4-5 units, Amanda Palmer, GER:DB:SocSci, EC:Gender

SPRING QUARTER

BEIJING

- OSPBEIJ 19. Population and Society in East Asia. 4 units, Yun Zhou, GER:DB:SocSci, EC:GlobalCom
- OSPBEIJ 41. Chinese Society and Business Culture. 4 units, Bobai Li, GER:DB:SocSci, EC:GlobalCom

CAPETOWN

- OSPCPTWN 32. Adult Learning, Development and Social Change: Service-Learning in the Contemporary South African Context. 4-5 units, Janice McMillan

STATISTICS

Emeriti: Theodore W. Anderson, Jerome H. Friedman, Ingram Olkin, Charles Stein, Paul Switzer
Chair: Wing H. Wong
Professors: Emmanuel Candes, Thomas M. Cover, Amir Dembo, Persi Diaconis, David L. Donoho, Bradley Efron, Trevor J. Hastie, Iain M. Johnstone, Tze L. Lai, Art Owen, Joseph P. Romano, David O. Siegmund, Robert J. Tibshirani, Guenther Walther, Wing H. Wong
Associate Professor: Jonathan Taylor
Assistant Professors: Andrea Montanari, Balakanapathy Rajaratnam, Nancy Zhang
Professor (Teaching): Susan Holmes
Courtesy Professors: Philip W. Lavori, Richard A. Olshen, Hua Tang
C*ourtesy Associate Professors:* Simon Jackman, David Rogosa, Chiara Sabatti
Consulting Professors: John Chambers, Charles Chui
Mail Code: 94305-4065
Phone: (650) 723-2620
Web Site: http://stat.stanford.edu

Courses offered by the Department of Statistics are listed under the subject code STATS on the *Stanford Bulletin's* ExploreCourses web site.

The department's goals are to acquaint students with the role played in science and technology by probabilistic and statistical ideas and methods, to provide instruction in the theory and application of techniques that have been found to be commonly useful, and to train research workers in probability and statistics. There are courses for general students as well as those who plan careers in statistics in business, government, industry, and teaching.

The requirements for a degree in Statistics are flexible, depending on the needs and interests of the students. Some students may be interested in the theory of statistics and/or probability, whereas other students may wish to apply statistical and probabilistic methods to a substantive area. The department has long recognized the relation of statistical theory to applications. It has fostered this by encouraging a liaison with other departments in the form of joint and courtesy faculty appointments: Economics (Anderson), Education (Olkin, Rogosa), Electrical Engineering (Cover), Geological and Environmental Sciences (Switzer), Health Research and Policy (Efron, Hastie, Johnstone, Lavori, Olshen, Tibshirani, Wong), Mathematics (Dembo, Diaconis), Political Science (Jackman), and the SLAC National Accelerator Laboratory (Friedman). The research activities of the department reflect an interest in applied and theoretical statistics and probability. There are workshops in biology/medicine and in environmental factors in health.

In addition to courses for Statistics majors, the department offers a number of service courses designed for students in other

departments. These tend to emphasize the application of statistical techniques rather than their theoretical development.

The Department of Statistics is well equipped for statistical applications and research in computational statistics. Computer facilities include several networked Unix servers and a PC lab for general research and teaching use. The Mathematical Sciences Library serves the department jointly with the departments of Mathematics and Computer Science.

The department has always drawn visitors from other countries and universities. As a consequence, there is usually a wide range of seminars offered by both the visitors and the department's own faculty.

UNDERGRADUATE PROGRAMS IN STATISTICS

MAJORING IN STATISTICS

Students wishing to build a concentration in probability and statistics are encouraged to consider declaring a major in Mathematical and Computational Science. This interdepartmental program is administered in the Department of Statistics and provides core training in computing, mathematics, operations research, and statistics, with opportunities for further elective work and specialization. See the "Mathematical and Computational Science" section of this bulletin.

GRADUATE PROGRAMS IN STATISTICS

University requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

MINOR IN STATISTICS

The undergraduate minor in Statistics is designed to complement major degree programs primarily in the social and natural sciences. Students with an undergraduate Statistics minor should find broadened possibilities for employment. The Statistics minor provides valued preparation for professional degree studies in postgraduate academic programs.

The minor consists of a minimum of six courses with a total of at least 20 units. There are two required courses (8 units) and four qualifying or elective courses (12 or more units). All courses for the minor must be letter graded. An overall 2.75 grade point average (GPA) is required for courses fulfilling the minor.

1. *Required Courses*—STATS 116 and 200.
2. *Qualifying Courses*—at most, one of these two courses may be counted toward the six course requirement for the minor: MATH 52; STATS 191.
3. *Elective Courses*—at least one of the elective courses should be a STATS 200-level course. The remaining two elective courses may also be 200-level courses. Alternatively, one or two elective courses may be approved courses in other departments. Special topics courses and seminars for undergraduates are offered from time to time by the department and these may be counted toward the course requirement. Students may not count any Statistics courses below the 100 level toward the minor. Examples of elective course sequences are:
   STATS 202, 203, 204, emphasizing data analysis and applied statistics
   STATS 205, 206, 207, emphasizing statistical methodology
   STATS 206, ECON 160, 181, emphasizing economic optimization
   STATS 206, PSYCH 156, 160, emphasizing psychology modeling and experiments
   STATS 207, EE 264, 279, emphasizing signal processing
   STATS 217, BIO 283, emphasizing genetic and ecologic modeling
   STATS 217, 218, emphasizing probability and its applications
   STATS 240, 250, emphasizing mathematical finance

The Statistics Department Chair must approve any exceptions to the list of electives.

MASTER OF SCIENCE IN STATISTICS

The department requires that the student take 45 units of work from offerings in the Department of Statistics or from authorized courses in other departments. Ordinarily, four or five quarters are needed to complete all requirements.

Students must fulfill the following requirements for the M.S. degree:

1. STATS 116, 191, 200, and 217. All must be taken for a letter grade. Courses previously taken may be waived by the adviser, in which case they must be replaced by other graduate courses offered by the department.
2. One of MATH 104, 113, 115, 171; and one of CS 106A, 106X, 137, 138, 140-181. Substitution of other courses in Mathematics and Computer Science may be made with consent of the adviser.
3. At least four additional Statistics courses from graduate offerings in the department (202-399). All must be taken for a letter grade. Consent of the adviser is required in order to take more than six units of STATS 260A,B,C, 298, 299, 390, or 399.
4. Additional elective units to complete the requirements may be chosen from the list available from the department web site. Other graduate courses (200 or above) may be authorized by the adviser if they provide skills relevant to statistics or deal primarily with an application of statistics or probability and do not overlap courses in the student's program. There is sufficient flexibility to accommodate students with interests in applications to business, computing, economics, engineering, health, operations research, and biological and social sciences.
5. Courses below 200 level are generally not acceptable, with the following exceptions: STATS 116, 191; MATH 103, 113, 115, 171, 180; CS 106A, 106B, 106X, 137, 138, 140-181. At most, one of these two courses may be counted: (1) MATH 151 *or* STATS 116, (2) MATH 103 *or* MATH 113.

Students with a strong mathematical background who may wish to go on to a Ph.D. in Statistics should consider applying to the Ph.D. program.

The eight Statistics courses required for the M.S. degree must be taken for letter grades. Courses other than the eight required statistics courses may be taken for a letter grade or Credit/No Credit. There is no thesis requirement. An overall 2.75 grade point average (GPA) is required.

DOCTOR OF PHILOSOPHY IN STATISTICS

The department looks for students who wish to prepare for research careers in statistics or probability, either applied or theoretical. Advanced undergraduate or master's level work in mathematics and statistics provides a good background for the doctoral program. Quantitatively oriented students with degrees in other scientific fields are also encouraged to apply for admission. In particular, the department is expanding its research and educational activities towards computational biology, mathematical finance and information science, via a VIGRE program. The program normally takes four years to complete.

Program Summary—STATS 300A,B,C, 305, 306A,B, and 310A,B,C (first-year core program); pass two of three parts of the qualifying examinations (end of first year); breadth requirement (second or third year); successfully complete the thesis proposal meeting (before end of third year); pass the University oral examination (fourth year); dissertation (fourth year).

In addition, students are required to take 9 units of advanced topics courses offered by the department (including at least two of the following: 314, 317, 318, 315A, or 315B, but not including literature, research, or consulting), and 3 units of 390 statistical consulting. All students who have passed the qualifying exams but have not yet passed the University oral examination must take 319 at least once per year.

First-Year Core Courses—STATS 300 systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples. 305 is

concerned with linear regression and the analysis of variance. 306 surveys a large number of modeling techniques, related to but going beyond the linear models of 305. 310 is a measure-theoretic course in probability theory, beginning with basic concepts of the law of large numbers and martingale theory. Students who do not have enough mathematics background can take 310 after their first year but need to have their first-year program approved by the Ph.D. program adviser.

Qualifying Examinations—These are intended to test the student's level of knowledge when the first-year program, common to all students, has been completed. There are separate examinations in the three core subjects of statistical theory and methods, applied statistics, and probability theory, and all are typically taken during the summer between the student's first and second years. Students may take two or three of these examinations and are expected to show acceptable performance in two examinations.

Breadth Requirement—Students are advised to choose an area of concentration in a specific scientific field of statistical applications; this can be realized by taking at least 15 units of course work approved by the Ph.D. program adviser.

Current areas with suggested course options include:

Computational Biology and Statistical Genomics—Students are expected to take 9 units of graduate courses in genetics or neurosciences (imaging), such as GENE 203/BIO 203, as well as 9 units of classes in Statistical Genetics or Bioinformatics, GENE 344A,B, STATS 345, STATS 366, STATS 367.

Machine Learning—Courses can be chosen from the following list:
Statistical Learning: STATS 315A and 315B
Data Bases: CS 245, 346, 347
Probabilistic Methods in AI: CS 221, 354
Statistical Learning Theory and Pattern Classification: CS 229

Applied Probability—Students are expected to take 15 units of graduate courses in some of the following areas:
Control and Stochastic Calculus: MS&E 322, 351, MATH 237, EE 363
Finance: STATS 250, FINANCE 622, MATH 236
Information Theory: EE 376A, 376B
Monte Carlo: STATS 318, 345, 362, MS&E 323
Queuing Theory: GSB 661, 663, MS&E 335
Stochastic Processes: STATS 317, MATH 234

Earth Science Statistics—Students are expected to take:
STATS 317, 318, 352
and three courses from the GES or Geophysics departments, such as GES 144 or GEOPHYS 210.

Social and Behavioral Sciences—Students are expected to take three advanced courses from the department with an applied orientation such as:
STATS 261/262, 324, 343, 354
and three advanced quantitative courses from departments such as Anthropology, Economics, Political Science, Psychology, and Sociology, and the schools of Education, Business, or Medicine.

Thesis Proposal Meeting and University Oral Examinations—The thesis proposal meeting is intended to demonstrate students' depth in some areas of statistics, and to examine the general plan for their research. In the meeting, the student gives a short presentation and discusses his/her ideas for completing a Ph.D. thesis, with a committee consisting of their adviser and thesis committee (a total of three members). The meeting must be completed before the end of the third year. If the student does not pass, the exam must be repeated. Repeated failure can lead to a loss of financial support.

The oral examination consists of a 40-minute presentation on the thesis topic, followed by a question period. The questions relate both to the student's presentation and also explore the student's familiarity with broader statistical topics related to the thesis research. The oral examination is normally completed within the last few months of the student's Ph.D. period. The examining committee usually consists of four faculty members from the Statistics Department and a fifth faculty member from outside the department. Four out of five passing votes are required and no grades are given. Nearly all students can expect to pass this examination, although it is common for specific recommendations to be made regarding completion of the thesis.

A reading committee must also read and approve the thesis. The reading committee is typically the same as the thesis committee from the thesis proposal meeting.

Transition policy—The policy above took effect in Autumn Quarter 2009-10. Students beginning their first year in 2008-09 or later must follow this new policy. Other students can choose either the old or new system; students in this category who choose the new scheme and have already finished their third year can have the thesis proposal meeting as soon as they are ready.

For further information on University oral examinations and committees, see the Graduate Academic Policies and Procedures (GAP) Handbook, section 4.7 or the "University Oral Examination" section of this bulletin.

Financial Support—Students accepted to the Ph.D. program are offered financial support. All tuition expenses are paid and there is a fixed monthly stipend determined to be sufficient to pay living expenses. Financial support can be continued for five years, department resources permitting, for students in good standing. The resources for student financial support derive from funds made available for student teaching and research assistantships. Students receive both a teaching and research assignment each quarter which, together, do not exceed 20 hours. Students are encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

PH.D. MINOR IN STATISTICS

Students must complete 30 total units for the Ph.D. minor. 20 units must be from Statistics courses numbered 300 and above and taken for letter grades. The remaining 10 units can be from Statistics courses numbered 200 and above, or courses from other departments that are on the approved list for the M.S. degree. The selection of courses must be approved by one of the M.S. advisers. The Application for the Ph.D. Minor form must be approved by both the student's Ph.D. department and the Statistics department.

SYMBOLIC SYSTEMS

Director: Kenneth Taylor
Director of Graduate Studies: Christopher Manning
Associate Director: Todd Davies
Program Committee: Lera Boroditsky, Herbert Clark, Todd Davies, Daniel Jurafsky, Scott Klemmer, Daphne Koller, Krista Lawlor, Christopher Manning, James McClelland, Clifford Nass, Stanley Peters, Christopher Potts, Eric Roberts, Ivan A. Sag, Kenneth A. Taylor, Johan van Benthem, Thomas A. Wasow, Terry Winograd

Program Faculty:

Art and Art History: Scott Bukatman (Associate Professor)
Applied Physics: Bernardo Huberman (Consulting Professor)
Classics: Reviel Netz (Professor)
Civil and Environmental Engineering: John Kunz (Lecturer)
Communication: Jeremy Bailenson (Associate Professor), Clifford J. Nass (Professor), Byron Reeves (Professor), Frederick Turner (Associate Professor)
Computer Science: David Dill (Professor), Michael Genesereth (Associate Professor), Jeffrey Heer (Assistant Professor), Oussama Khatib (Professor), Scott Klemmer (Assistant Professor), Daphne Koller (Professor), Jean-Claude Latombe (Professor), Marc Levoy (Professor), Christopher Manning (Associate Professor), John McCarthy (Professor, emeritus), Andrew Ng (Associate Professor), Nils Nilsson (Professor, emeritus), Vaughan Pratt (Professor, emeritus), Eric Roberts (Professor, Teaching), Tim Roughgarden (Assistant Professor), Mehran Sahami (Associate Professor, Teaching), Sebastian Thrun (Professor), Terry Winograd (Professor)
Economics: Muriel Niederle (Associate Professor)
Education: Raymond P. McDermott (Professor), Roy Pea (Professor), Daniel Schwartz (Professor)
Electrical Engineering: Krishna Shenoy (Associate Professor)
French and Italian: Jean-Pierre Dupuy (Professor)
Genetics: Russ B. Altman (Professor)
Graduate School of Business: Baba Shiv (Professor)
History: Jessica G. Riskin (Associate Professor)
Linguistics: Arto Anttila (Associate Professor), Joan Bresnan (Professor, emerita), Eve Clark (Professor), Daniel Jurafsky (Associate Professor), Ronald Kaplan (Consulting Professor), Lauri Karttunen (Consulting Professor), Martin Kay (Professor), Beth Levin (Professor), Christopher Manning (Associate Professor), Stanley Peters (Professor, emeritus), Christopher Potts, Ivan A. Sag (Professor), Meghan Sumner (Assistant Professor), Thomas A. Wasow (Professor), Annie Zaenen (Consulting Professor)
Management Science and Engineering: Pamela Hinds (Associate Professor)
Mathematics: Keith Devlin (Consulting Professor), Persi Diaconis (Professor), Solomon Feferman (Professor, emeritus)
Medicine: Russ B. Altman (Professor), Mark Musen (Professor)
Music: Jonathan Berger (Professor), Christopher Chafe (Professor), Eleanor Selfridge-Field (Consulting Professor), Ge Wang (Assistant Professor)
Neurobiology: Ben Barres (Professor), William T. Newsome (Professor), Jennifer Raymond (Associate Professor)
Philosophy: Michael Bratman (Professor), Alexis Burgess (Assistant Professor), Mark Crimmins (Associate Professor), John Etchemendy (Professor), Solomon Feferman (Professor, emeritus), Dagfinn Føllesdal (Professor, emeritus), Krista Lawlor (Associate Professor), Grigori Mints (Professor), John Perry (Professor, emeritus), Brian Skryms (Professor), Kenneth Taylor (Professor), Johan van Benthem (Professor), Thomas A. Wasow (Professor)
Psychiatry and Behavioral Sciences: Vinod Menon (Associate Professor, Research)
Psychology: Lera Boroditsky (Associate Professor), Herbert H. Clark (Professor), Anne Fernald (Associate Professor), Brian Knutson (Associate Professor), Ellen Markman (Professor), James McClelland (Professor), Samuel McClure (Assistant Professor), Barbara Tversky (Professor, emerita), Anthony Wagner (Associate Professor), Brian Wandell (Professor)
Statistics: Persi Diaconis (Professor), Susan P. Holmes (Professor, Teaching)
Symbolic Systems: Todd Davies (Lecturer), Tracy King (Consulting Associate Professor), Jeff Shrager (Consulting Associate Professor), Paul Skokowski (Consulting Associate Professor)
Other Affiliates: David Barker-Plummer (CSLI Engineering Research Associate), Daniel Flickinger (CSLI Senior Research Engineer), Stephan Oepen (CSLI Senior Research Engineer)

Program Offices: Margaret Jacks Hall, Building 460, Suite 040
Mail Code: 94305-2150
Phone: (650) 723-4284
Email: symsys-afs@lists.stanford.edu
Web Site: http://symsys.stanford.edu

Courses offered by the Program in Symbolic Systems are listed under the subject code SYMSYS on the *Stanford Bulletin's* ExploreCourses web site.

The observation that both human beings and computers can manipulate symbols lies at the heart of Symbolic Systems, an interdisciplinary program focusing on the relationship between natural and artificial systems that represent, process, and act on information. Computer programs, natural languages, the human mind, and the Internet embody concepts whose study forms the core of the Symbolic Systems curriculum, such as computation, representation, communication, and intelligence. A body of knowledge and theory has developed around these notions, from disciplines such as philosophy, computer science, linguistics, psychology, statistics, neurobiology, and communication. Since the invention of computers, researchers have been working across these disciplines to study questions such as: in what ways are computers and computer languages like human beings and their languages; how can the interaction between people and computers be made easier and more beneficial?

The core requirements of the Symbolic Systems Program (SSP) include courses in symbolic logic, the philosophy of mind, formal linguistics, cognitive psychology, programming, the mathematics of computation, statistical theory, artificial intelligence, and interdisciplinary approaches to cognitive science. These courses prepare students with the vocabulary, theoretical background, and technical skills needed for study and research at the advanced undergraduate and graduate levels. Most of the courses in SSP are drawn from affiliated departments. Courses designed specifically for the program are aimed at integrating and supplementing topics covered by the department-based offerings. The curriculum includes humanistic approaches to questions about language and intelligence, as well as training in science and engineering.

SSP offers B.S. and M.S. degree programs. Both programs require students to master a common core of required courses and to choose an area of specialization.

MISSION OF THE UNDERGRADUATE PROGRAM IN SYMBOLIC SYSTEMS

The undergraduate program in Symbolic Systems is an interdisciplinary program focusing on the relationship between natural and artificial systems that represent, process, and act on information. The mission of the program is to prepare majors with the vocabulary, theoretical background, and technical skills necessary to research questions about language, information, and intelligence, both human and machine. The curriculum offers a combination of traditional humanistic approaches to these questions as well as a training and familiarity with contemporary developments in the science and technology of computation. Students in the major take courses in cognitive science, computer programming, computational theory, probability, cognitive psychology, linguistics, and artificial intelligence. The program prepares student for careers in corporate and private sectors as well as for further study in graduate school.

LEARNING OUTCOMES

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Symbolic Systems Program . Students are expected to demonstrate:

1. understanding of important concepts from the undergraduate core requirements.
2. ability to apply core concepts to an advanced problem area.
3. ability to apply concepts and methods from more than one discipline to a particular issue.
4. ability to think critically about advanced reading material.
5. ability to present a cogent, coherent, evidence-backed argument.

BACHELOR OF SCIENCE IN SYMBOLIC SYSTEMS

The program leading to a B.S. in Symbolic Systems provides students with a core of concepts and techniques, drawing on faculty and courses from various departments. The curriculum prepares students for advanced training in the interdisciplinary study of language and information, or for postgraduate study in any of the main contributing disciplines. It is also excellent preparation for employment immediately after graduation.

Symbolic Systems majors must complete a core of required courses plus a field of study consisting of six additional courses. All major courses are to be taken for letter grades unless an approved course is offered satisfactory/no credit only. All core courses must be passed with a grade of 'C-' or better. Students who receive a grade lower than this in a core course must alert the program of this fact so that a decision can be made about whether the student should continue in the major.

CORE REQUIREMENTS

In order to graduate with a B.S. in Symbolic Systems, a student must complete the following requirements. Some of these courses have other courses as prerequisites; students are responsible for completing each course's prerequisites before they take it.

1. *Cognitive Science*: SYMSYS 100. Introduction to Cognitive and Information Sciences
2. *Computer Programming:*
   a. CS 106A. Programming Methodology *and* 106B. Programming Abstractions; *or* 106X. Programming Methodology and Abstractions (Accelerated); *and*
   b. CS 107. Computer Organization and Systems
3. *Logic*:
   a. PHIL 150. Basic Concepts in Mathematical Logic
   b. PHIL 151. First-Order Logic
4. *Computational Theory:*
   a. CS 103. Mathematical Foundations of Computing
5. *Probability*: one of the following:
   CS 109. Introduction to Probability for Computer Scientists
   CME 106/ENGR 155C. Introduction to Probability and Statistics for Engineers
   EE 178. Probabilistic Systems Analysis
   MATH 151. Introduction to Probability Theory
   MS&E 120. Probabilistic Analysis
   STATS 110. Statistical Methods in Engineering and the Physical Sciences
   STATS 116. Theory of Probability
6. *Philosophical Foundations:*
   a. an introductory course in Philosophy must be taken prior to the required PHIL 80, from among the following:
   PHIL 10. God, Self, and World: An Introduction to Philosophy
   PHIL 20. Introduction to Moral Philosophy
   PHIL 30. Introduction to Political Philosophy
   PHIL 60. Introduction to Philosophy of Science
   PHIL 102. Modern Philosophy, Descartes to Kant
   IHUM 23A,B. The Fate of Reason
   and
   a. PHIL 80. Mind, Matter, and Meaning (WIM)
7. *Cognitive Psychology*: PSYCH 55. Introduction to Cognition and the Brain
8. *Language and Mind:* one of the following:
   LINGUIST 1. Introduction to Linguistics
   LINGUIST 140. Language Acquisition I
   PHIL 181. Philosophy of Language
   PSYCH 131. Language and Thought
   PSYCH 137. Birds to Words: Cognition, Communication, and Language
9. *Linguistic Theory*: one of the following:
   LINGUIST 120. Introduction to Syntax
   LINGUIST 130A. Introduction to Linguistic Meaning
   LINGUIST 180. From Languages to Information
   LINGUIST 230A. Introduction to Semantics and Pragmatics
10. *Artificial Intelligence*: CS 121. Introduction to Artificial Intelligence, *or* 221. Artificial Intelligence: Principles and Techniques
11. *Advanced Small Seminar:** an upper-division, limited-enrollment seminar drawing on material from other courses in the core. Courses listed under Symbolic Systems Program offerings with numbers from SYMSYS 200 through 209 are acceptable, as are other courses which are announced at the beginning of each academic year.

* A course taken to fulfill one of these requirements can also be counted toward another requirement, as part of either the core or a student's concentration (see below), but not both.

FIELDS OF STUDY

In addition to the core requirements listed above, the Symbolic Systems major requires each student to complete a field of study consisting of six courses that are thematically related to each other. Students select concentrations from the list below or design others in consultation with their advisers. The field of study is declared on Axess; it appears on the transcript but not on the diploma.

Applied Logic
Artificial Intelligence
Cognitive Science
Computer Music
Decision Making and Rationality
Human-Computer Interaction
Learning
Natural Language
Neurosciences
Philosophical Foundations

UNDERGRADUATE RESEARCH

The program strongly encourages all SSP majors to gain experience in directed research by participating in faculty research projects or by pursuing independent study. In addition to the Symbolic Systems Honors Program (see below), the following avenues are offered.

1. *Summer Internships:* students work on SSP-related faculty research projects. Application procedures are announced in the winter quarter for SSP majors.
2. *Research Assistantships:* other opportunities to work on faculty research projects are typically announced to SSP majors as they arise during the academic year.
3. *Independent Study*: under faculty supervision. For course credit, students should enroll in SYMSYS 196.

Contact SSP for more information on any of these possibilities, or see http://symsys.stanford.edu. In addition, the Undergraduate Advising and Research office offers grants and scholarships supporting student research projects at all levels; see http://ual.stanford.edu/OO/research_opps/Grants
http://ual.stanford.edu/OO/research_opps/Grants.

HONORS PROGRAM

Seniors in SSP may apply for admission to the Symbolic Systems honors program prior to the beginning of their final year of study. Students who are accepted into the honors program can graduate with honors by completing an honors thesis under the

supervision of a faculty member. Course credit for the honors project may be obtained by registering for SYMSYS 190, Honors Tutorial, for any quarters while a student is working on an honors project. Juniors who are interested in doing an honors project during their senior year are advised to take SYMSYS 200, Symbolic Systems in Practice. SYMSYS 191, Senior Honors Seminar, is recommended for honors students during the senior year. Contact SSP or visit the program's web site for more information on the honors program, including deadlines and policies.

COGNATE COURSES

The following is a list of cognate courses that may be applied to the B.S. in Symbolic Systems. See respective department listings for course descriptions and General Education Requirements (GER) information.

BIO 20. Introduction to Brain and Behavior (Same as HUMBIO 21)
BIO 150/250. Human Behavioral Biology (Same as HUMBIO 160)
BIO 153. Cellular Neuroscience: Cell Signaling and Behavior
CME 106. Introduction to Probability and Statistics for Engineers (Same as ENGR 155C)
COMM 106/206. Communication Research Methods
COMM 169/269. Computers and Interfaces
COMM 172/272. Media Psychology
CS 21N. Can Machines Know? Can Machines Feel?
CS 26N. Motion Planning for Robots, Digital Actors, and Other Moving Objects
CS 47N. Computers and the Open Society
CS 51N. Visionaries in Computer Science
CS 74N. Digital Dilemmas
CS 103. Mathematical Foundations of Computing
CS 103A. Discrete Mathematics for Computer Science
CS 103B. Discrete Structures
CS 103X. Discrete Structures (Accelerated)
CS 106A. Programming Methodology (Same as ENGR 70A)
CS 106B. Programming Abstractions (Same as ENGR 70B)
CS 106X. Programming Abstractions (Accelerated) (Same as ENGR 70X)
CS 107. Computer Organization and Systems
CS 108. Object-Oriented Systems Design
CS 109. Introduction to Probability for Computer Scientists
CS 110. Principles of Computer Systems
CS 121. Introduction to Artificial Intelligence
CS 124. From Languages to Information (Same as LINGUIST 180/280)
CS 142. Web Applications
CS 147. Introduction to Human-Computer Interaction Design
CS 148. Introductory Computer Graphics and Imaging
CS 154. Introduction to Automata and Complexity Theory
CS 157. Logic and Automated Reasoning
CS 161. Design and Analysis of Algorithms
CS 170. Composition, Coding, and Performance with SLOrc (Same as MUSIC 128)
CS 181. Computers, Ethics, and Public Policy
CS 193D. Professional Software Development with C++
CS 193S. Scalable Web 2.0 Programming
CS 204. Computational Law
CS 205A. Mathematical Methods for Robotics, Vision, and Graphics
CS 207. The Economics of Software
CS 208. The Canon of Computer Science
CS 221. Artificial Intelligence: Principles and Techniques
CS 222. Rational Agency and Intelligent Interaction (Same as PHIL 358)
CS 223A. Introduction to Robotics
CS 223B. Introduction to Computer Vision
CS 224M. Multi-Agent Systems
CS 224N. Natural Language Processing (Same as LINGUIST 284)
CS 224S. Speech Recognition and Synthesis (Same as LINGUIST 285)
CS 224U. Natural Language Understanding (Same as LINGUIST 188/288)
CS 227. Reasoning Methods in Artificial Intelligence
CS 228. Structured Probabilistic Models: Principles and Techniques
CS 228T. Structured Probabilistic Models: Theoretical Foundations
CS 229. Machine Learning
CS 247. Human-Computer Interaction Design Studio
CS 249A. Object-Oriented Programming from a Modeling and Simulation Perspective
CS 276. Information Retrieval and Web Search (Same as LINGUIST 286)
CS 303. Designing Computer Science Experiments
CS 376. Research Topics in Human-Computer Interaction
CS 377. Topic in Human-Computer Interaction
CS 377L. Learning in a Networked World (Same as EDUC 298)
CS 378. Phenomenological Foundations of Cognition, Language, and Computation
CS 547. Human-Computer Interaction Seminar
ECON 51. Economic Analysis II
ECON 137. Information and Incentives
ECON 160. Game Theory and Economic Applications
EDUC 218. Topics in Cognition and Learning: Play
EDUC 298. Learning in a Networked World (Same as CS 377L)
EE 178. Probabilistic Systems Analysis
EE 376A. Information Theory
ENGR 62. Introduction to Optimization (Same as MS&E 111)
ENGR 155C. Introduction to Probability and Statistics for Engineers (Same as CME 106)
ETHICSOC 20. Introduction to Moral Philosophy (Same as PHIL 20)
ETHICSOC 30. Introduction to Political Philosophy (Same as PHIL 30, PUBLPOL 103A)
HPS 60. Introduction to Philosophy of Science (Same as PHIL 60)
HUMBIO 21. Introduction to Brain and Behavior (Same as BIO 20)
HUMBIO 145. Birds to Words: Cognition, Communication, and Language (Same as PSYCH 137/239A)
HUMBIO 160. Human Behavioral Biology (Same as BIO 15/250)
LINGUIST 1. Introduction to Linguistics
LINGUIST 83N. Translation
LINGUIST 105/205A. Phonetics
LINGUIST 110. Introduction to Phonetics and Phonology
LINGUIST 120. Introduction to Syntax
LINGUIST 124A/224A. Introduction to Formal Universal Grammar
LINGUIST 130A. Introduction to Linguistic Meaning
LINGUIST 130B. Introduction to Lexical Semantics
LINGUIST 140/240. Language Acquisition I
LINGUIST 180/280. From Languages to Information (Same as CS 124)
LINGUIST 181/281. Grammar Engineering
LINGUIST 182/282. Computational Theories of Syntax
LINGUIST 188/288. Natural Language Understanding (Same as CS 224U)
LINGUIST 210A. Phonology
LINGUIST 210B. Advanced Phonology
LINGUIST 221A. Foundations of English Grammar
LINGUIST 221B. Studies in Universal Grammar
LINGUIST 222A. Foundations of Syntactic Theory I
LINGUIST 230A. Introduction to Semantics and Pragmatics
LINGUIST 230B. Semantics and Pragmatics
LINGUIST 232A. Lexical Semantics
LINGUIST 235. Semantic Fieldwork
LINGUIST 241. Language Acquisition II
LINGUIST 247. Seminar in Psycholinguistics (Same as PSYCH 227)
LINGUIST 278. Programming for Linguists
LINGUIST 284. Natural Language Processing (Same as CS 224N)

LINGUIST 285. Speech Recognition and Synthesis (Same as CS 224S)
LINGUIST 286. Information Retrieval and Web Search (Same as CS 276)
LINGUIST 289. Quantitative, Probabilistic, and Optimization-Based Explanation in Linguistics
MATH 113. Linear Algebra and Matrix Theory
MATH 151. Introduction to Probability Theory
MATH 162. Philosophy of Mathematics (Same as PHIL 162)
ME 115B. Product Design Methods
MS&E 120. Probabilistic Analysis
MS&E 121. Introduction to Stochastic Modeling
MS&E 201. Dynamic Systems
MS&E 430. Tools for Experience Design
MUSIC 151. Psychophysics and Cognitive Psychology for Musicians
MUSIC 128. Composition, Coding, and Performance with SLOrc (Same as CS 170)
MUSIC 220A. Fundamentals of Computer-Generated Sound
MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing
MUSIC 250A. HCI Theory and Practice
MUSIC 251. Music, the Brain, and Human Behavior
MUSIC 253. Musical Information: An Introduction
MUSIC 254. Applications of Musical Information: Query, Analysis, and Style Simulation
NBIO 206. The Nervous System
NBIO 218. Neural Basis of Behavior
PHIL 9N. Philosophical Classics of the 20th Century
PHIL 10. God, Self, and World: An Introduction to Philosophy
PHIL 14N. Belief
PHIL 80. Mind, Matter, and Meaning
PHIL 102. Modern Philosophy, Descartes to Kant
PHIL 143/243. Quine
PHIL 150. Basic Concepts in Mathematical Logic
PHIL 151. First-Order Logic
PHIL 152. Computability and Logic
PHIL 154. Modal Logic
PHIL 155. General Interest Topics in Mathematical Logic
PHIL 157. Topics in Philosophy of Logic
PHIL 164. Central Topics in the Philosophy of Science: Theory and Evidence
PHIL 166. Probability: Ten Great Ideas About Chance
PHIL 167B. Philosophy, Biology, and Behavior
PHIL 180A/280A. Realism, Anti-Realism, Irrealism, Quasi-Realism
PHIL 181. Philosophy of Language
PHIL 184. Theory of Knowledge
PHIL 184B. Philosophy of the Body
PHIL 184P. Probability and Epistemology
PHIL 186. Philosophy of Mind
PHIL 187. Philosophy of Action
PHIL 188. Personal Identity
PHIL 189/289. Examples of Free Will
PHIL 194C. Time and Free Will
PHIL 194P. Naming and Necessity
PHIL 194R. Epistemic Paradoxes
PHIL 279. Collectivities
PHIL 350A. Model Theory
PHIL 351A. Recursion Theory
PHIL 354. Topics in Logic
PHIL 366. Evolution and Communication
PHIL 382A. Pragmatics and Reference
PHIL 387. Practical Rationality
PHIL 387C. Consistency and Coherence
PSYCH 1. Introduction to Psychology
PSYCH 7Q. Language Understanding by Children and Adults
PSYCH 23N. Aping: Imitation, Control, and the Development of the Human Mind
PSYCH 30. Introduction to Perception
PSYCH 45. Introduction to Learning and Memory
PSYCH 50. Introduction to Cognitive Neuroscience
PSYCH 55. Introduction to Cognition and the Brain
PSYCH 70. Introduction to Social Psychology
PSYCH 75. Introduction to Cultural Psychology
PSYCH 104. Uniquely Human
PSYCH 122S. Introduction to Cognitive and Comparative Neuroscience
PSYCH 131/262. Language and Thought
PSYCH 133. Human Cognitive Abilities
PSYCH 134. Seminar on Language and Deception
PSYCH 141. Cognitive Development
PSYCH 143. Developmental Anomalies
PSYCH 154. Judgement and Decision-Making
PSYCH 159. Psychology of Attitude Change and Social Influence
PSYCH 202. Cognitive Neuroscience
PSYCH 204A. Human Neuroimaging Methods
PSYCH 209/209A. The Neural Basis of Cognition: A Parallel Distributed Processing Approach
PSYCH 209B. Applications of Parallel Distributed Processing Models to Cognition and Cognitive Neuroscience
PSYCH 226. Models and Mechanisms of Memory
PSYCH 227. Seminar in Psycholinguistics (Same as LINGUIST 247)
PSYCH 232. Brain and Decision Making
PSYCH 246. Cognitive and Neuroscience Friday Seminar
PSYCH 250. High-level Vision
PSYCH 251. Affective Neuroscience
PSYCH 252. Statistical Methods for Behavioral and Social Sciences
PSYCH 253. Statistical Theory, Models, and Methodology
PSYCH 272. Special Topics in Psycholinguistics
SOC 126/226. Introduction to Social Networks
STATS 110. Statistical Methods in Engineering and the Physical Sciences
STATS 116. Theory of Probability
STATS 191. Introduction to Applied Statistics
STATS 200. Introduction to Statistical Inference

MINOR IN SYMBOLIC SYSTEMS

Students may minor in Symbolic Systems by completing either item 1 or item 2 below.

1. One course in each of the following core areas (please note that several of these courses have prerequisites):
   a. *Cognition*: SYMSYS 100* *or* PSYCH 55
   b. *Logic and Computation*: PHIL 150 *or* 151, *or* CS 103 *or* 154
   c. *Computer Programming*: CS 106B, 106X, *or* 107
   d. *Philosophical Foundations:* SYMSYS 100* *or* PHIL 80
   e. *Formal Linguistics*: LINGUIST 120, 130A, *or* 180
   f. *Artificial Intelligence:* CS 121 *or* 221
2. SYMSYS 100, plus an interdisciplinary SSP concentration listed on the SSP web site at http://symsys.stanford.edu. To qualify, the selection of courses used for the minor must be interdisciplinary; it must either include courses from at least three departments, or include more than one course from each of two departments.

* SYMSYS 100 may not be counted for both areas 'a' and 'd'.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES IN SYMBOLIC SYSTEMS

Many SSP majors also complete coterminal M.S. or M.A. degrees in affiliated departments. In addition to the Symbolic Systems M.S. program (see below), the Department of Philosophy offers a Special Program in Symbolic Systems track for interdisciplinary graduate level work leading to the Master of Arts in Philosophy.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and Uni-

versity application forms, see http://studentaffairs.stanford.edu/registrar/publications#Coterm.

MASTER OF SCIENCE IN SYMBOLIC SYSTEMS

The University's basic requirements for the M.S. degree is discussed in the "Graduate Degrees" section of this bulletin.

The M.S. degree in Symbolic Systems is designed to be completed in the equivalent of one academic year by coterminal students or returning students who already have a B.S. degree in Symbolic Systems, and in two years or less by other students depending upon level of preparation. Admission is competitive, providing a limited number of students with the opportunity to pursue course and project work in consultation with a faculty adviser who is affiliated with the Symbolic Systems Program. The faculty adviser may impose requirements beyond those described here.

Admission to the program as a coterminal student is subject to the policies and deadlines described in the "Undergraduate Degrees and Programs" section of this bulletin (see "Coterminal Bachelor's and Master's Degrees"). Applicants to the M.S. program are reviewed each Winter Quarter. Information on deadlines, procedures for applying, and degree requirements are available from the program's student services coordinator in the Linguistics Department office (460-127E) and at http://symsys.stanford.edu/ssp_static?page=masters.html.

REQUIREMENTS

A candidate for the M.S. degree in Symbolic Systems must complete a program of 45 units. At least 36 of these must be graded units, passed with an average grade of 3.0 (B) or better, and any course taken to fulfill requirements A, B, or C below must be taken for a letter grade unless the course is offered S/NC only. The 45 units may include no more than 21 units of courses from those listed below under Requirements A and B. Furthermore, none of the 45 units to be counted toward the M.S. degree may include units counted toward an undergraduate degree at Stanford or elsewhere. Course requirements are waived only if evidence is provided that similar or more advanced courses have been taken, either at Stanford or another institution. Courses that are waived rather than taken may not be counted toward the M.S. degree.

Each candidate for the M.S. degree must fulfill the following requirements:

REQUIREMENT A

Demonstrated competence in the core requirements for the B.S. degree in Symbolic Systems. Candidates who have gone through the Symbolic Systems undergraduate program satisfy this requirement in the course of the B.S. degree in Symbolic Systems. Other students admitted as candidates for a Symbolic Systems M.S. degree must complete or show evidence of having passed equivalent courses covering all the Symbolic Systems undergraduate core requirements, with the exception of the advanced small seminar requirement.

REQUIREMENT B

1. Submission to and approval by the Symbolic Systems Program office of these pre-project research documents:
   a. project area statement, endorsed with a commitment from the student's prospective project adviser due no later than May 1 of the academic year prior to the expected graduation year; and
   b. qualifying research paper due no later than the end of the Summer Quarter prior to the expected graduation year.
2. Completion of two additional skill requirements:
   a. *Computer Programming:* CS 108. Object-Oriented Systems Design; *or* CS 110. Principles of Computer Systems; *or* CS 249A. Object-Oriented Design from a Modeling and Simulation Perspective
   b. *Empirical Methods:* one of the following:
   COMM 206. Communication Research Methods
   COMM 239. Questionnaire Design for Surveys and Laboratory Experiments: Social and Cognitive Perspectives
   COMM 268. Experimental Research in Advanced User Interfaces
   LINGUIST 284. Natural Language Processing (Same as CS 224N)
   PSYCH 110. Research Methods and Experimental Design
   PSYCH 252. Statistical Methods for Behavioral and Social Science (for 3 or more units)
   PSYCH 253. Statistical Theory, Models, and Methodology (for 3 units)
   STATS 191. Introduction to Applied Statistics
   STATS 200. Introduction to Statistical Inference
   a Statistics course numbered higher than 200
3. Completion of three quarters of the Symbolic Systems Program M.S. Seminar (SYMSYS 291).

REQUIREMENT C

Completion of an approved specialization track. All tracks of the Symbolic Systems M.S. program require students to do a substantial project. The course requirements for each track are designed to prepare a student to undertake such a project. The nature of the project depends on the student's focus, but it should be academic in nature (contributing to generalizable knowledge) and it should relate to the subject matter of symbolic systems more or equally appropriately as it does to other master's degree programs at Stanford. In all cases, a written thesis or paper describing the project is required. The project normally takes three quarters, and work on the project may account for up to 15 units of a student's program. The thesis must be read and approved for the master's degree in Symbolic Systems by two qualified readers approved by the program, at least one of whom must be a member of the Academic Council. Each track of the Symbolic Systems M.S. program has its own core requirements, as well as unit requirements from a set of elective courses. The tracks and their requirements are as follows.

The Human-Computer Interaction (HCI) Track—The HCI Core: a course in Computer Science numbered 141-179 (excluding 147), *or* CS 241-279 (excluding 247), *or* CS 295, Software Engineering; *and* CS 147, Introduction to Human-Computer Interaction Design; *and* CS 247, Human-Computer Interaction: Interaction Design Studio*; and* CS 376, Research Topics in Human-Computer Interaction *or* COMM 269, Computers and Interfaces.

For HCI electives, at least 9 additional units of HCI courses, chosen in consultation with the student's adviser. The following are examples of themes around which an elective program might be built: animation, business systems, computer-aided design, computer graphics, data interfaces, decision systems, design for disabilities, design principles, dialogue systems, digital art, digital media, education technology, game design, history of computers, information retrieval, intelligent interfaces, interaction design, internet design, medical informatics, multimedia design, object-oriented design, philosophy of computation, social aspects of computing, usability analysis, virtual reality, and workplace computing.

The Natural Language Technology (NLT) Track—For the NLT core, in addition to the courses below, students must complete LINGUIST 284/CS 224N, Natural Language Processing, which can be used as the empirical methods course for Requirement B above.

1. An in-depth theory of English grammar course such as LINGUIST 221A, Foundations of English Grammar
2. A graduate-level semantics course (if not already taken as part of Requirement A) such as LINGUIST 232A, Lexical Semantics, or 230B, Semantics and Pragmatics
3. A two-course sequence in Computational Linguistics:
   a. LINGUIST 280. From Languages to Information, *and*
   b. LINGUIST 282. Computational Theories of Syntax

For NLT electives, at least 9 additional units of natural language technology courses, chosen in consultation with the student's adviser.

The Individually Designed Option—Students wishing to design their own M.S. curriculum in Symbolic Systems must present a project plan as part of their application. This plan must be endorsed by the student's adviser prior to admission to the Symbolic Systems M.S. program. The application must also specify at least 20 units of course work that the student plans tof take in support of the project.

Students are admitted under this option only if they present well-developed plans whose interdisciplinary character makes them inappropriate for any departmental master's program, but appropriate for Symbolic Systems.

COGNATE COURSES

The following is a list of cognate courses that may be applied to the M.S. in Symbolic Systems. See respective department listings for course descriptions and General Education Requirements (GER) information.

BIO 20. Introduction to Brain and Behavior (Same as HUMBIO 21)
BIO 150/250. Human Behavioral Biology (Same as HUMBIO 160)
BIO 153. Cellular Neuroscience: Cell Signaling and Behavior
CME 106. Introduction to Probability and Statistics for Engineers (Same as ENGR 155C)
COMM 106/206. Communication Research Methods
COMM 169/269. Computers and Interfaces
COMM 172/272. Media Psychology
CS 103. Mathematical Foundations of Computing
CS 103A. Discrete Mathematics for Computer Science
CS 103B. Discrete Structures
CS 103X. Discrete Structures (Accelerated)
CS 106A. Programming Methodology (Same as ENGR 70A)
CS 106B. Programming Abstractions (Same as ENGR 70B)
CS 106X. Programming Abstractions (Accelerated) (Same as ENGR 70X)
CS 107. Computer Organization and Systems
CS 108. Object-Oriented Systems Design
CS 109. Introduction to Probability for Computer Scientists
CS 110. Principles of Computer Systems
CS 121. Introduction to Artificial Intelligence
CS 124. From Languages to Information (Same as LINGUIST 180/280)
CS 142. Web Applications
CS 147. Introduction to Human-Computer Interaction Design
CS 148. Introductory Computer Graphics and Imaging
CS 154. Introduction to Automata and Complexity Theory
CS 157. Logic and Automated Reasoning
CS 161. Design and Analysis of Algorithms
CS 170. Composition, Coding, and Performance with SLOrc (Same as MUSIC 128)
CS 181. Computers, Ethics, and Public Policy
CS 193D. Professional Software Development with C++
CS 193S. Scalable Web 2.0 Programming
CS 204. Computational Law
CS 205A. Mathematical Methods for Robotics, Vision, and Graphics
CS 207. The Economics of Software
CS 208. The Canon of Computer Science
CS 221. Artificial Intelligence: Principles and Techniques
CS 222. Rational Agency and Intelligent Interaction (Same as PHIL 358)
CS 223A. Introduction to Robotics
CS 223B. Introduction to Computer Vision
CS 224M. Multi-Agent Systems
CS 224N. Natural Language Processing (Same as LINGUIST 284)
CS 224S. Speech Recognition and Synthesis (Same as LINGUIST 285)
CS 224U. Natural Language Understanding (Same as LINGUIST 188/288)
CS 227. Reasoning Methods in Artificial Intelligence
CS 228. Structured Probabilistic Models: Principles and Techniques
CS 228T. Structured Probabilistic Models: Theoretical Foundations
CS 229. Machine Learning
CS 247. Human-Computer Interaction Design Studio
CS 249A. Object-Oriented Programming from a Modeling and Simulation Perspective
CS 276. Information Retrieval and Web Search (Same as LINGUIST 286)
CS 303. Designing Computer Science Experiments
CS 376. Research Topics in Human-Computer Interaction
CS 377. Topic in Human-Computer Interaction
CS 377L. Learning in a Networked World (Same as EDUC 298)
CS 378. Phenomenological Foundations of Cognition, Language, and Computation
CS 547. Human-Computer Interaction Seminar
ECON 51. Economic Analysis II
ECON 137. Information and Incentives
ECON 160. Game Theory and Economic Applications
EDUC 218. Topics in Cognition and Learning: Play
EDUC 298. Learning in a Networked World (Same as CS 377L)
EE 178. Probabilistic Systems Analysis
EE 376A. Information Theory
ENGR 62. Introduction to Optimization (Same as MS&E 111)
ENGR 155C. Introduction to Probability and Statistics for Engineers (Same as CME 106)
ETHICSOC 20. Introduction to Moral Philosophy (Same as PHIL 20)
ETHICSOC 30. Introduction to Political Philosophy (Same as PHIL 30, PUBLPOL 103A)
HPS 60. Introduction to Philosophy of Science (Same as PHIL 60)
HUMBIO 21. Introduction to Brain and Behavior (Same as BIO 20)
HUMBIO 145. Birds to Words: Cognition, Communication, and Language (Same as PSYCH 137/239A)
HUMBIO 160. Human Behavioral Biology (Same as BIO 15/250)
LINGUIST 1. Introduction to Linguistics
LINGUIST 105/205A. Phonetics
LINGUIST 110. Introduction to Phonetics and Phonology
LINGUIST 120. Introduction to Syntax
LINGUIST 124A/224A. Introduction to Formal Universal Grammar
LINGUIST 130A. Introduction to Linguistic Meaning
LINGUIST 130B. Introduction to Lexical Semantics
LINGUIST 140/240. Language Acquisition I
LINGUIST 180/280. From Languages to Information (Same as CS 124)
LINGUIST 181/281. Grammar Engineering
LINGUIST 182/282. Computational Theories of Syntax
LINGUIST 188/288. Natural Language Understanding (Same as CS 224U)
LINGUIST 210A. Phonology
LINGUIST 210B. Advanced Phonology
LINGUIST 221A. Foundations of English Grammar
LINGUIST 221B. Studies in Universal Grammar
LINGUIST 222A. Foundations of Syntactic Theory I
LINGUIST 230A. Introduction to Semantics and Pragmatics
LINGUIST 230B. Semantics and Pragmatics
LINGUIST 232A. Lexical Semantics
LINGUIST 235. Semantic Fieldwork
LINGUIST 241. Language Acquisition II
LINGUIST 247. Seminar in Psycholinguistics (Same as PSYCH 227)
LINGUIST 278. Programming for Linguists
LINGUIST 284. Natural Language Processing (Same as CS 224N)
LINGUIST 285. Speech Recognition and Synthesis (Same as CS 224S)
LINGUIST 286. Information Retrieval and Web Search (Same as CS 276)

LINGUIST 289. Quantitative, Probabilistic, and Optimization-Based Explanation in Linguistics
MATH 113. Linear Algebra and Matrix Theory
MATH 151. Introduction to Probability Theory
MATH 162. Philosophy of Mathematics (Same as PHIL 162)
ME 115B. Product Design Methods
MS&E 120. Probabilistic Analysis
MS&E 121. Introduction to Stochastic Modeling
MS&E 201. Dynamic Systems
MS&E 430. Tools for Experience Design
MUSIC 151. Psychophysics and Cognitive Psychology for Musicians
MUSIC 128. Composition, Coding, and Performance with SLOrc (Same as CS 170)
MUSIC 220A. Fundamentals of Computer-Generated Sound
MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing
MUSIC 250A. HCI Theory and Practice
MUSIC 251. Music, the Brain, and Human Behavior
MUSIC 253. Musical Information: An Introduction
MUSIC 254. Applications of Musical Information: Query, Analysis, and Style Simulation
NBIO 206. The Nervous System
NBIO 218. Neural Basis of Behavior
PHIL 9N. Philosophical Classics of the 20th Century
PHIL 10. God, Self, and World: An Introduction to Philosophy
PHIL 80. Mind, Matter, and Meaning
PHIL 102. Modern Philosophy, Descartes to Kant
PHIL 143/243. Quine
PHIL 150. Basic Concepts in Mathematical Logic
PHIL 151. First-Order Logic
PHIL 152. Computability and Logic
PHIL 154. Modal Logic
PHIL 155. General Interest Topics in Mathematical Logic
PHIL 157. Topics in Philosophy of Logic
PHIL 164. Central Topics in the Philosophy of Science: Theory and Evidence
PHIL 166. Probability: Ten Great Ideas About Chance
PHIL 167B. Philosophy, Biology, and Behavior
PHIL 180A/280A. Realism, Anti-Realism, Irrealism, Quasi-Realism
PHIL 181. Philosophy of Language
PHIL 184. Theory of Knowledge
PHIL 184B. Philosophy of the Body
PHIL 184P. Probability and Epistemology
PHIL 186. Philosophy of Mind
PHIL 187. Philosophy of Action
PHIL 188. Personal Identity
PHIL 189/289. Examples of Free Will
PHIL 194C. Time and Free Will
PHIL 194P. Naming and Necessity
PHIL 194R. Epistemic Paradoxes
PHIL 279. Collectivities
PHIL 350A. Model Theory
PHIL 351A. Recursion Theory
PHIL 354. Topics in Logic
PHIL 366. Evolution and Communication
PHIL 382A. Pragmatics and Reference
PHIL 387. Practical Rationality
PHIL 387C. Consistency and Coherence
PSYCH 55. Introduction to Cognition and the Brain
PSYCH 104. Uniquely Human
PSYCH 122S. Introduction to Cognitive and Comparative Neuroscience
PSYCH 131/262. Language and Thought
PSYCH 133. Human Cognitive Abilities
PSYCH 134. Seminar on Language and Deception
PSYCH 141. Cognitive Development
PSYCH 143. Developmental Anomalies
PSYCH 154. Judgement and Decision-Making
PSYCH 159. Psychology of Attitude Change and Social Influence
PSYCH 202. Cognitive Neuroscience
PSYCH 204A. Human Neuroimaging Methods
PSYCH 209/209A. The Neural Basis of Cognition: A Parallel Distributed Processing Approach
PSYCH 209B. Applications of Parallel Distributed Processing Models to Cognition and Cognitive Neuroscience
PSYCH 226. Models and Mechanisms of Memory
PSYCH 227. Seminar in Psycholinguistics (Same as LINGUIST 247)
PSYCH 232. Brain and Decision Making
PSYCH 246. Cognitive and Neuroscience Friday Seminar
PSYCH 250. High-level Vision
PSYCH 251. Affective Neuroscience
PSYCH 252. Statistical Methods for Behavioral and Social Sciences
PSYCH 253. Statistical Theory, Models, and Methodology
PSYCH 272. Special Topics in Psycholinguistics
SOC 126/226. Introduction to Social Networks
STATS 110. Statistical Methods in Engineering and the Physical Sciences
STATS 116. Theory of Probability
STATS 191. Introduction to Applied Statistics
STATS 200. Introduction to Statistical Inference

URBAN STUDIES

Director: Doug McAdam (Sociology)
Associate Director: Michael Kahan (Lecturer, Urban Studies)
Executive Committee: Albert Camarillo (History), Prudence Carter (Education), Zephyr Frank (History), Michael Rosenfeld (Sociology), Walter Scheidel (Classics), Jeff Wachtel (President's Office)
Affiliated Faculty: Eric Bettinger (Education), Scott Bukatman (Art and Art History), Albert Camarillo (History), Prudence Carter (Education), Samuel Chiu (Management Science and Engineering), Karen Cook (Sociology), Paulla Ebron (Anthropology), Paula Findlen (History), James Fishkin (Communication), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Richard Ford (Law), Zephyr Frank (History), Leah Gordon (Education), David Grusky (Sociology), Ian Hodder (Anthropology), Miyako Inoue (Anthropology), Sarah Jain (Anthropology),Tomás Jiménez (Sociology), David Labaree (Education), Raymond Levitt (Civil and Environmental Engineering), Carolyn Lougee Chappell (History), Monica McDermott (Sociology), Raymond McDermott (Education), Daniel McFarland (Education), Milbrey McLaughlin (Education), William McLennan (Office of Religious Life), Ian Morris (Classics), Josiah Ober (Classics, Political Science), Susan Olzak (Sociology), Leonard Ortolano (Civil and Environmental Engineering), Sean Reardon (Education), Rob Reich (Political Science), Ian Robertson (Anthropology), Michael Rosenfeld (Sociology), Rebecca Sandefur (Sociology), Walter Scheidel (Classics), Gary Segura (Political Science), Michael Shanks (Classics), Jennifer Trimble (Classics), Nancy Brandon Tuma (Sociology, Hoover Institution), Fred Turner (Communication), Paul Turner (Art and Art History), Guadalupe Valdes (Education), Barbara Voss (Anthropology)
Lecturers: David Boesch, Hilary Schafer Boudet, Melanie Edwards, Dennis Gale, Radford Hall, Michael Kahan, Michael Kieschnick, Lawrence Litvak, Laura Scher, Frederic Stout, Virginia Visconti
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Courses offered by the Urban Studies Program are listed under the subject code URBANST on the *Stanford Bulletin's* ExploreCourses web site.

The Urban Studies program treats urbanism as an interdisciplinary field; it brings together students, faculty, and outside specialists concerned with cities, and the impacts of cities on society and people's lives. The Urban Studies major encourages students to inquire deeply into the nature of cities and the techniques used to modify urban environments. It prepares students to address urbanization, and gives students a knowledge base and theoretical, analytical, and practical skills to understand urban social systems and effect social change.

MISSION OF THE UNDERGRADUATE PROGRAM IN URBAN STUDIES

The mission of the undergraduate program in Urban Studies is to develop students' understanding of the nature of cities and their impacts on both the individual and society at large. The program is interdisciplinary in nature drawing from fields in the social sciences, history, and education. Courses in the program focus on issues in contemporary urban society, and on the tools and concepts that can bring about change to improve urban life. Courses also address how cities have changed over time and how they continue to change today in societies around the world. Through a comprehensive program that includes course work, an internship, and independent research, a major in Urban Studies prepares students for careers and advanced academic pursuits in fields including architecture, community service, education, environmental planning, real estate development, urban design, and urban planning; many alumni have obtained graduate degrees in architecture, business, law, public policy, urban design, and urban planning from major universities across the country. Information on careers and graduate programs pursued by Urban Studies alumni is available from the Urban Studies program office.

LEARNING OUTCOMES

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Urban Studies. Students are expected to demonstrate ability:

1. to formulate a research question and assess its significance in relation to one or more relevant scholarly literatures and, where relevant, to theoretical writings.
2. to collect data to answer proposed research question.
3. to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. to write clearly and persuasively.

BACHELOR OF ARTS IN URBAN STUDIES

The Urban Studies major requires students to complete four types of courses totaling at least 73 units: 19 units in the core; at least 8 units of skills courses; at least 25 units in an area of concentration; and 13 units in the capstone sequence. If units in these categories total less then 73, the remaining units may be fulfilled by courses in other concentrations or in Urban Studies courses numbered 100 or higher (except URBANST 198 and 199). Majors must also complete two prerequisites: ECON 1A, Introductory Economics A; and ECON 1B, Introductory Economics B; these prerequisite courses may be taken S/NC, as the units for these courses do not count toward the 73 units required for the major. URBANST 198, URBANST 199, and prerequisites for required courses and for electives also do not count towards the 73-unit minimum.

Urban Studies students interested in graduate school in business or urban planning are advised to obtain basic quantitative skills by completing MATH 19, 20, and 21, or MATH 41 and 42, preferably before the junior year. A course in statistical methods, such as STATS 60, ECON 102A, POLISCI 150A or 151B, or SOC 181B, is recommended for students interested in business or urban planning.

Urban Studies students carry out an internship in an urban organization in the public or private sector, typically by enrolling in URBANST 201B during Spring Quarter of the junior year. This internship, or an appropriate substitution where necessary, should be arranged no later than Winter Quarter of the junior year, in consultation with the Urban Studies internship coordinator. Urban Studies majors who wish to receive academic credit for additional internship work may enroll once in URBANST 194. Students may not count more than 7 units of internship, including URBANST 194 and 201A/B, toward their major. Students can consult the Haas Center for Public Service for other courses with internship placements at community organizations.

Urban Studies students are encouraged to spend at least one quarter studying overseas to learn how cities vary across societies. Some Urban Studies concentration courses, as well as electives, can be satisfied at Stanford overseas campuses. Courses offered overseas vary from year to year, and students should check in advance with Overseas Studies and Urban Studies concerning which courses meet Urban Studies requirements. Students may arrange to fulfill the internship requirement through a placement at one of Stanford's overseas locations.

Courses counted toward the 73-unit graduation requirement for the major must be taken for a letter grade, and a minimum grade of 'C' is required. The only exceptions are Urban Studies courses numbered 100 and higher that are offered only on an S/NC basis, such as URBANST 201A and 201B. Students may count up to 3 non-Stanford courses, for a maximum of 15 units, toward the major. These units must first be approved by the Office of Transfer Credit in the Registrar's Office and subsequently approved by the Urban Studies program. Transfer credit is not awarded for internship. Students may not count more than 5 units of URBANST 197, Directed Reading, toward the major without permission of the Director. Qualified students may write a senior honors thesis and graduate with honors; see details in "Honors Program" below. Students interested in declaring Urban Studies as a major are required to meet first with the student services administrator and one of the program's advisers; they then declare the Urban Studies major on Axess.

URBAN STUDIES CORE

Urban Studies majors should complete URBANST 110, Introduction to Urban Studies, before Spring Quarter of the junior year. The following courses, totaling 19 units, are required:
URBANST 110. Introduction to Urban Studies
URBANST 112. The Urban Underclass
URBANST 113. Introduction to Urban Design
URBANST 114. Cities in Comparative Perspective

SKILLS

A minimum of 8 units are required. The following courses may be used to fulfill the skills requirement; consult an adviser to determine if additional courses may be available:
ANTHRO 130D. Spatial Approaches to Social Science
SOC 180A. Foundations of Social Research

CONCENTRATIONS

Students must complete at least 25 units in one of the following concentrations. Courses may not be double counted. Students should consult an adviser to develop a program that meets their intellectual goals; relevant courses not listed here, including research methods courses taken in preparation for the capstone project, may be counted toward the concentration with the prior consent of an adviser.

These concentrations are declared to the department; they are not declared on Axess, and they do not appear on the transcript or the diploma.

CITIES IN COMPARATIVE AND HISTORICAL PERSPECTIVE

Focus is on how cities have evolved over time, and how they are continuing to change today in societies around the world, drawing on disciplinary approaches including anthropology, archaeology, art history, geography, and history. By placing urban issues

in perspective, students improve their comprehension of the present as well as the past.

Students in this concentration are encouraged to study off campus, and preferably overseas, for at least one quarter. Many courses offered through the Overseas Studies Program can be counted toward the concentration. Similarly, internships offered at many of Stanford's overseas locations can be used to fulfill the Urban Studies internship requirement. One of the following courses is required for the cities in comparative and historical perspective concentration:

ANTHRO 103. The Archaeology of Modern Urbanism
CLASSART 112. Ancient Urbanism

The following courses may be counted toward the cities in comparative and historical perspective concentration:

AMELANG 177. Middle Eastern Cities in Literature and FIlm
AMSTUD 184. Cityscapes of the Imaginary: The Urban World in Literature and Film
ANTHRO 105. Ancient Cities in the New World
ANTHRO 127. City and Sounds
ARTHIST 3. Introduction to the History of Architecture
ARTHIST 141. The Invention of Modern Architecture
ARTHIST 143A. History of American Architecture
ARTHIST 283A. Paris and Shanghai, 1880-1940: Mediating the City
CLASSART 42. Pompeii
CLASSART 112. Ancient Urbanism
CLASSGEN 60. The Life and Death of a Roman City: Pompeii
CLASSHIS 60. The Romans
CLASSHIS 101. The Greeks
HISTORY 31. Science, Technology, and Art: The Worlds of Leonardo da Vinci
HISTORY 106A. Global Human Geography: Asia and Africa
HISTORY 106B. Global Human Geography: Europe and Americas
HISTORY 110C. Introduction to Modern Europe
HISTORY 150C. The United States in the 20th Century
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
HISTORY 232D. Rome: The City and the World
HISTORY 234. Paris and Politics, 1600-2010
HISTORY 260. California's Minority-Majority Cities
HISTORY 276. Modern Brazil
HISTORY 281C. Urban History of the Middle East: Aleppo and Istanbul on the Eve of Modernity, 1650-1850
HISTORY 287D. Tel-Aviv: Site, Symbol, City
HISTORY 291B. The City in Imperial China
ME 120. History and Philosophy of Design
OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin
OSPCPTWN 20. Supervised Service Learning
OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development
OSPCPTWN 24. Targeted Research: Project in Community Health and Development
OSPCPTWN 40. Education in the Post-Apartheid City
OSPCPTWN 42. Race, Class, and Status: Cape Town in Comparative Perspective
OSPCPTWN 44. Negotiating Home, Citizenship, and the South African City
OSPCPTWN 65. Western Cape Sites of Memory
OSPFLOR 58. Space as History: Urban Change and Social Vision: Florence 1059-2008
OSPFLOR 115Y. The Duomo and the Piazza della Signoria: Symbols of a Civilization
OSPKYOTO 48. City and Sounds in Kyoto
OSPMADRD 21. Built Environmental History of Spain
OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities
OSPOXFRD 66. Oxford: The Culture of the City
OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design
POLISCI 110A. Sovereignty and Globalization
POLISCI 110C. America and the World Economy
RELIGST 237. Jewish and Christian Rome in the 1st to 6th Centuries
SOC 143. Poverty in Brazil: From Empirical Evidence to Anti-Poverty Policies
URBANST 115. Urban Sustainability: Long-Term Archaeological Perspectives
URBANST 161. American Urban History since 1920

URBAN EDUCATION

The purpose of this concentration is to prepare students for a career in educational policy and practice in diverse settings. This concentration is a useful basis for graduate study in educational policy, law, or business, and for students who have been admitted by the School of Education to pursue a coterminal master's degree in the Stanford Teacher Education Program (STEP) or the Policy, Organization, and Leadership Studies Program (POLS). Students planning to pursue a coterminal master's should take one of the three practica: EDUC 103A, B, and C (for the STEP elementary coterm); EDUC 101X (for the STEP secondary coterm); or EDUC 270A (for the POLS coterm). Application and admission to a coterminal degree in these programs occurs during the Autumn Quarter of the junior year and is handled by the School of Education.

Opportunities to obtain teaching and advising experience are available in nearby schools through Upward Bound and other programs administered by the Haas Center for Public Service and through courses offered by the School of Education.

Students who choose this concentration may be eligible for the undergraduate honors program of the School of Education, in which case they should enroll in EDUC 199A, B, or C during their senior year.

The following course is required for the urban education concentration:

EDUC 112X. Urban Education

The following courses may be counted toward the urban education concentration:

AFRICAST 111. Education for All? The Global and Local in Public Policy Making in Africa
EDUC 101. Undergraduate Teaching Practicum
EDUC 103A. Tutoring: Seeing a Child through Literacy (Same as SOC 103A)
EDUC 103B. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices
EDUC 103C. Educational Policy, Diversity, and English Learners
EDUC 104X. Conduct of Research with and in Communities
EDUC 115Q. Identities, Race, and Culture in Urban Schools
EDUC 116X. Service Learning as an Approach to Teaching
EDUC 144. Child Development in and Beyond Schools
EDUC 148X. Critical Perspectives on Teaching and Tutoring English Language Learners
EDUC 149. Theory and Issues in the Study of Bilingualism
EDUC 177. Education of Immigrant Students: Psychological Perspectives
EDUC 178X. Latino Families, Languages, and Schools
EDUC 179. Urban Youth and Their Institutions: Research and Practice
EDUC 198X. Tutoring with Adolescents: Ravenswood Writes
EDUC 201. History of Education in the United States
EDUC 201B. Education for Liberation
EDUC 202. Introduction to Comparative and International Education
EDUC 204. Introduction to the Philosophy of Education
EDUC 207X. School: What Is It Good For?
EDUC 216X. Education, Race, and Inequality in African American History, 1880-1990
EDUC 220A. Introduction to the Economics of Education
EDUC 220B. Introduction to the Politics of Education

EDUC 220C. Education and Society
EDUC 220D. History of School Reform: Origins, Policies, Outcomes, and Explanations
EDUC 221A. Policy Analysis in Education
EDUC 233A, B. Adolescent Development and Mentoring in the Urban Context
HUMBIO 142. Adolescent Development
or PSYCH 60. Introduction to Developmental Psychology
OSPCPTWN 40. Education in the Post-Apartheid City
SOC 132. Sociology of Education: The Social Organization of Schools

URBAN SOCIETY AND SOCIAL CHANGE

Focus is on issues in contemporary urban society and the tools and concepts that planners, policy makers, and citizens use to address those issues. Topics include environmental challenges, racial and class inequality, and the provision of adequate urban infrastructure. Students learn how community action, urban planning and design, and organizations in nonprofit, for-profit, and government sectors address urban social and environmental problems. This concentration prepares students to enter graduate programs concerned with urban affairs, community service, and public policy, and to work with local governmental agencies and for-profit and nonprofit organizations engaged in community service and development.

The following course is required for the urban society and social change concentration:
POLISCI 133. Ethics and Politics of Public Service

The following courses may be counted toward the urban society and social change concentration:
ANTHRO 32. Theories in Race and Ethnicity
ASNAMST 146S. Asian American Culture Community
CEE 64. Air Pollution: From Urban Smog to Global Change
CEE 100. Managing Sustainable Building Projects
CEE 115. Goals and Methods of Sustainable Building Projects
CEE 124. Sustainable Development Studio
CEE 129. Engineering and Policy Responses to Climate Change Impacts on Seaports
CEE 131. Architectural Design Process
CEE 141A. Infrastructure Project Development
CEE 142A. Creating Sustainable Development
CEE 171. Environmental Planning Methods
CEE 172. Air Quality Management
COMM 120. Digital Media in Society
EARTHSYS 124. Environmental Justice: Local, National, and International Dimensions
EARTHSYS 133. California Climate Change Law and Policy
EARTHSYS 181. Concepts of Urban Agriculture
ECON 150. Economic Policy Analysis
ECON 155. Environmental Economics and Policy
EDUC 270A. Learning to Lead in Public Service Organizations
ENGR 150. Social Innovation and Entrepreneurship
HISTORY 105. Gandhi, King and Non-Violence
HISTORY 255. Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice
HISTORY 259A,B. Poverty and Homelessness in America
HISTORY 260. California's Minority-Majority Cities
HUMBIO 122S. Social Class, Race, Ethnicity, Health
HUMBIO 127A,B. Community Health: Assessment and Planning
HUMBIO 128. Community Health Psychology
OSPCPTWN 20. Supervised Service Learning
OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development
OSPCPTWN 24. Targeted Research: Project in Community Health and Development
OSPCPTWN 42. Race, Class, and Status: Cape Town in Comparative Perspective
OSPMOSC 57. Social Inequality in Socialist and Post-Socialist Societies
POLISCI 221F. Race and American Politics
POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
PUBLPOL 135. Regional Politics and Decision Making in Silicon Valley
PUBLPOL 183. Philanthropy and Social Innovation
SOC 118. Social Movements and Collective Action
SOC 119. Understanding Large-Scale Societal Change: The Case of the 1960's
SOC 135. Poverty, Inequality, and Social Policy in the United States
SOC 137. Inequality and Access to Justice
SOC 140. Introduction to Social Stratification
SOC 141. Controversies About Inequality
SOC 143. Prejudice, Racism, and Social Change
SOC 145. Race and Ethnic Relations
SOC 160. Formal Organizations
or MS&E 180. Organizations: Theory and Management
SOC 161. The Social Science of Entrepreneurship
SOC 164. Immigration and the Changing United States
SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society
URBANST 111. Urban Politics
URBANST 115. Urban Sustainability: Long-Term Archaeological Perspectives
URBANST 123. Approaching Research and the Community
URBANST 126. Spirituality and Nonviolent Urban and Social Transformation
URBANST 131. Social Innovation and the Social Entrepreneur
URBANST 132. Concepts and Analytic Skills for the Social Sector
URBANST 133. Social Entrepreneurship Collaboratory
URBANST 137. Innovations in Microcredit and Development Finance
URBANST 162. Managing Local Governments
URBANST 163. Land Use Control
URBANST 165. Sustainable Urban and Regional Transportation Planning
URBANST 171. Urban Design Studio

SELF-DESIGNED

Students who wish to concentrate in an area of urban studies other than one of the above concentrations must complete the Urban Studies core, skills, and capstone requirement, and design additional units to bring the total to at least 73 units. The self-designed portion of the major should concentrate on a particular area of urban study, such as urban health care or urban environmental management. Additional units must be approved by both the Director of Urban Studies and an academic adviser who is a member of the Academic Council and has expertise in the particular area of interest to the student. Proposals for courses in the self-designed portion of the concentration should include a list of courses and a description of how each course meets the student's educational objectives. A proposal for a self-designed concentration must be accompanied by a letter to the Director of Urban Studies indicating that the academic adviser has examined and approved the student's plan.

Students pursuing a self-designed concentration must submit proposals for approval by the Director of Urban Studies by the beginning of the third quarter of the student's sophomore year. Applications received after that deadline are not considered. Students interested in designing their own concentration are strongly encouraged to meet with the Director of Urban Studies before the end of their sophomore year.

CAPSTONE

All majors are required to complete an internship and a sequence of two seminars, totaling 13 units, in which students participate in the work of an urban organization related to their area of interest, design a senior project, and write the results of their project. The capstone seminars can be used to satisfy the Writing in

the Major requirement and to complete some work on an honors thesis. URBANST 201A or B, and 201 or 202, should be taken in the junior year, and URBANST 203 in the senior year. Students who plan to be away during Winter Quarter of their junior year are advised to take URBANST 201 or 202 in the Winter Quarter of their sophomore year.

URBANST 201. Preparation for Senior Project

or URBANST 202. Preparation for Honors Thesis

URBANST 201A. Capstone Internship in Urban Studies

or URBANST 201B, Capstone Internship Seminar

URBANST 203. Senior Seminar (WIM)

HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research and to write a thesis summarizing the results. Before being accepted to the honors program in Urban Studies, a student must

1. declare a major in Urban Studies and complete at least 30 of the 73 required units including all prerequisites and core classes
2. complete URBANST 201 or 202 (offered Winter Quarter)
3. have an overall GPA of 3.3 and a GPA of at least 3.5 in Urban Studies
4. submit an application, including a one-page abstract and the signatures of an adviser and, if applicable, a second reader. If the adviser is not a member of Stanford's Academic Council, the student must have a second reader who is an Academic Council member. The application must be submitted to the program office no later than April 30 of the junior year, and it must then be approved by the Director of the Urban Studies honors program.

Honors students are expected to complete a portion of their honors work in URBANST 203, Senior Seminar, in Autumn Quarter. Additionally, they must register for 5-10 units total in URBANST 199, Senior Honors Thesis, over the course of their senior year. The units of URBANST 199 are in addition to the 73-units required for the major. Honors students are required to present their theses at the Senior Colloquium in Spring Quarter of senior year.

To graduate with honors, students must receive a grade of at least 'A-' in the honors work and have a GPA of at least 3.5 in courses for the Urban Studies major at the time of graduation.

MINOR IN URBAN STUDIES

The minor in Urban Studies is designed to introduce students to several disciplinary approaches to the study of cities, and provides the opportunity to explore one of three specialized options:

- Cities in comparative and historical perspective
- Urban education
- Urban society and social change

The minor in Urban Studies requires completion of seven courses for a letter grade, including the four core courses, the required course in the student's chosen concentration area, and two additional courses in that option as listed in the "Bachelor of Arts in Urban Studies" section of this bulletin.

COTERMINAL PROGRAMS IN URBAN STUDIES

Undergraduates in Urban Studies may enter coterminal master's degree programs in a number of departments and schools in the University. In recent years, Urban Studies majors have developed coterminal programs with the departments of Civil and Environmental Engineering, Communication, and Sociology, and with the School of Education. Information and applications for coterminal degree programs are available at Undergraduate Advising and Research. Students should discuss the coterminal program with a program director during their junior year.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

OVERSEAS STUDIES COURSES IN URBAN STUDIES

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (http://explorecourses.stanford.edu) or the Bing Overseas Studies web site (http://bosp.stanford.edu). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUTUMN QUARTER

BERLIN

- OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin. 5 units, Matthias Pabsch, GER:DB:Hum

FLORENCE

- OSPFLOR 38. Water Resources Engineering in Italy: An Historical Perspective. 4-5 units, Leonard Ortolano, GER:DB:EngrAppSci
- OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization. 4 units, Timothy Verdon, GER:DB:Hum

MADRID

- OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities. 5 units, Sheila Klaiber

MOSCOW

- OSPMOSC 57. Social Inequality in Socialist and Post-Socialist Societies. 3-5 units, Nancy Tuma, GER:DB:SocSci

OXFORD

- OSPOXFRD 66. Oxford: The Culture of the City. 3 units, Helena Chance, GER:DB:Hum

WINTER QUARTER

CAPETOWN

- OSPCPTWN 24A. Targeted Research Project in Community Health and Development. 3 units, Timothy Stanton

MADRID

- OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities. 5 units, Sheila Klaiber

SPRING QUARTER

BERLIN

- OSPBER 11. The Vanishing City: Lost Architecture and the Art of Commemoration in Berlin. 4-5 units, Knut Ebeling, GER:DB:Hum

CAPETOWN

- OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development. 3 units, Timothy Stanton
- OSPCPTWN 24B. Targeted Research Project in Community Health and Development. 5 units, Timothy Stanton
- OSPCPTWN 40. Education in the Post-Apartheid City. 4 units, Aslam Fataar
- OSPCPTWN 44. Negotiating Home, Citizenship and the South African City. 4 units, Sophie Oldfield

FLORENCE

- OSPFLOR 58. Space as History: Urban Change and Social Vision: Florence 1059-2008. 4 units, Filippo Rossi, Timothy Verdon, GER:DB:Hum

MADRID

- OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities. 5 units, Sheila Klaiber

PARIS

- OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design. 4 units, Estelle Halevi, GER:DB:Hum

STANFORD IN WASHINGTON

Director: Adrienne Jamieson

The Bing Stanford in Washington program provides highly-qualified undergraduates with an opportunity to work and study in the nation's capital. In addition to providing students with an understanding of public policy making, the program offers an opportunity to take advantage of the city's unique cultural resources.

Central in the student's educational experience is a full-time internship. Students serve as interns at such institutions and agencies as the Senate, the House of Representatives, the Office of Management and Budget, the White House, the National Institutes of Health, the Smithsonian Institution, CNN, World Bank, the departments of State, Justice, Treasury, Education, and Health and Human Services.

In addition to the internship, students also complete an academic course of study consisting of small courses taught by policy experts, and weekly seminars taught by Stanford faculty members. Seminars are generally 3-5 units. Past topics have included congressional oversight and the press; economic growth and development patterns, policies, and prospects; critical health issues in the U.S. and abroad; policy making in the Washington community; and criminal justice policy. Speakers from the Washington policy community frequently join students and faculty for discussions. Students often write a major paper related to their internship for 3-5 units of credit. Course and seminar topics vary according to student and faculty interest.

The Bing Stanford in Washington program offers stretch quarters in the Autumn and Spring (early September to mid-December, and late March to the end of June) and a regular quarter in Winter, which focuses on environmental and health policy. The program is designed for students in their junior year or during the first or second quarter of their senior year. Applications must be completed two quarters in advance, and three quarters in advance if a student is overseas or otherwise not on campus during the qualifying quarter.

Students interested in the program should contact the campus office of the Bing Stanford in Washington program in Room 105 of the SIEPR Gunn Building; see http://bsiw.stanford.edu; or email bsiwinfo_ca@stanford.edu.

SCHOOL OF LAW

Emeriti: (Professors) Barbara Allen Babcock, Wayne G. Barnett, Paul Brest, Gerhard Casper, William Cohen, Lance E. Dickson, Marc A. Franklin, Jack H. Friedenthal, Robert A. Girard, William B. Gould IV, Thomas C. Grey, Thomas C. Heller, Miguel A. Méndez, John Henry Merryman, Margaret Jane Radin, David Rosenhan, Kenneth E. Scott, Byron D. Sher, William H. Simon, Michael S. Wald

Dean: Larry D. Kramer

Vice Dean: Mark G. Kelman

Associate Dean for Curriculum: Jane Schacter

Associate Dean for Executive Education and Special Programs: F. Daniel Siciliano

Associate Dean for Graduate Studies: Deborah R. Hensler

Associate Dean for Public Interest and Clinical Education: Lawrence C. Marshall

Senior Associate Dean and Chief Financial Officer: Frank Brucato

Associate Deans: Diane Chin, Faye Deal, Catherine Glaze, Sabrina Johnson, Susan Robinson, Scott Showalter

Professors: Janet Cooper Alexander, Joseph Bankman, R. Richard Banks, Joshua Cohen, G. Marcus Cole, Richard Craswell, Mariano-Florentino (Tino) Cuéllar, Robert M. Daines, Michele Landis Dauber, John J. Donohue III, George Fisher (on leave autumn), Richard T. Ford, Barbara H. Fried (on leave autumn), Lawrence M. Friedman, Ronald J. Gilson (on leave autumn), Paul Goldstein, Henry T. Greely, Joseph A. Grundfest, Deborah R. Hensler, Daniel E. Ho, Pamela S. Karlan, Mark G. Kelman, Amalia D. Kessler, Daniel P. Kessler, Michael Klausner, Larry D. Kramer, Mark A. Lemley, Lawrence C. Marshall, Jenny S. Martinez (on leave winter/spring), Michael W. McConnell, Joan Petersilia, A. Mitchell Polinsky, Robert L. Rabin, Deborah L. Rhode , Jane Schacter, Norman W. Spaulding (on leave autumn), James F. Strnad II , Kathleen M. Sullivan (on leave), Alan O. Sykes, Barton H.Thompson, Jr., Robert Weisberg

Associate Professors: Alison D. Morantz, Barbara van Schewick

Assistant Professors: David Freeman Engstrom, Nora Freeman Engstrom, Michael W. Wara

Professors (Teaching): Juliet M. Brodie, William S. Koski, Deborah A. Sivas, Jayashri Srikantiah

Associate Professors (Teaching): Jeffrey L. Fisher, Jay Mitchell

Professor of the Practice of Law: David W. Mills

Senior Lecturers: Margaret R. Caldwell (on leave), Janet Martinez, F. Daniel Siciliano, Allen S. Weiner

Professors (by courtesy): Paul C. Pfleiderer, Madhav Rajan, Jack Rakove, Rebecca Sandefur

Visiting Professors: Michael Asimow, Siegfried Fina, P. (Deep) Gulasekaram, Daniel Hulsebosch, Donald Lewis, Mark McKenna, Bernadette Meyler, David Patton, Rogelio Perez-Perdomo, William Simon

Legal Research and Writing Instructors: Jeanne Merino, Elizabeth Pollman, Briana Rosenbaum, Andrea Roth, Shirin Sinnar, Deepa Varadarajan

Lecturers: Alvin Attles, Daniel L. Barton, Dimitry Bam, Marilyn Bautista, Jeanine Becker, Samuel Bray, Viola Canales, Diane Chin, John Crawford, Betsy de la Vega, Lother Determann, Michael E. Dickstein, Bonnie Eskanazi, Anthony Falzone, Randee G. Fenner, Bertram Fields, Jeremy Fogel, David Forst, Laurence Franklin, Michelle Galloway, Mei Gechlik, Thomas C. Goldstein, Richard Goldstone, Jonathan Greenberg, Timothy H. Hallahan, Brad Handler, Brooke Heymach, Amy Howe, John Huhs, Ivan Humphreys, Erik Jensen, David Johnson, Danielle Jones, Steve Juelsgaard, Kathleen A. Kelly, Julie Matlof Kennedy, Jason Kipnis, Suzanne McKechnie Klahr, Jeffery W. Kobrick, Charles Koob, Philip J. Levine, Paul Lomio, Brian Love, Beth McLellan, Jeanne Merino, Roberta J. Morris, Linda Netsch, Thomas J. Nolan, Jessica Notini, Ralph M. Pais, Moira Paz, B. Howard Pearson, Lisa M. Pearson, Pamela Phan, Joe W. (Chip)

Pitts III, Duane Quaini, Stephan Ray, Claudio N. Rechden, Michael Romano, Andrew Roper, Stephen Rosenbaum, Matthew Rossiter, Kevin Russell, Ticien Sassoubre, Rachelle Silverberg, Smita Singh, Stephanie Smith, Kimberly Summe, Peter Thiel, Jean Thomas, Dan Torres, Erika V. Wayne, Dana Weintraub, Robert Wexler, George D. Wilson, Katherine C. Wright

Affiliated Faculty: Kyle Bagwell (Economics/SIEPR), Alexandria B. Boehm (Civil and Environmental Engineering), Tamar Herzog (History), David Holloway (FSI), Brian Lowery (GSB), Lee Ross (Psychology), Frank Wolak (Economics/PESD)

Courses offered by the School of Law are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes LAW and LAWGEN.

The School of Law, established 1893, provides a legal education for students who are fitted by their maturity and academic training to pursue professional study under University methods of instruction. The curriculum leading to the first professional degree in law, the Doctor of Jurisprudence (J.D.), constitutes an adequate preparation for the practice of law in any English-speaking jurisdiction. Graduate work leading to the degrees of Master of Laws (L.L.M.), Master of the Science of Law (J.S.M.), and Doctor of the Science of Law (J.S.D.), and a non-professional degree, Master of Legal Studies (M.L.S.), is also offered. For the full curriculum, see http://lawreg.stanford.edu/stanford. Stanford Law School offers joint or dual degree options in combination with other Stanford graduate departments and universities across the country; see the "Joint and Dual Degrees in Law" section of this bulletin.

The school is on a three-term academic calendar: Autumn Quarter classes begin for first-year students on August 30, 2010 and on September 20, 2010 for all other students: the quarter ends on December 1, 2010. Winter Quarter classes begin on January 3, 2011, and the quarter ends on March 7, 2011. Spring Quarter classes begin on March 28, 2011 and the quarter ends on May 27, 2011. For a complete list of academic dates see the 2010-11 Academic Calendar on the Law School web site at http://www.law.stanford.edu/calendar.

For further information about admission, programs, curriculum, and faculty, see http://www.law.stanford.edu.

JOINT AND DUAL DEGREES IN LAW

Formal admission to both the Law School and to the other cooperating school or department in accordance with the established admission standards of each school or department is required. In addition to the formal joint degree programs offered, the school considers requests for a dual program on an individually designed basis. For additional information on Law School joint or dual degree programs, see http://www.law.stanford.edu/program/degrees. See relevant web sites or department sections of this bulletin for degree requirements.

Formal joint degree programs at Stanford:

School of Business—See http://www.gsb.stanford.edu/mba.

J.D./M.B.A. Master of Business Administration

School of Earth Sciences—

J.D./M.S. Emmett Interdisciplinary Program in Environment and Resources (E-IPER)

J.D./Ph.D. Emmett Interdisciplinary Program in Environment and Resources (E-IPER)

School of Education—

J.D./M.A. Education

School of Engineering—

J.D./M.S. Bioengineering

J.D./Ph.D. Bioengineering

J.D./M.S. Computer Science

J.D./M.S. Electrical Engineering

J.D./M.S. Management Science and Engineering (MS&E)

J.D./Ph.D. Management Science and Engineering (MS&E)

School of Humanities and Sciences—

J.D./M.A. Economics

J.D./Ph.D. Economics

J.D./M.A. History

J.D./Ph.D. History

J.D./M.A. in degree granting programs in the Division of International Comparative and Area Studies (ICA): African Studies, East Asian Studies, International Policy Studies, Latin American Studies, and Russian, East European and Eurasian Studies

J.D./Ph.D. Philosophy

J.D./Ph.D. Political Science

J.D./Ph.D. Psychology

J.D./M.P.P. Public Policy

J.D./Ph.D. Sociology

School of Medicine—

J.D./M.S. Health Research and Policy (HRP)

Formal joint degree programs with other universities—

J.D./M.P.A. with the Woodrow Wilson School of Public and International Affairs at Princeton University

J.D./M.A. with the Paul H. Nitze School of Advanced International Studies at Johns Hopkins University

COURSES IN LAW

Detailed course descriptions are posted on the Stanford Law School, Office of the Registrar web site at http://lawreg.stanford.edu/stanford. Some law courses have special enrollment instructions and restrictions, but many law courses are open to qualified graduate students in other departments of Stanford University with instructor consent. Non-law students may not enroll in courses that are part of the required first-year JD curriculum. Stanford non-Law students intending to enroll in any course with a LAW subject code must consult the Office of the Law School Registrar in the Stanford Law School Administration Building, room 100, or see http://www.law.stanford.edu/school/offices/registrar.

SCHOOL OF MEDICINE

Dean: Philip Pizzo
Senior Associate Dean for Graduate Education and Postdoctoral Affairs: John Pringle
Senior Associate Dean for Medical Education: Charles Prober

The School of Medicine offers courses of study leading to the M.S., Ph.D., and M.D. degrees.

UNDERGRADUATE PROGRAMS IN THE SCHOOL OF MEDICINE

At the undergraduate level, a number of the school's courses are open to any registered Stanford student who has fulfilled the prerequisites, subject to the usual limits of course enrollment and faculty approval. In the classroom, the school offers courses targeted to undergraduates as well as graduate-level courses where advanced undergraduates with a background in the life sciences are welcome. Among these offerings are Stanford Introductory Seminars for freshmen and sophomores; interested students are encouraged to see the "Stanford Introductory Studies" section of this bulletin or at http://ual.stanford.edu/OO/intro_seminars/IntroSemsOverview.

M.S. AND PH.D. PROGRAMS IN THE SCHOOL OF MEDICINE

The School of Medicine is home to graduate programs covering a broad range of disciplines within biomedicine leading to Ph.D. or M.S. degrees. These programs focus on interdisciplinary training with in-depth investigation of an original problem of fundamental importance to the biosciences. Each degree program sets its own curriculum, but many courses are taught by groups of faculty from multiple programs and departments. Flexibility is a priority to ensure that all students obtain the best possible training for pursuing careers in their areas of interest. The school is dedicated to training students from diverse backgrounds, and to the promotion of diversity in graduate education. Admission is through one of about 15 home programs. These home programs enable students to carry out dissertation research and training with School of Medicine faculty, as well as investigators in the departments of Biology and Biophysics in the School of Humanities and Sciences. Detailed information on School of Medicine M.S. and Ph.D. programs, curricula, and research can be found at http://med.stanford.edu/ms and http://med.stanford.edu/phd. Application information can be found at http://gradadmissions.stanford.edu.

M.D. PROGRAM IN THE SCHOOL OF MEDICINE

The School of Medicine seeks to attract students who are passionate about scholarship and wish to improve the health of the world's people through research, innovation, and leadership. The Stanford M.D. curriculum provides education in biomedical and clinical sciences along with study and independent research through scholarly concentrations. Emphasis is placed on interdisciplinary learning, with streamlined content and melding of basic science and clinical instruction across the curriculum. Blocks of unscheduled time allow for individual or group study, participation in elective courses, research, and reflection. Alternative pathways through the curriculum include an option of a fifth or sixth year of study as well as opportunities for pursuing a second degree, such as an M.P.H., M.B.A., Master's of Science in Epidemiology or Health Services Research, or a Ph.D.

Broad clinical science education occurs throughout the curriculum with exposure to patient care and the practice of medicine beginning on the first day of medical school. Students may begin clinical clerkships as early as May of the second year. A population health course combines classroom and experiential learning to provide understanding of the socioeconomic determinants of the health of patients and communities.

Scholarly concentrations offer opportunities for developing skills that enhance basic science and clinical training in areas such as bioengineering, biomedical ethics and medical humanities, biomedical informatics, clinical research, community health, health services and policy research, and the molecular basis of medicine. Through the scholarly concentration program, these skills may be applied in clinical areas housed within centers at Stanford such as the Comprehensive Cancer Center, the Cardiovascular Institute, the Neuroscience Institute, the Institute of Immunity, Transplantation, and Infection, and Women's Health at Stanford. Study in a scholarly concentration typically includes course work and research activities. Research for scholarly concentrations is supported through the Medical Scholars program, which funds student research projects at Stanford and overseas.

Students with interests in medical research as a career are encouraged to investigate opportunities available through the Medical Scientist Training Program (MSTP). Stanford also collaborates with the University of California, Berkeley, to offer students opportunities for M.D./M.P.H. training. Details about these programs may be found at http://med.stanford.edu/combined_degree.

Stanford is committed to representing the diversity of the U.S. and California populations by seeking a diverse body of students who are interested in the intellectual substance of medicine and committed to advancing the field of health care, broadly defined. Provided an applicant to the school has completed basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in advanced biology such as biochemistry, molecular biology, or genetics and the behavioral sciences is recommended because of their importance in understanding health care. Breadth of interests and depth of experiences play an important role in the selection of students from among those applicants having superior academic records.

The M.D. degree requires 13 quarters of registration at full Med-MD tuition; the joint M.D./Ph.D. degree requires 16 quarters. Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame. For further details on the M.D. degree, including admission requirements, see http://med.stanford.edu/md.

MULTIPLE-DEGREE PROGRAMS IN THE SCHOOL OF MEDICINE

MEDICAL SCIENTIST TRAINING PROGRAM

The Medical Science Training Program (MSTP) provides medical students with an opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. It is designed to equip students for careers in academic investigative medicine, and emphasizes flexibility of curricular and research programs for each trainee. Training for a combined M.D./Ph.D. includes the same content encountered by students who pursue each degree separately, but the total training time is less than the sum of the time normally required for each degree. The flexible curriculum at Stanford's School of Medicine allows each student, in consultation with a preceptor and other advisers, to pursue a plan of study that satisfies the requirements for the M.D.

degree and allows performance of doctoral-level research leading to the Ph.D. Students interested in joining the MSTP are considered for admission at the time of their application to the School of Medicine M.D. program and are asked to provide supplemental information relevant to their research background. Current Stanford M.D. students may also apply for admission to the MSTP. Further information regarding admission may be obtained from the MSTP administrator; details about the MSTP may be found at http://mstp.stanford.edu.

MASTER OF SCIENCE IN MEDICINE PROGRAM

The Master of Science in Medicine program admits current Stanford Ph.D. students who have a commitment to translational research, but are not interested in becoming clinicians. The goal of the program is to train researchers in human biology and disease to be better equipped to translate new scientific discoveries into useful medical advances. Students offered admission into any Ph.D. program at Stanford may apply for admission to the master's program. During their first five quarters, students take basic biomedical science courses with Stanford M.D. students. The School of Medicine M.D. curriculum is presented in a succinct format that allows time for students to concurrently complete their Ph.D. course requirements and lab rotations. By early in their second year, students choose a lab for their Ph.D. thesis research and complete their medical course work. They also elect a clinical comentor to discuss translational research needs and help to arrange a short clinical experience. Upon completion of the Program., participating students receive an M.S. in Medicine. Details about the program can be found at http://msm.stanford.edu.

BIOCHEMISTRY

Emeriti: (Professors) Robert L. Baldwin, Paul Berg, Douglas L. Brutlag, David S. Hogness, A. Dale Kaiser, I. Robert Lehman
Chair: Mark A. Krasnow
Professors: Patrick O. Brown, Gilbert Chu, Ronald W. Davis, James E. Ferrell, Jr., Daniel Herschlag, Mark A. Krasnow, Suzanne R. Pfeffer, James A. Spudich
Associate Professors: Pehr A. B. Harbury, Julie A. Theriot
Assistant Professors: Rhiju Das, Aaron F. Straight
Courtesy Professors: Kerwyn C. Huang, Chaitan S. Khosla, Sharon Long, Rajat Rohatgi
Department Offices: Beckman Center, B400
Mail Code: 94305-5307
Phone: (650) 723-6161
Web Site: http://biochemistry.stanford.edu

Courses offered by the Department of Biochemistry are listed under the subject code BIOC on the *Stanford Bulletin's* ExploreCourses web site.

Biochemistry is a department within the School of Medicine, with offices and labs located in the Beckman Center for Molecular and Genetic Medicine at the Stanford Medical Center. Courses offered by the department may be taken by undergraduates as well as graduate and medical school students.

Advanced courses offered in more specialized areas emphasize recent developments in biochemistry, cell biology, and molecular biology. These courses include the physical and chemical principles of biochemistry, enzyme reaction mechanisms, membrane trafficking and biochemistry, molecular motors and the cytoskeleton, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, the molecular and cell biology of yeast, and the structure and function of both eukaryotic and prokaryotic chromosomes.

Opportunities exist for directed reading and research in biochemistry and molecular biology, using the most advanced research facilities, including those for light and electron microscopy, chromatography and electrophoresis, protein and nucleic acid purification, rapid kinetic analysis, synthesis and analysis, single molecule analyses using laser light traps, microarray generation and analysis, and computer graphic workstation facilities for protein and nucleic acid structural analysis. Ongoing research uses a variety of organisms from bacteria to animal cells.

DOCTOR OF PHILOSOPHY IN BIOCHEMISTRY

Requirements for the M.S. and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin. The department does not offer undergraduate degrees.

The Department of Biochemistry offers a Ph.D. program which begins in the Autumn Quarter of each year. The program of study is designed to prepare students for productive careers in biochemistry; its emphasis is training in research, and each student works closely with members of the faculty. In addition to the requirement for a Ph.D. dissertation based on original research, students are required to complete six advanced courses in biochemistry and related areas among the 135 total units required for the Ph.D. Selection of these courses is tailored to fit the background and interests of each student. A second requirement involves the submission of two research proposals which are presented by the student to a small committee of departmental faculty members who are also responsible for monitoring the progress of student curricular and research programs, and a journal club presentation. All Ph.D. students are expected to participate actively in the department's seminar program, and students are encouraged to attend and to present papers at regional and national meetings in cellular biochemistry and molecular biology. Teaching experience is an integral part of the Ph.D. curriculum and is required for the degree.

The Department of Biochemistry offers an M.S. degree only to students already enrolled in the Ph.D. program. Students should contact the Graduate Studies adviser for more details.

Those applying for graduate study should have at least a baccalaureate degree and should have completed work in cell and developmental biology, basic biochemistry and molecular biology, and genetics. Also required are: at least one year of university physics; differential and integral calculus; and organic, inorganic, and physical chemistry. The department is especially interested in those applicants who have research experience in biology or chemistry. Students must submit an application, including transcripts and letters of recommendation, by December (see web site) for admission in the following Autumn Quarter.

Applications should be submitted at http://gradadmissions.stanford.edu. Applicants are notified by March 31 of decisions on their applications. Stanford University requires scores from the Graduate Record Examination (GRE) (verbal, quantitative, and analytical), and applicants are encouraged to submit scores from the GRE Subject Test in biochemistry, biology, or chemistry. Applicants should take the October GRE exam.

All applicants are urged to compete for non-Stanford fellowships or scholarships, and U.S. citizens should complete an application for a National Science Foundation Predoctoral Traineeship. Students are provided with financial support to cover normal living expenses; Stanford tuition costs are paid. Applicants for admission to the department are considered without regard to race, color, creed, religion, sex, age, national origin, or marital status.

Postdoctoral research training is available to graduates who hold a Ph.D. or an M.D. degree. Qualified individuals may write to individual faculty members for further information.

At present, the primary research interests of the department are the structure and function of proteins and nucleic acids, the biochemistry and control of development processes, molecular motors and the cytoskeleton, the trafficking of proteins between membrane-bound organelles, the control and regulation of gene expression, bioinformatics/protein structure design, and the application of microarrays to problems in human health and disease.

CENTER FOR BIOMEDICAL ETHICS

Director: David C. Magnus
Director Emeritus: Thomas A. Raffin
Associate Director: Mildred K. Cho
Participating Faculty and Staff: Clarence H. Braddock, Julie A. Collier, LaVera M. Crawley, Maren Grainger-Monsen, Henry Greely, Katrina A. Karkazis, Sandra S. Lee, Jose R. Maldonado, Kelly E. Ormond, Laura W. Roberts, Christopher T. Scott, Audrey Shafer, Sara L. Tobin, Abraham C. Verghese, Lawrence I. Zaroff
Center Offices: 1215 Welch Road, Modular A
Mail Code: 94305-5417
*Phone: (*650) 723-5760
Web Site: http://bioethics.stanford.edu

The Stanford University Center for Biomedical Ethics (SCBE) is dedicated to interdisciplinary research and education, and provides clinical and research ethics consultation. SCBE serves as a scholarly resource on emerging ethical issues raised by medicine and biomedical research.

SCBE offers a scholarly concentration in Biomedical Ethics and Medical Humanities (BEMH) to medical students. This program allows medical students to study in depth the moral, social, and humanistic dimensions of medicine and biomedical science. Using cross-disciplinary methods such as those from philosophy, social science, film, literature, art, and law, students examine the meaning and implications of medicine and medical research.

Requirements—Students who pursue Biomedical Ethics and Medical Humanities in conjunction with an application area, such as Immunology, are required to complete 6 units including:

INDE 212. The Human Condition: Medicine, Arts, and Humanities (2 units)

MED 250A. Medical Ethics I (2 units)

Students may select the other two core BEMH units from a wide variety of University, Medical School, and Law School courses, and students interested in completing all 12 units in the BEMH scholarly area may do the same. Students are encouraged to go through the various offerings and devise a course plan to present to the director, David Magnus, and Audrey Shafer. Additional information on requirements for the scholarly concentration, is available at http://bioethics.stanford.edu/education/bemh.

BIOMEDICAL INFORMATICS

Committee: Russ B. Altman *(Chair and Program Director)*; Lawrence M. Fagan, Mark A. Musen *(Co-Directors)*; Betty Cheng *(Associate Director)*; Atul Butte, Amar K. Das, Teri Klein, David Paik, Daniel L. Rubin

PARTICIPATING FACULTY AND STAFF BY DEPARTMENT*

Biochemistry: Douglas L. Brutlag (Professor, emeritus), Rhiju Das (Assistant Professor), Ronald Davis (Professor), James Ferrell (Professor), Hunter Fraser (Assistant Professor), Julie Theriot (Associate Professor)

Bioengineering: Russ B. Altman (Professor), Kwabena Boahen (Associate Professor), Markus Covert (Assistant Professor), Scott Delp (Professor), Charles A. Taylor (Associate Professor)

Biology: Markus Feldman (Professor), Dmitri Petrov (Associate Professor)

Chemistry: Vijay Pande (Associate Professor)

Chemical and Systems Biology: Joshua Elias (Assistant Professor), James Ferrell (Professor)

Computer Science: Serafim Batzoglou (Associate Professor), Gill Bejerano (Assistant Professor), David Dill (Professor), Leo Guibas (Professor), Daphne Koller (Associate Professor), Jean-Claude Latombe (Professor), Chris Manning (Associate Professor), Teresa Meng (Professor), Terry Winograd (Professor)

Developmental Biology: Gill Bejerano (Assistant Professor), Harley McAdams (Professor, Research)

Electrical Engineering: Teresa Meng (Professor)

Genetics: Russ B. Altman (Professor), Mike Cherry (Associate Professor, Research), Stanley N. Cohen (Professor), Ronald Davis (Professor), Teri E. Klein (Senior Research Scientist), Gavin Sherlock (Assistant Professor), Michael P. Snyder (Professor), Hua Tang (Associate Professor)

Health Research and Policy: Mark A. Hlatky (Professor), Richard A. Olshen (Professor), Robert Tibshirani (Professor)

Management Science and Engineering: Margaret Brandeau (Professor), Ross D. Shachter (Associate Professor)

Medicine: Russ B. Altman (Professor), Euan Ashley (Assistant Professor), Jayanta Bhattacharya (Assistant Professor), Atul Butte (Assistant Professor), Robert W. Carlson (Professor), Betty Cheng (Associate Director), Amar K. Das (Assistant Professor), Lawrence M. Fagan (Co-Director), Alan M. Garber (Professor), Mary Goldstein (Professor), Peter D. Karp (Consulting Assistant Professor), Henry Lowe (Associate Professor, Research; Senior Associate Dean for Information Resources and Technology), Mark A. Musen (Professor), Douglas K. Owens (Associate Professor), Robert W. Shafer (Assistant Professor, Research), Samson Tu (Senior Research Scientist), P.J. Utz (Associate Professor), Michael G. Walker ((Consulting Associate Professor)

Microbiology and Immunology: Karla Kirkegaard (Professor), Garry Nolan (Professor), Julie Theriot (Associate Professor)

Pediatrics: Atul Butte (Assistant Professor), Chris Longhurst (Clinical Assistant Professor)

Psychiatry and Behavioral Sciences: Amar K. Das (Assistant Professor), Vinod Menon (Associate Professor)

Radiation Oncology: Lei Xing (Professor)

Radiology: Sam Gambhir (Professor), Gary H. Glover (Professor), Sandy A. Napel (Professor), David Paik (Assistant Professor), Norbert J. Pelc (Professor), Sylvia Plevritis (Associate Professor), Daniel L. Rubin (Assistant Professor), Geoffrey D. Rubin (Professor)

Structural Biology: Michael Levitt (Professor)

Statistics: Trevor J. Hastie (Professor), Susan Holmes (Professor), Art Owen (Professor), Robert Tibshirani (Professor), Michael G. Walker (Consulting Associate Professor), Nancy Zhang (Assistant Professor)

Surgery: Thomas Krummel (Professor), Charles A. Taylor (Associate Professor, Research)

* Research opportunities are not limited to faculty and departments listed.

Program Offices: Medical School Office Building (MSOB), room X- 215, 251 Campus Drive
Mail Code: 94305-5479
Phone: (650) 723-1398
Fax: (650) 725-7944
Web Site: http://bmi.stanford.edu

Courses offered by the Program in Biomedical Informatics are listed under the subject code BIOMEDIN on the *Stanford Bulletin's* ExploreCourses web site.

The program in Biomedical Informatics emphasizes research to develop novel computational methods that can advance biomedicine. Students receive training in the investigation of new approaches to conceptual modeling and to development of new algorithms that address challenging problems in the biological sciences and clinical medicine. Students with a primary interest in developing new informatics methods and knowledge are best suited for this program. Students with a primary interest in the biological or medical application of existing informatics techniques may be better suited for training in the application areas themselves.

GRADUATE PROGRAMS IN BIOMEDICAL INFORMATICS

The Biomedical Informatics Program is interdepartmental and offers instruction and research opportunities leading to M.S. and Ph.D. degrees in Biomedical Informatics. All students are required to complete the core curriculum requirements, and also to elect additional courses to complement both their technical interests and their goals in applying informatics methods to clinical settings, biology, or imaging. Candidates must maintain a 3.0 GPA in each of the five core areas, and an overall GPA of 3.0. If the candidate's GPA does not meet the minimum requirement, the Biomedical Informatics Executive Committee may require corrective courses of action. In addition, prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of biomedical informatics fundamentals and a potential for research by passing a qualifying exam.

The core curriculum is common to all degrees offered by the program but is adapted or augmented depending on the interests and experience of the student. Deviations from the core curriculum must be justified in writing and approved by the student's Biomedical Informatics academic adviser and the chair of the Biomedical Informatics Executive Committee. It should be noted, however, that the program is intended to provide flexibility and to complement other opportunities in applied medical research that exist at Stanford. Although most students are expected to comply with the basic program of study outlined here, special arrangements can be made for those with unusual needs or those simultaneously enrolled in other degree programs within the University. Similarly, students with prior relevant training may have the curriculum adjusted to eliminate requirements met as part of prior training.

CORE CURRICULUM AND PROGRAM REQUIREMENTS IN BIOMEDICAL INFORMATICS

CORE CURRICULUM IN BIOMEDICAL INFORMATICS

Students are expected to participate regularly in the Biomedical Informatics Student Seminar (BIOMEDIN 201) and a research Colloquium, such as BIOMEDIN 200 or BIOMEDIN 205. In addition, all students are expected to fulfill requirements in the following five categories:

1. *Core Biomedical Informatics* (17 units): students are expected to understand current applications of computers in biology and medicine and to develop a broad appreciation for research in the management of biomedical information. Required courses are: BIOMEDIN 210, 211, 212, 214, and 217, all of which should be taken during the first and second year in the program.
2. *Computer Science* (9 units): the student is expected to acquire a knowledge of the use of computers, computer organization, programming, and symbolic systems. It is assumed that prior to matriculation students have computing experience at least equivalent to a course introducing the fundamentals of data structures and algorithms, such as CS 103A,B, 103X, 106A,B, 106X, or other courses approved by academic adviser or executive committee. Students are required to take a minimum of 9 units of courses in the Department of Computer Science. If similar courses have not been taken previously, these units must include CS 161, a class in artificial intelligence or learning (for example, CS 121, CS 228, CS 229, STATS 315A, STATS 315B), and a course that requires significant programming and knowledge of machine architectures (for example, CS 108). For those who have taken such courses previously, replacement units may be taken from any other course in CS chosen by the student and approved by the academic adviser. A course in databases is especially recommended. With the exception of CS 108 and 121, all other CS courses applied to the degree requirements must be numbered 137 or higher.
3. *Probability, Statistics, and Decision Science* (9 units): students are required to take at least three courses chosen from the following five topics: basic probability theory, Bayesian statistics, decision analysis, machine learning, and experimental-design techniques. Prior courses in statistics at least equivalent to STATS 60 and calculus equivalent to MATH 42 are prerequisites. A prior course in linear algebra equivalent to MATH 103 or 113 is recommended. For the probability requirements, students may, for example, take MS&E 220, STATS 116, or MS&E 221. For the statistics requirements, students should take STATS 141 or STATS 212, if they have not had an equivalent class prior to entry to the program. Otherwise, sequences (taken after STATS 116) may include STATS 200 followed by a course in stochastic modeling, machine learning or data mining, such as STATS 202 or 315A,B, or CS 228 or 229. Options for decision analysis include MS&E 152 or 252, or cost effectiveness analysis (BIOMEDIN 432). Also recommended is a course in the psychology of human problem solving. Specific courses should be chosen in consultation with the student's academic adviser.
4. *Biomedical Domain Knowledge* (6 units): students are expected to acquire an understanding of pertinent life sciences and how to analyze a domain of application interest. Prior courses in biology at least equivalent to BIO 41 and 42 are prerequisites. All students must have completed a course in basic biochemistry, molecular biology, or genetics. Other areas of basic biology may be an acceptable alternative. Exposure to laboratory methods in biology is encouraged. All students without formal health care training are encouraged to take IMMUNOL 230 (formerly BIOMEDIN 207).
5. *Social and Ethical Issues* (4 units): candidates are expected to be familiar with issues regarding ethics, public policy, financing, organizational behavior, management, and pertinent legal topics. Students are required to take MED 255, The Responsible Conduct of Research, or the equivalent. Students may choose at least 3 units from suitable courses, including BIOMEDIN 432; CS 201; MS&E 284, 197; HRP 391, 392; or any other advanced course in policy and social issues proposed by the student and approved by the Biomedical Informatics academic adviser.

The core curriculum generally entails a minimum of 45 units of course work for master's students and 54 units of course work for Ph.D. students, but can require substantially more or less depending upon the courses chosen and the previous training of the student. All courses must be taken for a letter grade. Students may request an elective course be taken for a grade of credit/no credit by submitting a petition to the BMI executive committee. BIOMEDIN 299, 801, and 802 may be taken for satisfactory/no credit (S/NC). The varying backgrounds of students are well recognized and no one is required to take courses in an area in which he or she has already been adequately trained; under such circumstances, students are permitted to skip courses or substitute more advanced work. Students design appropriate programs for their interests with the assistance and approval of their Biomedical Informatics academic adviser. At least 27 units of formal course work are expected.

PROGRAM REQUIREMENTS FOR THE ACADEMIC M.S., PROFESSIONAL M.S., AND COTERMINAL DEGREES

Students enrolled in any of the M.S degrees must complete the program requirements in order to graduate. Programs of at least 45 units that meet the following guidelines are normally approved:

1. Completion of the core curriculum.
2. Masters candidates who are able to attend classes on campus should sign up at least once for BIOMEDIN 201, Student Seminar, plus a Research Colloquium in their field of research, such as BIOMEDIN 200 or BIOMEDIN 205. Regardless of their registration status, students should participate in the Student Seminar and Research Colloquium every quarter.

3. Electives: additional courses to bring the total to 45 or more units as necessary.
4. Masters candidates should sign up for BIOMEDIN 801 for their project units.

The University requirements for the M.S. degree are described in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE IN BIOMEDICAL INFORMATICS (ACADEMIC)

This degree is designed for individuals who wish to undertake in-depth study of biomedical informatics with research on a full-time basis. Normally, a student spends two years in the program and implements and documents a substantial project during the second year. The first year involves acquiring the fundamental concepts and tools through course work and research project involvement. All first- and second-year students are expected to devote 50 percent or more of their time participating in research projects. Research rotations are not required, but can be done with approval of the academic adviser or training program director. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics. This degree requires a written research paper to be approved by two faculty members.

MASTER OF SCIENCE IN BIOMEDICAL INFORMATICS (PROFESSIONAL/HONORS COOPERATIVE PROGRAM)

This degree is designed primarily for the working professional who already has advanced training in one discipline and wishes to acquire interdisciplinary skills. All classes necessary for the degree are available online. The professional M.S. is offered in conjunction with Stanford Center for Professional Development (SCPD), which establishes the rates of tuition and fees. The program uses the honors cooperative model (HCP), which assumes that the student is working in a corporate setting and is enrolled in the M.S. on a part-time basis. The student has up to five years to complete the program. Research projects are optional and the student must make arrangements with program faculty. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics.

MASTER OF SCIENCE IN BIOMEDICAL INFORMATICS (COTERMINAL)

The coterminal degree program allows Stanford University undergraduates to study for a master's degree while completing their bachelor's degree(s) in the same or a different department. Please refer to the "Coterminal Bachelor's and Master's Degrees" section under "Undergraduate Degrees and Programs" in this bulletin for additional information.

The coterminal Master of Science program follows the same program requirements as the Master of Science (Professional), except for the requirement to be employed in a corporate setting. The coterminal degree is available only to current Stanford undergraduates. Coterminal students are enrolled full-time and courses are taken on campus. Research projects are optional and the student must make arrangements with program faculty. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/pdf/CotermAppRules.pdf

DOCTOR OF PHILOSOPHY IN BIOMEDICAL INFORMATICS

The University's basic requirements for the doctorate (residence, dissertation, examination, and so on) are discussed in the "Graduate Degrees" section of this bulletin.

Individuals wishing to prepare themselves for careers as independent researchers in biomedical informatics, with applications experience in bioinformatics, clinical informatics, or imaging informatics, should apply for admission to the doctoral program. The following are additional requirements imposed by the Biomedical Informatics Executive Committee:

1. A student plans and completes a coherent program of study including the core curriculum and additional requirements as for the master's program. In addition, doctoral candidates are expected to take at least nine more units of advanced courses to bring the total to 54 units. Recommended classes include: Computer Sciences courses numbered 135 or higher, courses in Management Science and Engineering or Statistics numbered 200 or higher, PSYCH 256 or 225, or relevant courses in other departments approved by the student's academic adviser. In the first year, two or three research rotations are encouraged. The master's requirements should be completed by the end of the second year in the program (six quarters of study, excluding summers). Doctoral students are generally advanced to Ph.D. candidacy after passing the qualifying exam, which takes place during the end of the second year of training. A student's academic adviser has primary responsibility for the adequacy of the program, which is regularly reviewed by the Biomedical Informatics Executive Committee.
2. To remain in the Ph.D. program, each student must attain a grade point average (GPA) of 3.0 (B) in each of the five core areas and an overall GPA of 3.0 for the required courses. The student must fulfill these requirements and apply for admission to candidacy for the Ph.D. by the end of six quarters of study (excluding summers). In addition, reasonable progress in the student's research activities is expected of all doctoral candidates.
3. During the third year of training, generally in Winter Quarter, each doctoral student is required to give a preproposal seminar that describes evolving research plans and allows program faculty to assure that the student is making good progress toward the definition of a doctoral dissertation topic.
4. By the end of nine quarters (excluding summers), each student must orally present a written thesis proposal for the written dissertation and must orally defend the proposal before a dissertation committee that generally includes at least one member of the Biomedical Informatics Executive Committee. The committee determines whether the student's general knowledge of the field and the details of the planned thesis are sufficient to justify proceeding with the dissertation.
5. After application for Terminal Graduate Registration (TGR) status, the Ph.D. candidate should register each quarter for BIOMEDIN 802 so their research effort may be counted toward the degree.
6. As part of the training for the Ph.D., each student is required to be a teaching assistant for two courses approved by the Biomedical Informatics Executive Committee; one should be completed in the first two years of study.
7. The most important requirement for the Ph.D. degree is the dissertation. Prior to the oral dissertation proposal and defense, each student must secure the agreement of a member of the program faculty to act as dissertation adviser. The principal adviser need not be an active member of the Biomedical Informatics program faculty, but all committees should include at least one participating BMI faculty member.
8. At the completion of training, while still matriculated and shortly prior to deposit of the dissertation, the student gives a final talk describing his or her results. No official additional oral examination is required upon completion of the written dissertation. The oral defense of the dissertation proposal satisfies the University oral examination requirement.
9. The student is expected to demonstrate an ability to present scholarly material and research in a lecture at a formal seminar.
10. The student is expected to demonstrate an ability to present scholarly material in concise written form. Each student is re-

quired to write a paper suitable for publication, usually discussing his or her doctoral research project. This paper must be approved by the student's academic adviser as suitable for submission to a refereed journal before the doctoral degree is conferred.

11. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a member of the program faculty, and a third faculty member chosen from anywhere within the University.

PH.D. MINOR IN BIOMEDICAL INFORMATICS

For a Ph.D. minor in Biomedical Informatics (BMI), a candidate must complete a minimum of 20 unduplicated units of Biomedical Informatics course work, including 12 units in BMI core courses from BIOMEDIN 210, 211, 212, 214, and 217.

The candidate must complete the one-unit MED 255, Responsible Conduct of Research, or an approved substitute.

The remaining units must be courses that would count towards the BMI master's degree, taken from any of these three areas:

- Computer Science
- Probability, Statistics, Machine Learning, and Experimental Design
- Biomedicine

Courses used for the BMI Ph.D. minor may not be double-counted to meet the requirements of a master's or Ph.D. degree.

All courses used for the BMI Ph.D. minor, except MED 255, must be taken for a letter grade and passed with an overall GPA of 3.0 or better.

This degree offering is effective in Autumn Quarter 2010-11. Courses taken prior to that date may be counted towards the BMI Ph.D. minor degree.

CANCER BIOLOGY

Program Director: Amato Giaccia (Radiation Oncology)

Committee on Cancer Biology: Nicholas Denko (Radiation Oncology), Howard Chang (Dermatology), Jeffrey Axelrod (Pathology), Katrin Chua (Medicine, Endocrinology), Julien Sage (Pediatrics), Alexandro Sweet-Cordero (Pediatrics), Timothy Stearns (Biology, Genetics), Jonathan Pollack (Pathology)

Participating Departments and Faculty:

Biochemistry: Patrick O. Brown (Professor)

Bioengineering: Jennifer Cochran (Assistant Professor)

Biology (School of Humanities and Sciences): William Burkholder (Assistant Professor), Martha Cyert (Professor), Guowei Fang (Assistant Professor), Judith Frydman (Associate Professor), Or Gozani (Assistant Professor), W. James Nelson (Professor), Virginia Walbot (Professor), Tim Stearns (Professor)

Chemical And Systems Biology: James K. Chen (Assistant Professor), Karlene Cimprich (Associate Professor), James E. Ferrell (Professor)

Dermatology: Howard Y. Chang (Associate Professor), Paul A. Khavari (Professor), M. Peter Marinkovich (Associate Professor), Anthony Oro (Associate Professor)

Developmental Biology: Roeland Nusse (Professor), Matthew Scott (Professor)

Genetics: Anne Brunet (Assistant Professor), Michele Calos (Professor), Stanley Cohen (Professor)

Medicine/Cardiovascular Medicine: Ching-pin Chang (Assistant Professor)

Medicine/Endocrinology/Geronotology/Metabolism: Katrin Chua (Assistant Professor), Andrew R. Hoffman (Professor)

Medicine/Gastroenterology and Hepatology: Christine Cartwright (Professor), Anson Lowe (Assistant Professor)

Medicine/Hematology: Steven Artandi (Associate Professor), Calvin Kuo (Associate Professor), Ravindra Majeti (Assistant Professor)

Medicine/Oncology: Gilbert Chu (Professor), Dean Felsher (Associate Professor), James Ford (Associate Professor), Ronald Levy (Professor), Beverly S. Mitchell (Professor; Director, Stanford Cancer Center)

Medicine/Pulmonary and Critical Care Medicine: Glenn Rosen (Associate Professor)

Microbiology and Immunology: Helen M. Blau (Professor)

Neurology and Neurological Sciences: Thomas Rando (Professor)

Neurosurgery: Albert J. Wong (Professor)

Obstetrics and Gynecology: Renee A. Reijo Pera (Professor)

Otolaryngology: John Sunwoo (Assistant Professor)

Pathology: Jeff Axelrod (Associate Professor), Matthew Bogyo (Associate Professor), Michael Cleary (Professor), Gerald Crabtree (Professor), Edgar Engleman (Professor), Andrew Fire (Professor), Isabella Graef (Assistant Professor), Joseph Lipsick (Professor), Bingwei Lu (Assistant Professor), Jonathan Pollack (Associate Professor), Irving Weissman (Professor; Director, Stanford University School of Medicine Institute of Stem Cell Biology and Regenerative Medicine), Marius Wernig (Assistant Professor)

Pediatrics/Cancer Biology: Julien Sage (Assistant Professor), Alejandro Sweet-Cordero (Assistant Professor)

Pediatrics/Cardiology: Marlene Rabinovitch (Professor)

Pediatrics/Endocrinology: Brian Feldman (Assistant Professor)

Radiation Oncology/Radiation Biology: Laura Attardi (Associate Professor), J. Martin Brown (Professor), Nicholas Denko (Assistant Professor), Amato Giaccia (Professor; Director, Stanford University Cancer Biology Program)

Radiation Oncology/Radiation Physics: Edward Graves (Assistant Professor)

Radiation Oncology/Radiation Therapy: Susan Knox (Associate Professor), Albert Koong (Assistant Professor), Quynh-Thu Le (Professor), Max Diehn (Assistant Professor)

Radiation Oncology/Stem C

Radiology/Diagnostic Radiology: Samira Guccione (Assistant Professor, Research), Jianghong Rao (Assistant Professor)

Structural Biology: William Weis (Professor)

Urology: Donna Peehl (Professor, Research), Zijie Sun (Associate Professor)

Program Office: 251 Campus Drive, MSOB X234
Mail Code: 94305-5421
Phone: (650) 723-6198
Email: gracebk@stanford.edu
Web Site: http://stanford.edu/group/cancerbio

Courses offered by the Cancer Biology Program are listed under the subject code CBIO on the *Stanford Bulletin's* ExploreCourses web site.

The Cancer Biology Program at Stanford University is an interdisciplinary program leading to the Ph.D. degree. During the past three decades, understanding of cancer has increased with the discovery of oncogenes, tumor suppressor genes, pathways of DNA damage and repair, chromatin remodeling, cell cycle regulation, angiogenesis and responses to hypoxia, and recent glimpses into the molecular basis of metastasis and cancer stem cell biology. In addition, methods of parallel analysis including gene expression arrays, protein arrays, and tissue arrays have begun to refine and redefine the taxonomy of cancer diagnosis. This explosion of basic and clinical science has resulted in the first successful cancer chemotherapies and immunotherapies based on the knowledge of specific molecular targets. Stanford presents a unique environment to pursue interdisciplinary cancer research because the schools of Medicine, Humanities and Sciences, and Engineering are located on a single campus

The goal of the Cancer Biology Ph.D. program is to provide students with education and training that enables them to make significant contributions to this field. Course work during the first year is designed to provide a broad understanding of the molecular, genetic, cell biological, and pathobiological aspects of cancer. Students also learn about the current state of the epidemiology, clinical diagnosis, treatment, and prevention of human cancers. Equally important during the first year is a series of three rotations

in research laboratories chosen by each student. By the beginning of the second year, each student chooses a research adviser and begins work on the dissertation project. A qualifying examination must be completed by the end of the second year. An annual Cancer Biology conference at Asilomar on the Pacific Ocean provides students with an opportunity to present their research to one another and to faculty. The expected time to degree is four to five years.

Students are not limited to a single department in choosing their research adviser. The Cancer Biology Ph.D. program currently has approximately 60 graduate students located in basic science and clinical departments throughout the School of Medicine and the School of Humanities and Sciences.

GRADUATE PROGRAMS IN CANCER BIOLOGY

The program offers a Ph.D. in Cancer Biology.

DOCTOR OF PHILOSOPHY IN CANCER BIOLOGY

University requirements for the Ph.D. are described under the "Graduate Degrees" section of this bulletin.

A small number of applicants are admitted to the program each year. Applicants should have completed an undergraduate major in the biological sciences; applicants with undergraduate majors in physics, chemistry, or mathematics may be admitted if they complete background training in biology during the first two years of study. During the first year, each student is required to complete a minimum of three, one quarter laboratory rotations. Students must choose a dissertation adviser prior to the end of Summer Quarter, first year, but not before the end of Spring Quarter, first year.

The requirements for the Ph.D. degree are as follows:

1. Training in biology equivalent to that of an undergraduate biology major at Stanford.
2. Completion of the following courses:
   a. CBIO 241. Molecular, Cellular, and Genetic Basis of Cancer
   b. GENE 203. Advanced Genetics
   c. BIO 214. Cell Biology of Physiological Processes
   d. CSB 210. Signal Transduction Pathways and Networks. Students can take GENE 211, Genomics, or SBIO 214, Biological Macromolecules, in lieu of CSB 210.
   e. CBIO 280. Cancer Biology Journal Club; required for first- and second-year graduate students in Autumn, Winter, and Spring quarters.
   f. MED 255. Responsible Conduct in Research; with consent, may be audited.
3. At least 6 units of additional cancer biology-related, graduate-level courses. Course work taken is determined in consultation with the student's adviser and/or the Program Director.
4. Presentation of research results at the annual Cancer Biology Conference on at least three occasions, at least one being an oral presentation.
5. Completion of a qualifying examination in Cancer Biology is required for admission to Ph.D. candidacy. The exam consists of an NIH-style written grant proposal not to exceed ten pages (excluding references), and an oral examination. The examining committee consists of three faculty members from the Cancer Biology Program and does not include the student's dissertation adviser. The composition of this committee is chosen by the student and dissertation adviser and must be submitted to and approved by the program director prior to the end of Autumn Quarter, second year. The qualifying examination must be taken prior to the end of Spring Quarter, second year. If necessary, one retake is permitted prior to the end of Summer Quarter, second year. After the qualifying examination has been completed, the student is required to form a dissertation reading committee that includes the student's adviser and three other members of the Academic Council with appropriate expertise. Each student is required to arrange annual meetings (more frequently, if necessary) of the dissertation reading committee, at which time oral presentations of progress during the past year and a plan of study for the coming year are presented and discussed. Completion of each annual committee meeting must be communicated in writing to the program director by the adviser by the end of Spring Quarter each year.

The major accomplishment of each successful Ph.D. student is the presentation of a written dissertation resulting from independent investigation that contributes to knowledge in the area of cancer biology. An oral examination is also required for the Ph.D. degree. In the Cancer Biology Program, a public seminar (one hour) is presented by the Ph.D. candidate, followed by a closed-door oral examination. The oral examination committee consists of at least four examiners (the members of the doctoral dissertation reading committee) and a chair. The oral examination chair may not have a full or joint appointment in the adviser's or student's home department. However, a courtesy appointment does not affect eligibility. The oral examination chair may be from the same department as any other member(s) of the examination committee. All members of the oral examination committee are normally members of the Academic Council, as the oral examination chair must be. With the prior approval of the program director or school dean, one of the examiners may be a person who is not a member of the Academic Council if that individual contributes expertise not otherwise available. Official responsibility for selecting the oral examination chair rests with the program. Cancer Biology delegates this to the student and dissertation adviser.

CHEMICAL AND SYSTEMS BIOLOGY

Emeriti: (Professors) Robert H. Dreisbach, Avram Goldstein, Dora B. Goldstein, Tag E. Mansour, Oleg Jardetzky, Richard A. Roth, James P. Whitlock

Chair: James E. Ferrell, Jr.

Professors: James E. Ferrell, Jr., Tobias Meyer, Daria Mochly-Rosen

Associate Professors: James K. Chen, Karlene A. Cimprich, Thomas J. Wandless

Assistant Professors: Joshua Elias, Joanna K. Wysocka

Courtesy Professors: Stuart Kim, Beverly S. Mitchell, Paul A. Wender

Courtesy Associate Professors: Calvin J. Kuo, Matthew Bogyo

Courtesy Assistant Professors: Ajay Chawla, Markus Willard Covert, Jan M. Skotheim

Web Site: http://casb.stanford.edu

Courses offered by the Department of Chemical and Systems Biology are listed under the subject code CSB on the *Stanford Bulletin's* ExploreCourses web site.

The department emphasizes individualized training at the interface of physical science and biomedical science. The program encourages students to draw upon a variety of modern scientific techniques, ranging from recent advances in molecular biology and protein biochemistry to synthetic organic chemistry and single cell imaging. Graduate students in the department take courses in signal transduction networks, chemical biology, and other areas of importance to their research goals.

MASTER OF SCIENCE IN CHEMICAL AND SYSTEMS BIOLOGY

Students in the Ph.D. program may apply for an M.S. degree after having satisfactorily completed the course and laboratory requirements of the first two years. The degree also requires a written thesis based on literature or laboratory research. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree.

DOCTOR OF PHILOSOPHY IN CHEMICAL AND SYSTEMS BIOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The Department of Chemical and Systems Biology offers interdisciplinary training to prepare students for independent careers in biomedical science. The main focus of the program is cell signaling, chemical biology, and systems biology.

The program leading to the Ph.D. degree includes formal and informal study in chemical biology, systems biology, drug discovery, biochemistry, and other areas of relevance to the interests of particular students. First-year students spend one quarter in each of three different laboratories, working closely with other graduate students, a professor, and postdoctoral fellows on various research projects. During the fourth quarter, the student chooses a faculty mentor with whom to undertake thesis research, based on available positions and the student's interest. During or before the eighth quarter of study, students must pass a qualifying exam which consists of an oral exam on general knowledge and a defense of a research proposal. Course requirements are fulfilled during the first two years of study; the later years of the four- to six-year program are devoted to full-time dissertation research. Close tutorial contact between students and faculty is stressed throughout the program.

Research opportunities also exist for medical students and undergraduates. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department participates in the four quarter Health and Human Disease and Practice of Medicine sequence which provides medical students with a comprehensive, systems-based education in physiology, pathology, microbiology, and pharmacology.

COMPARATIVE MEDICINE

Chair: Sherril Green
Professors: Donna M. Bouley, Linda C. Cork, Sherril Green
Associate Professors: Paul Buckmaster, Corinna Darian-Smith, Shaul Hestrin
Assistant Professors: Megan Albertelli, Stephen Felt, Claude Nagamine

Department Offices: Edwards Building, Room R321
Mail Code: 94305-5342
Phone: (650) 498-5080
Web Site: http://med.stanford.edu/compmed

Courses offered by the Department of Comparative Medicine are listed under the subject code COMPMED on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Comparative Medicine is a clinical department that offers residency training in laboratory animal medicine for veterinarians. Its faculty offer courses at the undergraduate and graduate levels. Clinical faculty and basic science faculty in the Department of Comparative Medicine accept students to participate in research projects.

The discipline of Comparative Medicine studies the differences and similarities among species to elucidate biological and disease mechanisms.The research interests of faculty include neuroscience, infectious diseases, neuropathology, cancer, molecular genetics, and laboratory animal science.

DEVELOPMENTAL BIOLOGY

Emeriti: (Professors) David S. Hogness, A. Dale Kaiser
Chair: Roeland Nusse
Associate Chair: Lucy Shapiro
Professors: Ben Barres, Philip Beachy, Gerald Crabtree, Margaret Fuller, Stuart Kim, David Kingsley, Roeland Nusse, Matthew Scott, Lucy Shapiro, James Spudich, William Talbot, Anne Villeneuve, Irving Weissman
Associate Professor: Seung Kim
Assistant Professors: Gill Bejerano, Joanna Wysocka
Professor (Teaching): Ellen Porzig
Professor (Research): Harley McAdams

Courses offered by the Department of Development Biology are listed under the subject code DBIO on the *Stanford Bulletin's* ExploreCourses web site.

A fundamental problem in biology is how the complex set of multicellular structures that characterize an adult animal is generated from the fertilized egg. Recent advances at the molecular level, particularly with respect to the genetic control of development, have been explosive. These advances represent the beginning of a major movement in the biological sciences toward the understanding of the molecular mechanisms underlying developmental decisions and the resulting morphogenetic processes. This new thrust in developmental biology derives from the extraordinary methodological advances of the past decade in molecular genetics, immunology, and biochemistry. However, it also derives from groundwork laid by the classical developmental studies, the rapid advances in cell biology and animal virology, and from models borrowed from prokaryotic systems. Increasingly, the work is directly related to human diseases, including oncogene function and inherited genetic disease.

The Department of Developmental Biology includes a critical mass of scientists who are leading the thrust in developmental biology and who can train new leaders in the attack on the fundamental problems of development. Department labs work on a wide variety of organisms from microbes to worms, flies, and mice. The dramatic evolutionary conservation of genes that regulate development makes the comparative approach of the research particularly effective. Scientists in the department labs have a very high level of interaction and collaboration. The discipline of developmental biology draws on biochemistry, cell biology, genetics, molecular biology, and genomics. People in the department have a major interest in regenerative medicine and stem cell biology.

The department is located in the Beckman Center for Molecular and Genetic Medicine within the Stanford University Medical Center.

MASTER OF SCIENCE IN DEVELOPMENTAL BIOLOGY

University requirements for the M.S. are described in the "Graduate Degrees" section of this bulletin.

Students in the Ph.D. program in Developmental Biology may apply for an M.S. degree, assuming completion of their course requirements and preparation of a written proposal. The master's degree awarded by the Department of Developmental Biology does not include the possibility of minors for graduate students enrolled in other departments or programs.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including 210, Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs. In addition, the candidate must complete a research paper proposing a specific experimental approach and background in an area of science relative to developmental biology.

DOCTOR OF PHILOSOPHY IN DEVELOPMENTAL BIOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The graduate program in Developmental Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program (MSTP) in which individuals are candidates for both the M.D. and Ph.D. degrees.

Students are required to complete at least six courses, including Developmental Biology (210); Advanced Genetics (203); Frontiers in Biological Sciences (215); and an advanced molecular biology, biochemistry, or biophysics course. Students are expected to attend Developmental Biology seminars and journal clubs.

Completion of a qualifying examination is required for admission to Ph.D. candidacy. The examination consists of two parts. One proposal is on a subject different from the dissertation research and the other proposal is on the planned subject of the thesis. The final requirements of the program include presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of developmental biology. The student must pass the University oral examination, taken only after the student has substantially completed research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

GENETICS

Emeritus: (Professor) Leonard Herzenberg
Chair: Michael Snyder
Professors: Russ Altman, Gregory Barsh, Carlos Bustamante, Michele Calos, Stanley Cohen, Ronald Davis, Andrew Fire, Uta Francke, Margaret Fuller, Mark Kay, Stuart Kim, Joseph Lipsick, John Pringle, Matthew Scott, Tim Stearns
Associate Professors: Laura Attardi, Julie Baker, James Ford, Arend Sidow, Zijie Sun, Hua Tang, Anne Villeneuve, Douglas Vollrath
Assistant Professors: Anne Brunet, Julien Sage
Professor (Research): Leonore Herzenberg
Associate Professor (Research): J. Michael Cherry
Associate Professor (Teaching): Kelly Ormond
Assistant Professor (Research): Gavin Sherlock
Courtesy Professor: Hank Greely
Consulting Associate Professor: Man-Wah Tan
Lecturer: Andrea Kwan
Mail Code: 94305-5120
Phone: (650) 723-3335
Email: genetics-info@genome.stanford.edu
Web Site: http://genetics.stanford.edu

Courses offered by the Department of Genetics are listed under the subject code GENE on the *Stanford Bulletin's* ExploreCourses web site.

MASTER OF SCIENCE IN HUMAN GENETICS AND GENETIC COUNSELING

The University requirements for the M.S. are described in the "Graduate Degrees" section of this bulletin.

The Department of Genetics offers an M.S. in Human Genetics and Genetic Counseling, which is accredited by the American Board of Genetic Counseling. This program prepares students to practice in the healthcare profession of genetic counseling. The program is a full time two-year program, and accepts students to begin the program only in Autumn Quarter. Students must be admitted directly into this program, and cannot automatically transfer from the Ph.D. programs within the department, or vice versa. While courses are oriented primarily towards genetic counseling students, they may also be taken by medical students, other graduate students, residents or post-doctoral fellows, and (with permission) undergraduates.

The degree requires the completion of clinical rotations and an approved research project. Students must also complete required course work (GENE 271-286), several additional required courses (bioethics, research ethics and developmental biology), and are encouraged to take 2-4 elective courses of their choice, including a research methods elective. Faculty members include members of the Stanford faculty from Genetics, Pediatrics, Obstetrics, Pathology, Developmental Biology, Biomedical Ethics, Law, and Psychology, and practicing genetic counselors and clinical geneticists in various medical centers across the Bay Area.

Applications are due in December (see web site) for admission in the following Autumn Quarter. Applicants should demonstrate a combination of academic preparation, exposure to genetic counseling, and counseling and/or laboratory experiences. Exposure to persons with disabilities or chronic illness is also helpful. Additional information about the program is available at http://www.med.stanford.edu/genetic-counseling.

DOCTOR OF PHILOSOPHY IN GENETICS

University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

The Ph.D. program in the Department of Genetics offers graduate students the opportunity to pursue a discipline that encompasses both a set of tools and a coherent way of thinking about biology and medicine. All major areas of genetics are represented in the department, including human genetics (molecular identification of Mendelian traits and the pathophysiology of genetic disease, gene therapy, genetic epidemiology, analysis of complex traits, and human evolution), and application of model organisms such as bacteria, yeast, flies, worms, or mice to basic questions in biomedical research. The department is especially strong in genomic and bioinformatic approaches to genome biology and evolution, and includes several genome-scale databases such as the Saccharomyces Genome Database (SGD), the Stanford Microarray Database (SMD), and the Pharmacogenetics and Pharmacogenomics Knowledge Base (PharmGKB) and, administered through the Department of Biochemistry, the Stanford Genome Technology Center (SGTC).

Exposure to the intellectual scope of the department is provided by laboratory rotations, dissertation research, advanced courses in genetics and other areas of biomedical science, seminar series, journal clubs, and an annual three-day retreat of faculty, students, postdoctoral fellows, and staff scientists. Emphasis is placed on interactions and collaborations among students, postdoctoral students, and faculty within the department and throughout the campus.

During their first year, graduate students in the department take graduate courses and sample areas of research by doing rotations in three or four laboratories. At the end of the first three quarters, students may select a laboratory in which to do their dissertation research. While the dissertation research is generally performed in one laboratory, collaborative projects with more than one faculty member are encouraged. In addition to interacting with their faculty preceptor, graduate students receive advice regularly from other faculty members who serve as members of their dissertation committee. Study for the Ph.D. generally requires between four and five years of graduate work, most of which is focused on dissertation research.

Students are generally enrolled in the program to receive the Ph.D. degree, although a limited number of M.D. candidates can combine research training in genetics with their medical studies. Ph.D. candidates who have passed the qualifying exam in the second year can opt to receive the M.S. as a terminal degree.

There are opportunities for graduate students to teach in graduate-level and professional-school courses. In addition, students have the opportunity to participate in educational outreach activities coordinated by the department, which include opportunities to interact with secondary school students and teachers, lay groups, and local science museums.

Students who have recently received a bachelor's, master's, M.D., or Ph.D. degree in related fields may apply for graduate study. Prospective students must have a background in biology, mathematics, physics, and chemistry. Decisions for admission are based on comparison of the relative merits of all the candidates' academic abilities and potential for research and the department's interest in promoting a diverse learning environment. Interviews take place in late February or early March and successful applicants are offered admission by early spring. Students who wish to

pursue a combined M.D./Ph.D. degree are considered for admission into the graduate program in the department after they have been admitted to the M.D. program in the School of Medicine.

Students begin graduate studies in Autumn Quarter. Prospective students are encouraged to start the application process early to ensure that they are able to submit a complete application by the December deadline. All students accepted into the Ph.D. program in the Department of Genetics are provided with full tuition and a stipend. Two training grants from the National Institutes of Health provide major support for the graduate training program in the department. Other student support is provided by departmental funds and from research grants, both federal and private, of the faculty. In addition, a number of graduate students are funded by fellowships, including those from the National Science Foundation and the Stanford Graduate Fellows program.

HEALTH RESEARCH AND POLICY

Emeriti: (Professors) Dan Bloch, John Farquhar, Victor R. Fuchs
Chair: Phil Lavori
Co-Chair: Robert Tibshirani
Professors: Laurence Baker, Bradley Efron, Trevor Hastie, Victor W. Henderson, Mark Hlatky, Iain M. Johnstone, Abby C. King, Philip W. Lavori, Ying Lu, Richard A. Olshen, Julie Parsonnet, Robert Tibshirani, Alice S. Whittemore, Dee W. West, Wing Wong
Associate Professor: Lorene M. Nelson, Chiara Sabatti
Assistant Professors: M. Kate Bundorf, Marc Coram, Allison Kurian, Mei-Chiung Shih, Weiva Sieh, Lu Tian
Assistant Professors (Clinical): Rita Popat, Kristin Sainani
Courtesy Professors: Stephen P. Fortmann, Alan M. Garber, Mary Goldstein, Daniel Kessler, Alex Macario, Yvonne Maldonado, Douglas Owens, Paul Wise
Courtesy Associate Professors: Jay Bhattacharya, Michael K. Gould, Paul Heidenreich, David R. Rogosa
Courtesy Assistant Professors: Grant Miller
Senior Lecturer: Irene Corso
Lecturers: Raymond Balise, Scarlett Gomez, Laurel Habel, De Kun Li, David Lilienfeld, Cynthia O'Malley, Caroline Tanner, Stephen Van Den Eeden
Consulting Professors: Gary Friedman, Elizabeth Holly, Marion Lee, George Lundberg, Peggy Reynolds, Joseph Selby
Consulting Associate Professors: Paul Barnett, Sally Glaser, Pamela Horn-Ross, Esther John, Ciaran Phibbs
Consulting Assistant Professors: Ellen Chang, Christina Clarke-Dur, Theresa Keegan, Bang Nguyen, Ingrid Oakley-Girvan, Rudy Rull, Todd Wagner
Mail Code: 94305-5405
Phone: (650) 723-5456
Web Site: http://hrp.stanford.edu

Courses offered by the Department of Health Research and Policy are listed under the subject code HRP on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Health Research and Policy has three principal areas of scholarly interest:

1. Biostatistics deals with scientific methodology in the medical sciences, emphasizing the use of statistical techniques.
2. Epidemiology is the study of the distribution and determinants of illness and impairment in human populations. Epidemiology training provides analytic tools for clinical and translational research, including studies of disease etiology, prevention, and therapy.
3. Health Services Research is concerned with many aspects of health policy analysis in the public and private sectors

GRADUATE PROGRAMS IN HEALTH RESEARCH POLICY

The Program in Epidemiology and the Program in Health Services Research are housed in the Department of Health Research and Policy. These programs offer M.S. degrees in Epidemiology and in Health Services Research. Students with an interest in pursuing advanced degrees with an emphasis on biostatistics can do so through programs offered by the Department of Statistics. Division of Biostatistics faculty participate in these programs.

For additional information, address inquiries to the Educational Coordinator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T138C, Stanford, California 94305-5405.

HEALTH SERVICES RESEARCH

Director: Mark Hlatky (Professor, Health Research and Policy, and Medicine)
Executive Committee: Laurence Baker (Professor, Health Research and Policy), M. Kate Bundorf (Assistant Professor, Health Research and Policy), Alan Garber (Professor, Medicine), Mary Goldstein (Professor, Medicine), Mark Hlatky (Professor, Health Research and Policy, and Medicine), Douglas Owens (Professor, Medicine)
Participating Faculty and Staff by Department:
Anesthesia: Alex Macario (Professor)
Business: Alain Enthoven (Professor, emeritus), Daniel Kessler (Professor)
Health Research and Policy: Laurence Baker (Professor), Paul Barnett (Consulting Associate Professor), M. Kate Bundorf (Assistant Professor), Victor Fuchs (Professor, emeritus), Trevor Hastie (Professor), Mark Hlatky (Professor), Philip Lavori (Professor), Richard Olshen (Professor), Ciaran Phibbs (Consulting Associate Professor), Joseph Selby (Consulting Professor), Robert Tibshirani (Professor)
Law: Henry Greely (Professor)
Management Science and Engineering: Margaret Brandeau (Professor)
Medicine: Jay Bhattacharya (Assistant Professor), Jeremy Goldhaber-Fiebert (Assistant Professor), Alan Garber (Professor), Mary Goldstein (Professor), Michael Gould (Associate Professor), Paul Heidenreich (Associate Professor), Mark Hlatky (Professor), Grant Miller (Assistant Professor), Douglas Owens (Professor)
Pediatrics: Paul Wise (Professor)
Psychiatry: Rudolph Moos (Professor)
Sociology: Richard Scott (Professor, emeritus)
Program Offices: HRP Redwood Building, Room T138C
Mail Code: 94305-5405
Phone: (650) 723-5456
Email: hsr-program@med.stanford.edu
Web Site: http://med.stanford.edu/hsr

MASTER OF SCIENCE IN HEALTH SERVICES RESEARCH

The master's degree program in Health Services Research seeks to train students in the quantitative analysis of issues in health and medical care. The program emphasizes an individually designed program of course work and completion of a master's project under the mentorship of a faculty member. The typical student in the program is either a physician who has completed residency training and is preparing for a research career, or a student with a strong background in policy analysis who wishes to focus on problems in health or medical care. Faculty interests include outcomes research, health economics, health care organization, health care access, quality of care, decision analysis, clinical guidelines, and assessment of patient preferences and quality of life.

To receive the degree, students are expected to demonstrate knowledge of issues in health services research and the quantitative skills necessary for research in this area. Students must take at least 45 units of course work (9 of the units may be double-counted to meet other degree requirements) and write a University thesis. The course work requirements are:

1. At least 8 units from the following group of Health Research and Policy (HRP) core courses: HRP 256, Economics of Health and Medical Care; HRP 391, Health Care Regulation; HRP 392, Analysis of Costs, Risks, and Benefits in Health Care.
2. At least 6 units of graduate-level statistics courses. The sequence of HRP 261, Intermediate Biostatistics: Analysis of Discrete Data; and HRP 262, Intermediate Biostatistics: Regression, Prediction, Survival Analysis, is strongly recommended.
3. At least 3 units of HRP 283, Health Services Research Core Seminar.
4. At least 15 units of HRP research credit from HRP 299, Directed Reading, or HRP 399, Research.
5. An additional set of approved elective courses to complete the program total of at least 45 units.

For additional information, address inquiries to the Educational Coordinator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T138C, Stanford, California 94305-5405.

EPIDEMIOLOGY

Director: Victor W. Henderson (Professor, Health Research and Policy, and Neurology and Neurological Sciences)

Core Faculty and Academic Teaching Staff: Raymond R. Balise (Lecturer, Health Research and Policy), Gary D. Friedman (Consulting Professor, Health Research and Policy), Victor W. Henderson (Professor, Health Research and Policy, and Neurology and Neurological Sciences), Abby C. King (Professor, Health Research and Policy, and Medicine), Allison Kurian (Assistant Professor, Medicine, and Health Research and Policy), Philip Lavori (Professor, Health Research and Policy), Yvonne A. Maldonado (Professor, Pediatrics), Lorene M. Nelson (Associate Professor, Health Research and Policy), Julie Parsonnet (Professor, Medicine, and Health Research and Policy), Rita A. Popat (Clinical Assistant Professor, Health Research and Policy), Kristin L. Sainani (Clinical Assistant Professor, Health Research and Policy), Weiva Sieh (Assistant Professor, Health Research and Policy), Dee W. West (Professor, Health Research and Policy), Alice S. Whittemore (Professor, Health Research and Policy)

Program Offices: HRP Redwood Building, Room T138C
Mail Code: 94305-5405
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Web Site: http://www.stanford.edu/dept/HRP/epidemiology

MASTER OF SCIENCE IN EPIDEMIOLOGY

The Graduate Program in Epidemiology offers instruction and interdisciplinary research opportunities leading to the M.S. degree in Epidemiology. Epidemiology is the study of the distribution and determinants of illness and impairment in human populations. It is important in its own right, and epidemiologic methods are used by clinical investigators and by other scientists who conduct observational and experimental research on the identification, prevention, and treatment of human disorders.

Core and affiliated faculty come from the Department of Health Research and Policy; other Stanford University departments, and notable Bay Area research facilities. The Program has particular strengths in cancer epidemiology, cardiovascular disease epidemiology, infectious disease epidemiology, musculoskeletal disease epidemiology, neuroepidemiology, and aspects of epidemiologic methods, genetic epidemiology, and reproductive epidemiology and women's health.

The mission of the Stanford University School of Medicine is to be a premier research-intensive medical school that improves health through leadership and collaborative discoveries and innovation in patient care, education and research. With support from a NIH Clinical and Translational Science Award, the graduate program in Epidemiology fosters this mission through the training of physician investigators in techniques of clinical research. The department also considers students from other disciplines who would benefit from formal training in epidemiologic methods.

A typical student has the M.D. degree and is in the fellowship stage of his or her postgraduate training, or in an early stage of faculty development. Other students may not have prior clinical training. These may include behavioral, social, and life scientists; law students; and students with the baccalaureate degree. They may wish to bring an epidemiologic orientation to their research or practice, or they may be considering careers in epidemiology or a related discipline.

To receive the M.S. degree, students are expected to obtain a grounding in epidemiologic methods and applied biostatistics and to demonstrate research skills through the completion of a thesis. Students must complete at least 45 units of course work:

1. Epidemiologic methods: HRP 225, Design and Conduct of Clinical and Epidemiologic Studies; HRP 226, Advanced Epidemiologic and Clinical Research Methods; HRP 251, Design and Conduct of Clinical Trials.
2. Biostatistics: HRP 259, Introduction to Probability and Statistics for Epidemiology; HRP 261, Intermediate Biostatistics: Analysis of Discrete Data; HRP 262, Intermediate Biostatistics: Regression, Prediction, Survival Analysis.
3. Research seminars: HRP 236, Epidemiology Research Seminar (at least 3 units).
4. Research: HRP 399, Master thesis (at least 12 units).
5. Research conduct: Students must complete MED 255, Responsible Conduct of Research, and attend a Human Subjects Institutional Review Board meeting.
6. Additional approved selective and elective courses to complete the program total of at least 45 units.

Students are assigned a methodology mentor from the Department of Health Research and Policy, and they also select a research mentor, who may be from another department. For physicians, the research mentor is often an affiliated faculty member from the department of the student's clinical specialty.

University requirements for the M.S. degree are described in the "Graduate Degrees" section of this bulletin. Other programmatic requirements are in *Graduate Program in Epidemiology, Information and Guidelines*, available from the educational coordinator in the Department of Health Research and Policy.

IMMUNOLOGY

Chair, Executive Committee for the Immunology Program: Lawrence Steinman (Professor, Neurology and Neurological Sciences)

Director for Immunology Program: Olivia Martinez (Professor, Research, Surgery, Transplantation)

Director for Clinical Immunology Program: C. Garrison Fathman (Medicine/Immunology and Rheumatology)

Participating Departments and Faculty:

Biology: Patricia P. Jones (Professor)

Chemistry: Harden M. McConnell (Professor, emeritus)*

Genetics: Leonore A. Herzenberg (Professor, Research), Leonard A. Herzenberg (Professor, emeritus), Man-wah Tan (Associate Professor)

Medicine/Bone Marrow Transplantation Program: Robert Negrin (Professor), David Miklos (Assistant Professor), Judith Shizuru (Associate Professor)

Medicine/Cardiovascular Medicine: Joseph Wu (Assistant Professor)

Medicine/Hematology: Calvin Kuo (Associate Professor), Peter Lee (Associate Professor), Ravi Majeti (Assistant Professor)

Medicine/Immunology and Rheumatology: C. Garrison Fathman (Professor), William Robinson (Assistant Professor), Samuel Strober (Professor), Paul J. Utz (Associate Professor), Cornelia Weyand (Professor)

Medicine/Oncology: Gilbert Chu (Professor, and Biochemistry), Dean Felsher (Associate Professor, and Pathology), Ronald Levy (Professor), Shoshana Levy (Professor, Research)
Medicine/Pulmonary and Critical Care Medicine: Mark Nicolls (Associate Professor)
Medicine/Urology: Michael Hsieh (Assistant Professor)
Microbiology and Immunology: John Boothroyd (Professor), Chang-Zheng Chen (Assistant Professor), Yueh-Hsiu Chien (Professor), Mark M. Davis (Professor, and Director, Institute for Immunity, Transplantation and Infection), Hugh McDevitt (Professor,emeritus), Garry P. Nolan (Professor), David Schneider (Associate Professor)
Molecular and Cellular Physiology: K. Christopher Garcia (Professor, and Structural Biology), Richard S. Lewis (Professor)
Neurology and Neurological Sciences: Lawrence Steinman (Professor, and Pediatrics), Tony Wyss-Coray (Associate Professor, Research)
Neurosurgery: Theo Palmer (Associate Professor)
Otolaryngology/Head & Nect Surgery (ENT): John B. Sunwoo (Assistant Professor)
Pathology: Eugene C. Butcher (Professor), Michael Cleary (Professor), Gerald R. Crabtree (Professor, and Developmental Biology), Edgar G. Engleman (Professor, and Medicine/Immunology and Rheumatology), Magali Fontaine (Assistant Professor), Stephen Galli (Professor and Chair), Sara Michie (Professor), Raymond A. Sobel (Professor), Irving Weissman (Professor, and Director, Stem Cell Institute)
Pediatrics: Ann Arvin (Professor, and Microbiology and Immunology), Atul Butte (Assistant Professor), Manish Butte (Assistant Professor), Christopher Contag (Professor, Research, and Microbiology and Immunology, and Radiology), David B. Lewis (Professor), Elizabeth Mellins (Associate Professor), Kari Nadeau (Assistant Professor), Minnie Sarwal (Professor)
Psychiatry and Behavioral Sciences: Firdaus Dhabhar (Associate Professor), Emmanuel Mignot (Professor)
Structural Biology: Peter Parham (Professor, and Microbiology and Immunology)
Surgery: Sheri Krams (Associate Professor, Research), Olivia Martinez (Professor, Research)

* Recalled to active duty

Mail Code: 94305-5421
Phone: (650) 725-5076
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Web Site: http://immunol.stanford.edu

Courses offered by the Immunology Program are listed under the subject code IMMUNOL on the *Stanford Bulletin's* ExploreCourses web site.

MASTER OF SCIENCE IN IMMUNOLOGY

Students in the Ph.D. program in Immunology may apply for an M.S. degree in Immunology only under special circumstances, assuming completion of appropriate requirements. Students must complete:

1. Three full-tuition quarters of residency as a graduate student at Stanford.
2. At least 45 units of academic work, all of which must be in courses at or above the 100 level, 36 units of which must be at or above the 200 level.
3. 2-3 quarters of graduate research (IMMUNOL 399), consisting of rotations in the labs of three faculty members.
4. Course work in Immunology as follows:
   a. Basic Immunology. For graduate students, BIO 230A, Molecular and Cellular Immunology Literature Review; for medical students, IMMUNOL 205, Immunology in Human Health and Disease or equivalent
   b. Advanced Immunology such as IMMUNOL 201, 202, and 203
   c. IMMUNOL 215. Principles of Biological Technologies
   d. In addition, the student may take one elective course. Some possible electives are:
      - MPHA 210. Signal Transduction Pathways and Networks
      - SBIO 241. Biological Macromolecules
      - CBIO 241. Molecular, Cellular, and Genetic Basis of Cancer
      - DBIO 210. Developmental Biology.
   e. Students have the option to select from two of the following three courses in the first year:
      - GENE 203. Advanced Genetics
      - BIO 214. Advanced Cell Biology
      - MI 210. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites
5. Graduate-level biochemistry and molecular biology (BIOC 220).
6. Course work in IMMUNOL 311, Seminar in Immunology, and IMMUNOL 311A, Seminar Discussion in Immunology.
7. Participation in the Immunology journal club (IMMUNOL 305), and attendance at the Immunology seminar series and at the annual Stanford Immunology Scientific Conference.
8. The qualifying examination process in Immunology before admission to Ph.D. candidacy has two parts: a comprehensive written exam on many fields in immunology, (qualifying examination process, Part I), in the third week in June, first year; the thesis proposal (qualifying examination process, Part II), before December 17th, second year. In addition, an oral presentation is required on the research of one rotation, early July in the first year.
9. Students must submit a master's thesis paper on one of their rotations. This requirement may be waived under special circumstances.

DOCTOR OF PHILOSOPHY IN IMMUNOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The Immunology Program offers instruction and research opportunities leading to a Ph.D. in Immunology. The goal of the program is to develop investigators who have a solid foundation in Immunology and related sciences to carry out innovative research. The program features a flexible choice of courses and seminars combined with extensive research training in the laboratories of participating Immunology faculty.

Students applying to the program typically have an undergraduate major in biological sciences, but majors in other areas are acceptable if the applicants have had sufficient course work in biology and chemistry. Formal application should be made by December 1st. Applications are evaluated by the Immunology predoctoral committee based upon: GRE scores; grades; evidence of research experience; letters of recommendation, including letters from research sponsor(s); and commitment to a career in biomedical research. Subject tests are not required. Interested Stanford medical students are welcome to apply to the program and should submit a formal application by December 1.

Students admitted to the program are offered financial support covering tuition, a living stipend, insurance coverage, and an allowance for books/travel. Applicants are urged to apply for independent fellowships such as from the National Science Foundation. Fellowship applications are due in November of the year prior to matriculation in the graduate program, but Immunology graduate students may continue to apply for outside fellowships after matriculation. Because of the small number of department-funded slots, students who have been awarded an outside fellowship have an improved chance of acceptance into the program. On matriculation, each student is assisted by a first-year advising committee in selecting courses and lab rotations in the first year and in choosing a lab for the dissertation research. Once a dissertation adviser has been selected, a dissertation committee including the dissertation adviser and two additional Immunology faculty, is constituted to guide the student during the dissertation research. The student must meet with the dissertation committee at least once a year.

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a program of study that includes 135 units of graduate course work and research. At least 3 units must be taken with each of four different Stanford faculty members.

Requirements for the Ph.D. degree in Immunology include—

1. Training in biology and cognate disciplines equivalent to that provided by the undergraduate Biology major at Stanford.
2. Completion of the following courses (or their equivalents from undergraduate work):
   a. Basic Immunology (BIO 230A, Molecular and Cellular Immunology Literature Review)
   b. Advanced Immunology (IMMUNOL 201, 202, 203)
   c. Chemistry of Biological Processes (BIOC 220)
   d. Biostatistics (BIO 141or STATS 141)
   e. Principles of Biological Technologies (IMMUNOL 215)
   f. One elective course; suggested courses include:
      - MPHA 210. Signal Transduction Pathways and Networks
      - SBIO 241. Biological Macromolecules
      - CBIO 241. Cancer Biology
      - DBIO 210. Developmental Biology
   g. MED 255. Responsible Conduct in Science
   h. Students have the option to select from two of the following three courses in the first year:
      - GENE 203. Advanced Genetics
      - BIO 214. Advanced Cell Biology
      - MI 210. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites
   i. IMMUNOL 305. Immunology Journal Club
3. Prior to enrolling for Autumn Quarter, first-year students are required to read Janeway's *Immunobiology*, 7th edition, in preparation for their graduate studies. First-year students are required to take both the IMMUNOL 311, Seminar in Immunology, and the companion course, IMMUNOL 311A, Seminar Discussion in Immunology, and participate in IMMUNOL 305, Immunology Journal Club.
4. Students in their second year and above must participate in the IMMUNOL 311, Seminar in Immunology and may opt to take the companion course, IMMUNOL 311A.
5. Students who have not yet achieved TGR status must register for 1 unit for IMMUNOL 311. Students attend the Immunology Seminar Series (12:00 p.m., Tuesdays). Students read the papers of visiting seminar speakers and meet to discuss the material in IMMUNOL 311A.
6. Elective courses as agreed upon by the student, adviser, and advisory committee. Electives may be chosen from graduate courses and seminars in any of the biomedical science departments and programs.
7. Part I of the Qualifying Examination process is given in mid-June and consists of five questions on different areas in immunology. After the students submit their written responses, the Predoctoral Committee discusses with each student their written answers. This oral session provides an opportunity for faculty to follow up with students on their answers, and for students to discuss/clarify their answers and respond to faculty comments. Completion in the first year of three one quarter rotations. Medical students who are accepted into the Ph.D. program must do at least three rotations. First year students, including MSTP and M.D./Ph.D. students, present their lab rotation research projects to the predoctoral committee in early July.
8. Teaching assistantship in two Immunology courses (IMMUNOL 290, Teaching in Immunology). A teaching assistantship requirement may be fulfilled by proposing a graduate student-initiated course: IMMUNOL 315, Topics in Immunology. Before fulfilling their teaching assistantships, Immunology graduate students are required to attend a teaching assistantship orientation offered at the beginning of every quarter by the Center for Teaching and Learning. MSTP students may submit one of their medical school TAships as partial fulfillment of the TA requirement for the Ph.D. in Immunology.
9. For admission to Ph.D. candidacy, a comprehensive written examination (qualifying examination process, Part I) in Immunology and related biomedical sciences, and a rotation presentation on one of three lab rotations, must be completed satisfactorily by the middle of Summer Quarter of the first year. Students must prepare and defend a research proposal on their dissertation research (qualifying examination process, Part II) by December 17, the end of Autumn Quarter of their second year, and complete all core course requirements by the end of the second year. Administration and evaluation of these requirements leading to Ph.D. candidacy is the responsibility of the Predoctoral Committee; the student's dissertation committee is responsible for advising the student through the research and other courses as needed towards the completion of the Ph.D. dissertation.
10. Participation (through regular attendance and oral presentation) in the student-run Immunology journal clubs for at least the first three years (IMMUNOL 305), the Tuesday Immunology seminars, and the annual Stanford Immunology Scientific Conference. Students are required to give one poster and one scientific presentation at these annual Stanford Immunology scientific conferences. Fourth-year and above students present their current research to fellow students and faculty in a monthly forum, The Next Generation.
11. Passing the University oral examination on the dissertation research, which is to be taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the candidate presents his/her research.
12. Completion of a Ph.D. dissertation, resulting from independent investigation and constituting a contribution to knowledge in the area of immunology.

MICROBIOLOGY AND IMMUNOLOGY

Emeriti: (Professors) Stanley Falkow, Hugh O. McDevitt, Edward S. Mocarski, Sidney Raffel, Leon T. Rosenberg
Chair: Karla Kirkegaard
Associate Chair: Stanley Falkow
Professors: Ann Arvin, Helen Blau, John C. Boothroyd, Yueh-Hsiu Chien, Mark M. Davis, Stephen J. Galli, Harry B. Greenberg, Karla Kirkegaard, A. C. Matin, Garry Nolan, Peter Parham, Phillip Pizzo, Charles Prober, David Relman, Peter Sarnow, Gary K. Schoolnik, Lucy S. Tompkins
Associate Professors: Matthew Bogyo, Christopher Contag, David Schneider, Julie Theriot
Assistant Professors: Manuel Amieva, Chang-Zheng Chen, Denise Monack, Upinder Singh, Justin Sonnenburg
Associate Professor (Teaching): Robert D. Siegel
Institute for Immunity, Transplantation and Infection
Director, Human Immune Monitoring Center and Senior Research Scientist: Holden Maecker
Department Offices: D300 Fairchild Building, 299 Campus Drive
Mail Code: 94305-5124
Phone: (650) 725-8541
Email: micro_immuno@lists.stanford.edu
Web Site: http://microimmuno.stanford.edu

Courses offered by the Department of Microbiology and Immunology are listed under the subject code MI on the *Stanford Bulletin's* ExploreCourses web site.

GRADUATE PROGRAMS IN MICROBIOLOGY AND IMMUNOLOGY

The Department of Microbiology and Immunology offers a program of training leading to the Ph.D. degree, as well as research

training, courses, and seminars for medical students and postdoctoral fellows. Research interests focus on two broad areas: host/parasite interactions, and the function of the immune system. Laboratories investigate mechanisms of pathogenesis and the physiology of viruses, bacteria, and protozoan parasites, as well as the lymphocyte function in antigen recognition, immune response, and autoimmunity.

MASTER OF SCIENCE

A regular M.S. program is not offered, although this degree is awarded under special circumstances. Candidates for master's degrees are expected to have completed the preliminary requirements for the B.S. degree, or the equivalent. In addition, the candidate is expected to complete 45 quarter units of work related to microbiology; at least 25 of these units should concern research devoted to a thesis. The thesis must be approved by at least two members of the department faculty.

DOCTOR OF PHILOSOPHY IN MICROBIOLOGY AND IMMUNOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

Application, Admission, and Financial Aid—Prospective Ph.D. candidates should have completed a bachelor's degree in a discipline of biology or chemistry, including course work in biochemistry, chemistry, genetics, immunology, microbiology, and molecular biology. The deadline for receipt of applications with all supporting materials is December 1.

Applicants must file a report of scores on the general subject tests of the Graduate Record Examination (GRE). It is strongly recommended that the GRE be taken before October so that scores are available when applications are evaluated.

In the absence of independent fellowship support, entering predoctoral students are fully supported with a stipend and tuition award. Highly qualified applicants may be honored by a nomination for a Stanford Graduate Fellowship. Successful applicants have been competitive for predoctoral fellowships such as those from the National Science Foundation.

Program for Graduate Study—The Ph.D. degree requires course work and independent research demonstrating an individual's creative, scholastic, and intellectual abilities. On entering the department, students meet an advisory faculty member; together they design a timetable for completion of the degree requirements. Typically, this consists of first identifying gaps in the student's undergraduate education and determining courses that should be taken. Then, a tentative plan is made for two to four lab rotations (one rotation per quarter). During the first year of graduate study in the department, each student also takes six or seven upper-level (200-series) courses. Three of these courses are requirements of the department: MI 215, Principles of Biological Techniques; MI 230, Medical Microbiology and Infectious Diseases; and MI 210, Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites. Three courses are part of the core curriculum that is required of many graduate students in Stanford Biosciences: BIO 203 /DBIO 203 /GENE 203, Advanced Genetics; BIO 230, Molecular and Cellular Immunology; and BIO 214/BIOC 224, Advanced Cell Biology.

In Autumn Quarter of the second year, a research proposal based on the student's own thesis topic is defended to the thesis committee. In Spring Quarter of the second year, each student defends orally a formal research proposal on a topic outside the intended thesis project. This qualifying examination proposal is due to the graduate program steering committee by May 1. Based on successful performance on this proposal, the student is admitted to candidacy. Teaching experience and training are also part of the graduate curriculum. Graduate students are required to act as teaching assistants for two courses. In addition, first- and second-year graduate students are required to participate in a bi-weekly journal club.

MOLECULAR AND CELLULAR PHYSIOLOGY

Chair: Brian K. Kobilka
Professors: Axel T. Brunger, Brian K. Kobilka, Richard S. Lewis, W. James Nelson, Stephen J. Smith, Thomas C. Sudhof, Richard W. Tsien, William Weis
Associate Professors: Christopher Garcia, John Huguenard, V. Daniel Madison, Merritt C. Maduke, Miriam B. Goodman

Assistant Professors: Maxence V. Nachury
Courtesy Associate Professors: Stefan Heller, Anthony J. Ricci
Courtesy Assistant Professor: Richard J. Reimer
Department Offices: Beckman Center, B100
Mail Code: 94305-5345
Phone: (650) 725-7554
Email: schantae@stanford.edu
Web Site: http://mcp.stanford.edu

Courses offered by the Department of Molecular and Cellular Physiology are listed under the subject code MCP on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine.

A central goal of physiology in the post-genomic era is to understand how thousands of encoded proteins serve to bring about the highly coordinated behavior of cells and tissues. Research in the department approaches this goal at many levels of organization, ranging from single molecules and individual cells to multicellular systems and the whole organism. The faculty share common interests in the molecular mechanisms of cell signaling and behavior, with a special focus on structure/function analysis of ion channels and G-protein coupled receptors, and their roles at the cellular, organ, and whole-organism levels; the molecular basis of sensory transduction, synaptic transmission, plasticity and memory; the role of ion channels and calcium in controlling gene expression in neural and immune cells; and the regulation of vesicle trafficking and targeting, cell polarity, and cell-cell interactions in the nervous system and in epithelia. Research programs employ a wide range of approaches, including molecular and cell biology, biochemistry, genetics, biophysics, x-ray crystallography and solution NMR, electrophysiology, and *in vitro* and *in vivo* imaging with confocal and multi-photon microscopy.

GRADUATE PROGRAMS IN MOLECULAR AND CELLULAR PHYSIOLOGY

The department offers required and elective courses for students in the School of Medicine and is also open to other qualified students with the consent of the instructor. Training of medical, graduate, and postdoctoral students is available. The program offers a course of study leading to the Ph.D. degree. No B.S. is offered, and an M.S. is offered only in the unusual circumstance where a student completes the course work, rotation, and the written section of the qualifying exam, but is unable to complete the requirements for the Ph.D.

DOCTOR OF PHILOSOPHY IN MOLECULAR AND CELLULAR PHYSIOLOGY

Students with undergraduate or master's degrees who have completed a year each of college chemistry (including lectures in organic and physical chemistry), physics, calculus, and biology are considered for admission to graduate study. Applicants submit a report of scores from the Graduate Record Examination (verbal, quantitative, analytical, and an advanced subject test in one of the sciences) as part of the application. Students who do not speak English as their native language must submit scores from TOEFL unless waived by Graduate Admissions.

Study toward the Ph.D. is expected to occupy five years, including summers. A minimum of six quarter-long courses is required. These include four graduate-level courses (200-300 series) and a choice of two out of these three courses: MCP 221, MCP 258, and MCP 256. Students are also required to take the Molecular and Cellular Physiology Seminar/Research In Progress series. Each student presents a talk on research in progress to the department at least every other year, starting their second year. Grades for course work must be a minimum of 'B-', and at least two grades equal to 'A-' or above are necessary but not sufficient for continuation in the program.

Qualifying Examination—At the end of the second year in residence as a graduate student, each Ph.D. candidate presents a written thesis proposal to be defended at an oral comprehensive examination. The examinations may be taken only after all course work has been completed by the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor. Upon passing this exam, the student is advanced to candidacy for the Ph.D.

Dissertation and University Oral Examination—The results of independent, original work by the students are presented in a dissertation. The oral examination is largely a defense of the dissertation.

Advisers and Advisory Committees—A graduate advisory committee, currently professors Lewis and Madison, advises students during the period before the formation of their qualifying committees.

Financial Aid—Students may be funded by their advisers' research grants, by training grants, by department funds, or by extramural funds. Students are encouraged to obtain funding from outside sources such as NIH and NSF.

NEUROBIOLOGY

Emeritus: Denis Baylor, Uel J. McMahan, Eric Shooter, Lubert Stryer
Chair: Ben Barres
Professors: Eric I. Knudsen, William T. Newsome
Associate Professors: Thomas Clandinin, Jennifer Raymond
Assistant Professors: Stephen Baccus, Ricardo Dolmetsch, Tirin Moore
Department Offices: Fairchild Building, Second Floor
Mail Code: 94305-5125
Web Site: http://neurobiology.stanford.edu

Courses offered by the Department of Neurobiology are listed under the subject code NBIO on the *Stanford Bulletin's* ExploreCourses web site.

GRADUATE PROGRAM IN NEUROBIOLOGY

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neurosciences Ph.D. program. Accepted students receive funding for tuition and a living stipend. Applicants should familiarize themselves with the research interests of the faculty and, if possible, indicate their preference on the application form which is submitted directly to the Neurosciences Program.

Medical students also are encouraged to enroll in the Ph.D. program. The requirements of the Ph.D. program are fitted to the interests and time schedules of the student. Postdoctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty member concerned.

Research interests of the department include information processing in vertebrate retina; structure, function, and development of auditory and visual systems; development and regeneration in the central and peripheral nervous system; neural mechanisms mediating higher nervous system functions, including perception, learning, attention and decision making.

NEUROSCIENCES

Director: John R. Huguenard (Professor, Neurology and Neurological Sciences)
Committee: Katrin Andreasson, Thomas Clandinin, Luis de Lecea, Craig Garner, John R. Huguenard, Fei-Fei Li, Merritt Maduke, Samuel McClure, Anthony Ricci, Carla Shatz

Participating Faculty:

Anesthesia: Rona Giffard (Professor), M. Bruce MacIver (Associate Professor, Research), Sean Mackey (Associate Professor), David Yeomans (Associate Professor)
Applied Physics: Mark Schnitzer (Assistant Professor)
Bioengineering: Kwabena Boahen (Associate Professor), Karl Deisseroth (Associate Professor), Scott Delp (Professor), Michael Lin (Assistant Professor), Matthew Scott (Professor)
Biology: Russell D. Fernald (Professor), William F. Gilly (Professor), H. Craig Heller (Professor), Ron Kopito (Professor), Liqun Luo (Professor), Susan McConnell (Professor), Robert M. Sapolsky (Professor), Mark Schnitzer (Assistant Professor), Carla Shatz (Professor), Kang Shen (Assistant Professor), Stuart Thompson (Professor)
Chemical and Systems Biology: Tobias Meyer (Professor), Daria Mochly-Rosen (Professor)
Comparative Medicine: Paul S. Buckmaster (Associate Professor), Corinna Darian-Smith (Associate Professor), Shaul Hestrin (Associate Professor)
Computer Science: Fei-Fei Li (Assistant Professor)
Developmental Biology: Ben Barres (Professor), Seung Kim (Professor), David Kingsley (Professor), Matthew P. Scott (Professor)
Electrical Engineering: Krishna Shenoy (Associate Professor)
Genetics: Anne Brunet (Assistant Professor), Matthew Scott (Professor)
Microbiology and Immunology: Helen Blau (Professor)
Molecular and Cellular Physiology: Axel Brunger (Professor), Miriam B. Goodman (Associate Professor), Brian Kobilka (Professor), Richard S. Lewis (Professor), V. Daniel Madison (Associate Professor), Merritt C. Maduke (Assistant Professor), Stephen Smith (Professor), Thomas Sudhof (Professor), Richard Tsien (Professor)
Neurobiology: Stephen Baccus (Assistant Professor), Ben Barres (Professor), Tom Clandinin (Associate Professor), Ricardo Dolmetsch (Assistant Professor), Eric I. Knudsen (Professor), U. J. McMahan (Professor), Tirin Moore (Assistant Professor), William T. Newsome (Professor), Jennifer Raymond (Associate Professor), Carla Shatz (Professor)
Neurology and Neurological Sciences: Katrin Andreasson (Associate Professor), Ben Barres (Professor), Helen Bronte-Stewart (Associate Professor), Paul Buckmaster (Associate Professor), Robert S. Fisher (Professor), Michael Greicius (Assistant Professor), May Han (Assistant Professor), Ting-Ting Huang (Assistant Professor, Research), John A. Huguenard (Professor), Frank Longo (Professor), William C. Mobley (Professor), Josef Parvizi (Assistant Professor), Kathleen Poston (Assistant Professor), David A. Prince (Professor), Thomas A. Rando (Professor), Lawrence Recht (Professor), Richard Reimer (Assistant Professor), Robert M. Sapolsky (Professor), Lawrence Steinman (Professor), Tony Wyss-Coray (Associate Professor, Research), Yanmin Yang (Associate Professor)
Neurosurgery: Marion Buckwalter (Assistant Professor), Pak H. Chan (Professor), Theo Palmer (Associate Professor), Gary K. Steinberg (Professor)
Ophthalmology: Yaping Joyce Liao (Assistant Professor)
Otolaryngology: Stefan Heller (Associate Professor), Anthony Ricci (Associate Professor)
Pathology: Isabella Graef (Assistant Professor), Bingwei Lu (Assistant Professor), Raymond Sobel (Professor), Marius Wernig (Assistant Professor)

Pediatrics: Heidi Feldman (Professor), Michael Lin (Assistant Professor), Anna Penn (Assistant Professor), Lawrence Steinman (Professor)
Philosophy: Patrick Suppes (Professor, emeritus)
Psychiatry and Behavioral Sciences: Karl Deisseroth (Associate Professor), Luis de Lecea (Associate Professor), Firdaus Dhabhar (Associate Professor), Craig Garner (Professor), Terrence A. Ketter (Professor), Robert C. Malenka (Professor), Vinod Menon (Associate Professor, Research), Emmanuel Mignot (Professor), Karen Parker (Assistant Professor), Natalie Rasgon (Professor), Allan L. Reiss (Professor), Edith Sullivan (Professor, Research), Jamie Zeitzer (Assistant Professor)
Psychology: Lera Boroditsky (Assistant Professor), Ian Gotlib (Professor), Kalanit Grill-Spector (Assistant Professor), James J. Gross (Professor), Brian Knutson (Associate Professor), James McClelland (Professor), Samuel McClure (Assistant Professor), Anthony Wagner (Associate Professor), Brian Wandell (Professor), Jeffrey J. Wine (Professor)
Radiology: Gary H. Glover (Professor)
Structural Biology: U. J. McMahan (Professor)
Program Offices: MSOB x236
Mail Code: 94305-5421
Phone: (650) 723-9855
Web Site: http://neuroscience.stanford.edu/education/phd_program

Courses offered by the Neurosciences Program are listed under the subject code NEPR on the *Stanford Bulletin's* ExploreCourses web site.

DOCTOR OF PHILOSOPHY IN NEUROSCIENCES

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The interdepartmental Neurosciences Program offers instruction and research opportunities leading to a Ph.D. in Neurosciences. The requirements for a Ph.D. degree follow those of the University and in addition are tailored to fit the background and interests of the student. Accepted students receive an award covering tuition, a basic health plan, and a living stipend. Qualified applicants should, where possible, apply for the predoctoral fellowships in open competition, especially those from the National Science Foundation. December 2 is the deadline for receipt in the Neurosciences Program office of applications with all supporting material.

Applicants should familiarize themselves with the research interests of the faculty and indicate their preferences clearly on the application form.

Since students enter with differing backgrounds, and the labs in which they may elect to work cover several different disciplines, the specific program for each student is developed individually with an advisory committee. All students are required to complete the basic introduction to neurobiology (NBIO 206 or equivalent). Students must also take five advanced courses, four of which must be distributed among four of the following core areas: systems and behavioral neuroscience, molecular and cellular neuroscience, developmental neuroscience, clinical neuroscience, and computational neuroscience. The fifth advanced course is chosen by the student in an area related to the student's research interest, and may be selected from outside the Neurosciences core with prior approval from the program director and the student's adviser.

Students usually rotate through several labs during their first year, although they may choose to begin thesis research on entry. After the first rotation, students may rotate both within and outside the Neurosciences Program. Required course work should be completed by the end of the second year. Passing of a comprehensive oral preliminary examination given by the student's advisory committee is required for admission to Ph.D. candidacy. This examination is usually taken by the end of the second year. The student is required to present a Ph.D. dissertation, which is the result of independent investigation contributing to knowledge in an area of neuroscience, and to defend his or her dissertation in a University oral examination, which includes a public seminar.

Medical students may participate in this program provided they meet the prerequisites and satisfy all the requirements of the graduate program as listed above. The timing of the program may be adjusted to fit their special circumstances.

OBSTETRICS AND GYNECOLOGY

Chair: Jonathan S. Berek

Courses offered by the Department of Obstetrics and Gynecology are listed under the subject code OBGYN on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Obstetrics and Gynecology does not offer degrees; however, qualified medical, graduate, or undergraduate students with an interest in basic research in reproductive biology may apply to arrange individual projects under the supervision of the faculty. The focus for the Division of Reproductive Biology is the study of the molecular and cellular biology of male and female reproductive organs.

PATHOLOGY

Emeriti: *(Professor)* Ronald Dorfman, Richard L. Kempson; *(Professor, Clinical)* Lawrence F. Eng, Luis Fajardo, Heinz Furthmayr, F. Carl Grumet, Jon Kosek; *(Associate Professor)* P. Joanne Cornbleet
Chair: Stephen J. Galli
Professors: Daniel Arber, Ellen Jo Baron, Gerald J. Berry, Eugene C. Butcher, Michael L. Cleary, Gerald R. Crabtree, Edgar G. Engleman, Andrew Fire, Steven Foung, Stephen J. Galli, Lawrence Tim Goodnough, Michael R. Hendrickson, Joseph S. Lipsick, Donald P. Regula, Robert V. Rouse, Richard K. Sibley, Raymond Sobel, Howard H. Sussman, Dolly Tyan, Matt van de Rijn, Hannes Vogel, Teresa S. F. Wang, Roger A. Warnke, Irving L. Weissman, James Zehnder
Associate Professors: Jeffrey D. Axelrod, Matt Bogyo, Athena M. Cherry, Andrew Connolly, Tina Cowan, James D. Faix, Dean Felsher, Susan A. Galel, Sharon M. Geaghan, John P. Higgins, Neeraja Kambham, Christina Kong, Teri A. Longacre, Sara A. Michie, Yasodha Natkunam, Bruce Patterson, Jonathan R. Pollack, Iris Schrijver, Arend Sidow
Assistant Professors: Niaz Banaei, Raffick Bowen, Magali Fontaine, Tracy George, Dita Gratzinger, F. Kim Hazard, Kristin Jensen, Bingwei Lu, Jesse McKenney, Erich Schwartz, Uma Sundram, Marius Wernig, Robert West
Courtesy Professors: Donna Bouley, Bertil Glader, Lucy Tompkins
Courtesy Associate Professor: Robert Shafer
Clinician Educators: Susan Atwater, David Bingham, Barbara Egbert, Christopher Gonzales, Terri Haddix, Jinah Kim, Amy McKenney, Melanie Manning, Reetesh Pai, Run Shi, Brent Tan, Maurene Viele
Instructors: Ching-Cheng Chen, Neng Chen, Franklin Mullins, Chris Park, Adrian Piliponsky
Adjunct Clinical Faculty: Robert Archibald, Jerome S. Burke, Glenn Cockerham, Stephen Shi-Hua Chen, Seth Haber, Maie K. Herrick, Paul W. Herrmann, Anthony Le, Steven Long, Charles Lombard, Judy Melinek, Gregory Moes, Joseph O'Hara, Girish Putcha, Mahendra Ranchod, Thomas W. Rogers, Joshua Sickel
Department Offices: Medical Center, Lane Building, L-235
Mail Code: 94305-5324
Phone: (650) 723-5255
Web Site: http://pathology.stanford.edu

Courses offered by the Department of Pathology are listed under the subject code PATH on the *Stanford Bulletin's* ExploreCourses web site.

PROGRAMS OF STUDY IN PATHOLOGY

The Department of Pathology offers advanced courses in aspects of pathology. The department does not offer advanced degrees in pathology, but qualified graduate students who are admitted to department-based or interdepartmental graduate programs may elect to pursue their thesis requirements in the department's research laboratories. The discipline of pathology has served as a bridge between the preclinical and clinical sciences and is concerned with the application of advances in the basic biological sciences, both to the diagnosis of human disease and the elucidation of the mechanisms of normal molecular, cellular, and organ structure and function that manifest themselves in clinical disease. Accordingly, the department's research interests extend from fundamental molecular biology to clinical-pathological correlations, with an emphasis on experimental oncology.

Investigation in the department includes basic studies in areas using molecular biological, biochemical, and genetic cell biological techniques: DNA replication in yeast and cultured eukaryotic cells, cell cycle control in animal cells and yeast, identification and pathogenetic role of chromosomal aberrations in human malignancies and mechanisms of activation of oncogenes in human and animal cells, lymphocyte and neutrophil-interactions with endothelial cells, cell type specification and signal transduction pathways leading to specific gene expression or modulation of cytoskeletal behavior; cytoskeletal architecture, cell-matrix interaction, developmental biology of hematopoietic stem cells and thymus, regulation of the immune system, mechanisms of immune and other responses in the central nervous system, and neuro-degenerative diseases. Various studies focus on the development of novel diagnostic and immunotherapeutic treatment modalities and techniques for solid tumors, lymphomas, HIV, and genetic diseases. Research training in all of these areas is available for qualified medical and graduate students by individual arrangement with the appropriate faculty member. A summary of the research interests of the department faculty is available at http://pathology.stanford.edu.

RADIATION ONCOLOGY

Emeriti: Malcolm A. Bagshaw, Peter Fessenden, Don R. Goffinet, George M. Hahn, Kendric Smith
Chair: Richard T. Hoppe
Professors: J. Martin Brown, Sarah S. Donaldson, Amato J. Giaccia, Steven L. Hancock, Richard T. Hoppe, Quynh-Thu Le, Daniel S. Kapp, Steven A. Liebel
Associate Professors: Iris C. Gibbs, Paul Keall, Christopher R. King, Susan J. Knox, Gary Luxton, Lei Xing
Assistant Professors: Laura Attardi, Daniel Chang, Nicholas Denko, Edward Graves, Albert C. Koong
Consulting Professor: Robert M. Sutherland

Courses offered by the Department of Radiation Oncology are listed under the subject code RADO on the *Stanford Bulletin's* ExploreCourses web site.

Radiation Oncology focuses on the use of radiation for cancer therapy and research. The department does not offer degrees; however, its faculty teach courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Graduate students in Biophysics and Cancer Biology may perform their thesis research in the department. Undergraduates may arrange individual research projects under supervision of faculty.

STRUCTURAL BIOLOGY

Chair: Joseph D. Puglisi
Associate Chair: Michael Levitt
Professors: Theodore Jardetzky, Roger D. Kornberg, Michael Levitt, Peter Parham, Joseph D. Puglisi, William I. Weis

At the present time, the major areas of basic research investigation in the department include: DNA repair in mammalian cells after ionizing irradiation; studies of the mechanism of tumor hypoxia in animal tumors; development of new anti-cancer drugs to exploit tumor hypoxia; cytogenetic and molecular methods of predicting the sensitivity of individual tumors to cancer therapy; radiolabeled monoclonal antibodies for cancer detection and treatment; studies of oxygen levels in human tumors using polarographic electrodes; clinical trials of a new hypoxic cytotoxic agent (tirapazamine); studies of the late effects of cancer therapy; and techniques of conformal and intensity modulated radiation therapy.

RADIOLOGY

Emeriti: (Professors) Herbert L. Abrams, Malcolm Bagshaw, Ronald Castellino, Barton Lane, Gerald Friedland, David A. Goodwin, Henry H. Jones, William Marshall, I. Ross McDougall, Robert E. Mindelzun, William H. Northway, Bruce R. Parker, Lewis Wexler, Leslie M. Zatz
Chair: Gary M. Glazer
Professors: Scott W. Atlas, Richard A. Barth, Christopher F. Beaulieu, Michale Federle, Sanjiv Sam Gambhir, Gary M. Glazer, Gary H. Glover, Michael L. Goris, Robert J. Herfkens, Dave Hovsepian, Debra M. Ikeda, R. Brooke Jeffrey, Ann Leung, Michael Marks, Michael Moseley, Sandy Napel, Matilde Nino-Murcia, Norbert J. Pelc, Allan Reiss, Geoffrey Rubin, Brian Rutt, George Segall, F. Graham Sommer, Daniel Spielman
Professors (Research): R. Kim Butts-Pauly
Associate Professors: Francis Blankenberg, Frandics P. Chan, Bruce Daniel, Terry Desser, Huy M. Do, Nancy Fischbein, Dominik Fleischmann, Garry E. Gold, Lawrence Hofmann, Beverley Newman, Eric W. Olcott, Kathryn J. Stevens, Daniel Y. Sze
Associate Professors (Research): Roland Bammer, Rebecca Fahrig, Sylvia Plevritis
Assistant Professors: Sandip Biswal, Robert Dodd, Gloria Hwang, Aya Kamaya, Nishita Kothary, William Kuo, Jafi Lipson, Andrew Quon, Jianghong Rao, Daniel Rubin, Lewis Shin, Shreyas Vasanawala, Juergen Willmann, Joseph Wu, Kristen Yeom, Greg Zaharchuk
Assistant Professors (Research): Zhen Cheng, Brian Hargreaves, David Paik, Ramasamy Paulmurugan
Web Site: http://www-radiology.stanford.edu

Courses offered by the Department of Radiology are listed under the subject code RAD on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Radiology does not offer degrees; however, its faculty teach courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Undergraduates may also arrange individual research projects under the supervision of the department's faculty. This discipline focuses on the use of radiation, ultrasound, and magnetic resonance as diagnostic, therapeutic, and research tools. The fundamental and applied research within the department reflects this broad spectrum as it relates to anatomy, pathology, physiology, and interventional procedures. Original research and development of new clinical applications in medical imaging is supported within the Radiological Sciences Laboratory.

Associate Professor: K. Christopher Garcia
Associate Professor (Research): Yahli Lorch
Assistant Professor (Research): Elizabetta Viani Puglisi
Courtesy Professor: Axel Brunger
Courtesy Associate Professor: Vijay Pande
Courtesy Assistant Professor: Zev Bryant
Department Offices: Fairchild Building, D100
Mail Code: 94305- 5126
Phone: (650) 723-7576

Email: structuralbio@med.stanford.edu
Web Site: http://structuralbio.stanford.edu

Courses offered by the Department of Structural Biology are listed under the subject code SBIO on the *Stanford Bulletin's* ExploreCourses web site.

The department offers course work and opportunities for research in structural biology. Courses fall into two categories: (1) a series of one quarter courses that treat topics of current interest in structural biology and biophysics at an advanced level; and (2) INDE 216, Cells to Tissues, a course for medical students that includes lectures on structure-function relationships of mammalian cells and tissues and a lab on medical histology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of biological macromolecules and their assemblies. Techniques used include standard methods of biochemistry, cell culture, single-molecule fluorescence spectroscopy, genetic engineering, and three dimensional structure determination by x-ray diffraction, nuclear magnetic resonance spectroscopy and electron microscopy, coupled with the development of computational methods.

DOCTOR OF PHILOSOPHY IN STRUCTURAL BIOLOGY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The graduate program in Structural Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program (MSTP) in which individuals are candidates for both Ph.D. and M.D. degrees.

The graduate program is intended to prepare students for careers as independent investigators in cell and molecular biology. The principal requirement of a Ph.D. degree is the completion of research constituting an original and significant contribution to the advancement of knowledge. The requirements and recommendations for the Ph.D. degree include:

1. Training in a major with connections to biophysics (e.g., physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford).
2. Completion of the following background courses or their equivalents at other institutions:
   a. CHEM 131, 171, 173, and 175
   b. BIOC 200, 201
3. Completion of the following courses or their equivalents:
   a. SBIO 241 and 242
   b. At least four additional graduate-level courses in physical or biological science
   c. MED 255
4. Opportunities for teaching are available during the first nine quarters at the discretion of the advising committee.
5. The student must prepare a dissertation proposal defining the research to be undertaken including methods of procedure. This proposal should be submitted by Winter Quarter of the third year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Department of Structural Biology. The candidate must defend the dissertation proposal in an oral examination. The dissertation reading committee normally evolves from the dissertation proposal review committee.
6. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of structural biology.
7. The student must pass the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

Applicants to the program should have a bachelor's degree and should have completed at least a year of course work in biology, mathematics, organic chemistry, physical chemistry, and physics. Application forms must be received by the department before December 15 for notification by April 15. Application to the National Science Foundation for fellowship support is also encouraged. Remission of fees and a personal stipend are available to graduate students in the department. Prospective applicants should contact the Department of Structural Biology for further information.

Current topics of research in the department lie in the areas of gene expression; theoretical, crystallographic, and genetic analysis of protein structure; and cell-cell interaction. See http://www.med.stanford.edu/school/structuralbio for further information.

COURSES OF INSTRUCTION 2010-11

This listing is based on a static extract of courses performed on August 28, 2010. For latest and correct information, including scheduling, see the Bulletin's ExploreCourses web site at http://explorecourses.stanford.edu.

Courses of instruction are listed in alphabetical order by subject name, and then numerically by catalog number.

Stanford does not have a standard course catalog numbering system. Courses numbered from 1 through 99 are primarily for freshmen and sophomores. Courses numbered from 100 through 199 are primarily for juniors and seniors; some departments, however, offer courses numbered from 200 through 299 for juniors and seniors. Most courses numbered 200 and above are for graduate students; no graduate career course is numbered below 200, and all courses above 300 are for graduate students.

Courses offered for variable units require different amounts of work depending upon the units for which a student enrolls. Students are advised to consult with the department or instructor offering the course to determine the appropriate number of units.

Beginning in Autumn Quarter 2005, a modified and redefined set of undergraduate General Education Requirements, designated in this bulletin as GERs, went into effect. Students who matriculated Autumn Quarter 2004-05 or later are subject to the revised General Education Requirements effective Autumn Quarter 2005-06. Students who matriculated Autumn Quarter 2003-04 or earlier remain on the old General Education Requirements, but may elect to change to the new system. Students interested in electing the revised GER system should contact the Office of the University Registrar. No further changes are allowed once a student has elected to move to the new system.

WIM indicates courses that fulfill the undergraduate departmental Writing in the Major requirement. AU indicates Activity courses that are subject to undergraduate University Activity Unit limitations (8 units maximum).

SUBJECT CODES

Each course is identified by a subject code and a catalog number. Throughout this bulletin, Axess subject codes have been printed wherever relevant.

SUMMER SESSION

This bulletin includes, for the Summer Session, only those courses that can be tentatively scheduled at publication time by each department. For the complete list of courses and faculty, refer to http://summer.stanford.edu, updated in February. Courses added during the academic year are available on the *Stanford Bulletin's* ExploreCourses web site at http://explorecourses.stanford.edu.

OVERSEAS STUDIES

Undergraduate courses taught overseas at Stanford's Bing Overseas Studies Program are listed under the relevant Overseas Studies Center subject code. Courses applicable to an undergraduate major are also listed at the end of many department degree requirement sections above.

SCHEDULE OF CLASSES

Scheduling information is available on the *Stanford Bulletin's* ExploreCourses web site at http://explorecourses.stanford.edu. Students enroll on Axess at http://axess.stanford.edu.

AERONAUTICS AND ASTRONAUTICS (AA) COURSES

UNDERGRADUATE COURSES IN AERONAUTICS AND ASTRONAUTICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

AA 100. Introduction to Aeronautics and Astronautics
The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including takeoff, climb, range, and landing performance, structural concepts, propulsion systems, trajectories, and orbits. The history of aeronautics and astronautics. Prerequisites: MATH 41, 42; elementary physics. GER:DB-EngrAppSci

3 units, Aut (Alonso, J)

AA 113N. Structures: Why Things Don't (and Sometimes Do) Fall Down
(Stanford Introductory Seminar) Preference to freshmen. How structures created by nature or built by human beings keep things up and keep things in. Topics: nature's structures from microorganisms to large vertebrae; buildings from ancient dwellings to modern skyscrapers; spacecraft and airplanes; boats from ancient times to America's Cup sailboats, and how they win or break; sports equipment; and biomedical devices including bone replacements and cardiovascular stents. How composite materials are used to make a structure light and strong. GER:DB-EngrAppSci

3 units, Win (Springer, G)

AA 116N. Electric Automobiles and Aircraft
(Stanford Introductory Seminar) (Same as EE 25Q) Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption with impacts on climate change, air pollution, resource depletion, and national security. Finding sustainable transportation solutions, covering the past and present of transportation and its impacts. Alternative fuel proposals including the most promising option, battery electric vehicles. Energy requirements of air, ground, and maritime transportation; design of electric motors, power control systems, drive trains, and batteries; and technologies for generating renewable energy. Two opportunities for hands-on experiences with electric cars. Prerequisites: introductory calculus and Physics AP or elementary mechanics.

3 units, Aut (Cox, D; Enge, P)

AA 190. Directed Research and Writing in Aero/Astro
For undergraduates. Experimental or theoretical work under faculty direction, and emphasizing development of research and communication skills. Written report(s) and letter grade required; if this is not appropriate, enroll in 199. Consult faculty in area of interest for appropriate topics, involving one of the graduate research groups or other special projects. May be repeated for credit. Prerequisite: consent of student services manager and instructor. WIM

3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AA 199. Independent Study in Aero/Astro
Directed reading, lab, or theoretical work for undergraduate students. Consult faculty in area of interest for appropriate topics involving one of the graduate research groups or other special projects. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN AERONAUTICS AND ASTRONAUTICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AA 200. Applied Aerodynamics
Analytical and numerical techniques for the aerodynamic analysis of aircraft, focusing on airfoil theory, finite wing theory, far-field and Trefftz-plane analysis, two-dimensional laminar and turbulent boundary layers in airfoil analysis, laminar-to-turbulent transition, compressibility effects, and similarity rules. Biweekly assignments require MATLAB or a suitable programming language. Prerequisite: undergraduate courses in basic fluid mechanics and applied aerodynamics, AA 210A.

3 units, Win (Alonso, J)

AA 201A. Fundamentals of Acoustics
Acoustic equations for a stationary homogeneous fluid; wave equation; plane, spherical, and cylindrical waves; harmonic (monochromatic) waves; simple sound radiators; reflection and transmission of sound at interfaces between different media; multipole analysis of sound radiation; Kirchoff integral representation; scattering and diffraction of sound; propagation through ducts (dispersion, attenuation, group velocity); sound in enclosed regions (reverberation, absorption, and dispersion); radiation from moving sources; propagation in the atmosphere and underwater. Prerequisite: first-year graduate standing in engineering, mathematics, sciences; or consent of instructor.

3 units, not given this year

AA 201B. Topics in Aeroacoustics
Acoustic equations for moving medium, simple sources, Kirchhoff formula, and multipole representation; radiation from moving sources; acoustic analogy approach to sound generation in compact flows; theories of Lighthill, Powell, and Mohring; acoustic radiation from moving surfaces; theories of Curl, Ffowcs Williams, and Hawkings; application of acoustic theories to the noise from propulsive jets, and airframe and rotor noise; computational methods for acoustics. Prerequisite: 201A or consent of instructor.

3 units, Spr (Lele, S)

AA 202. Hypersonic Flow
Principles and equations governing hypersonic flight and high temperature gas dynamics, including chemical and thermal equilibrium and non-equilibrium; statistical thermodynamics; kinetic theory; transport phenomena; radiation; surface heating; and scramjet engines. Prerequisite: understanding of aerodynamics. Recommended: AA 200A.

3 units, Spr (MacCormack, R)

AA 206. Bio-Aerodynamics
Topics: flapping flight, low Reynolds number aerodynamics, wing design, flocks, swarms, and dynamic soaring. Readings from current and historical literature dealing with theoretical and observational studies. Applications in aircraft design, and simulation-based problem sets. Prerequisite: course in aerodynamics such as 100, 200A, or 241A.

3 units, not given this year

AA 208. Aerodynamics of Aircraft Dynamic Response and Stability
Companion to 200A for those interested in control and guidance. Typical vehicles and the technical tradeoffs affecting their design. Equations of motion, stressing applications to dynamic performance, stability, and forced response. Forms and sources for the required aerodynamic data. Response to small disturbances and stability derivatives. Static stability and trim. Review of aerodynamic fundamentals, leading to airload predictions for wings, bodies, and complete aircraft. Paneling and other methods for derivative estimation. Natural motions of the aircraft, and the influence on them of various configuration parameters. Vehicle behavior in maneuvers of small and large amplitudes. Prerequisites: 200A, 210A, or equivalents (may be taken concurrently).

3 units, Spr (Kroo, I)

AA 210A. Fundamentals of Compressible Flow
Topics: development of the three-dimensional, non-steady, field equations for describing the motion of a viscous, compressible fluid; differential and integral forms of the equations; constitutive equations for a compressible fluid; the entropy equation; compressible boundary layers; area-averaged equations for one-dimensional steady flow; shock waves; channel flow with heat addition and friction; flow in nozzles and inlets; oblique shock waves; Prandtl-Meyer expansion; unsteady one-dimensional flow; the shock tube; small disturbance theory; acoustics in one-dimension; steady flow in two-dimensions; potential flow; linearized potential flow; lift and drag of thin airfoils. Prerequisites: undergraduate background in fluid mechanics and thermodynamics.

3 units, Aut (Cantwell, B)

AA 210B. Fundamentals of Compressible Flow
Continuation of 210A with emphasis on more general flow geometry. Use of exact solutions to explore the hypersonic limit. Identification of similarity parameters. Solution methods for the linearized potential equation with applications to wings and bodies in steady flow; their relation to physical acoustics and wave motion in nonsteady flow. Nonlinear solutions for nonsteady constant area flow and introduction to Riemann invariants. Elements of the theory of characteristics; nozzle design; extension to nonisentropic flow. Real gas effects in compressible flow. Flows in various gas dynamic testing facilities. Prerequisite: 210A.

3 units, Spr (Alonso, J)

AA 214A. Introduction to Numerical Methods for Engineering
(Same as CME 206, ME 300C) Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B.

3 units, Spr (Iaccarino, G)

AA 214B. Numerical Computation of Compressible Flow
Numerical methods for solving hyperbolic sets of partial differential equations. Explicit, implicit, flux-split, finite difference, and finite volume procedures for approximating the governing equations and boundary conditions. Numerical solution by direct approximate factorization and iterative Gauss-Seidel line relaxation. Application to Euler equations. Computational problems. Prerequisite: 214A.

3 units, Win (MacCormack, R)

AA 214C. Numerical Computation of Viscous Flow
Numerical methods for solving parabolic sets of partial differential equations. Numerical approximation of the equations describing compressible viscous flow with adiabatic, isothermal, slip, and no-slip wall boundary conditions. Applications to the Navier-Stokes equations in two and three dimensions at high Reynolds number. Computational problems are assigned. Prerequisite: 214B.

3 units, Spr (MacCormack, R)

AA 215A. Advanced Computational Fluid Dynamics
(Same as CME 215A) High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent.

3 units, Win (Jameson, A)

AA 215B. Advanced Computational Fluid Dynamics
(Same as CME 215B) High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent.

3 units, Spr (Jameson, A)

AA 218. Introduction to Symmetry Analysis
Methods of symmetry analysis and their use in the reduction and simplification of physical problems. Topics: dimensional analysis, phase-space analysis of autonomous systems of ordinary differential equations, use of Lie groups to reduce the order of nonlinear ODEs and to generate integrating factors, use of Lie groups to reduce the dimension of partial differential equations and to generate similarity variables, exact solutions of nonlinear PDEs generated from groups. Mathematica-based software developed by the instructor is used for finding invariant groups of ODEs and PDEs.

3 units, Spr (Cantwell, B)

AA 222. Introduction to Multidisciplinary Design Optimization
Design of aerospace systems within a formal optimization environment. Mathematical formulation of the multidisciplinary design problem (parameterization of design space, choice of objective functions, constraint definition); survey of algorithms for unconstrained and constrained optimization and optimality conditions; description of sensitivity analysis techniques. Hierarchical techniques for decomposition of the multidisciplinary design problem; use of approximation theory. Applications to design problems in aircraft and launch vehicle design. Prerequisites: multivariable calculus; familiarity with a high-level programming language: FORTRAN, C, C++, or MATLAB.

3 units, not given this year

AA 236A. Spacecraft Design
The design of unmanned spacecraft and spacecraft subsystems emphasizing identification of design drivers and current design methods. Topics: spacecraft configuration design, mechanical design, structure and thermal subsystem design, attitude control, electric power, command and telemetry, and design integration and operations.

3-5 units, Aut (Kalman, A)

AA 236B. Spacecraft Design Laboratory
Continuation of 236A. Emphasis is on practical application of systems engineering to the life cycle program of spacecraft design, testing, launching, and operations. Prerequisite: 236A or consent of instructor.

3 units, Win (Kalman, A)

AA 236C. Spacecraft Design Laboratory

3 units, Spr (Kalman, A)

AA 240A. Analysis of Structures
Elements of two-dimensional elasticity theory. Boundary value problems; energy methods; analyses of solid and thin walled section beams, trusses, frames, rings, monocoque and semimonocoque structures. Prerequisite: ENGR 14 or equivalent.

3 units, Aut (Chang, F)

AA 240B. Analysis of Structures
Thin plate analysis. Structural stability. Material behavior: plasticity and fracture. Introduction of finite element analysis; truss, frame, and plate structures. Prerequisite: 240A or consent of instructor.

3 units, Win (Chang, F)

AA 241A. Introduction to Aircraft Design, Synthesis, and Analysis
New aircraft systems emphasizing commercial aircraft. Economic and technological factors that create new aircraft markets. Determining market demands and system mission performance requirements; optimizing configuration to comply with requirements; the interaction of disciplines including aerodynamics, structures, propulsion, guidance, payload, ground support, and parametric studies. Applied aerodynamic and design concepts for use in configuration analysis. Application to a student-selected aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation; propulsion system performance; engine types; environmental problems; performance estimation. Direct/indirect operating costs prediction and interpretation. Aircraft functional systems; avionics; aircraft reliability and maintainability. Prerequisite: 100 or equivalent.

3 units, Aut (Kroo, I)

AA 241B. Introduction to Aircraft Design, Synthesis, and Analysis
New aircraft systems emphasizing commercial aircraft. Economic and technological factors that create new aircraft markets. Determining market demands and system mission performance requirements; optimizing configuration to comply with requirements; the interaction of disciplines including aerodynamics, structures, propulsion, guidance, payload, ground support, and parametric studies. Applied aerodynamic and design concepts for use in configuration analysis. Application to a student-selected aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation;

propulsion system performance; engine types; environmental problems; performance estimation. Direct/indirect operating costs prediction and interpretation. Aircraft functional systems; avionics; aircraft reliability and maintainability. Prerequisite: 100 or equivalent.

3 units, Win (Kroo, I)

AA 241X. Design, Construction, and Testing of Autonomous Aircraft

Students grouped according to their expertise to carry out the multidisciplinary design of a solar-powered autonomous aircraft that must meet a clearly stated set of design requirements. Design and construction of the airframe, integration with existing guidance, navigation, and control systems, and development and operation of the resulting design. Design reviews and reports. Prerequisites: expertise in any of the following disciplines by having satisfied the specified courses or equivalent work elsewhere: conceptual design (241A,B); applied aerodynamics (200A,B); structures (240A); composite manufacturing experience; guidance and control (208/271, ENGR 205).

3 units, Spr (Alonso, J; Kroo, I)

AA 242A. Classical Dynamics

(Same as ME 331A) Accelerating and rotating reference frames. Kinematics of rigid body motion; Euler angles, direction cosines. D'Alembert's principle, equations of motion. Inertia properties of rigid bodies. Dynamics of coupled rigid bodies. Lagrange's equations and their use. Dynamic behavior, stability, and small departures from equilibrium. Prerequisite: ENGR 15 or equivalent.

3 units, Aut (Close, S)

AA 242B. Mechanical Vibrations

For M.S.-level graduate students. Covers the vibrations of discrete systems and continuous structures. Introduction to the computational dynamics of linear engineering systems. Review of analytical dynamics of discrete systems; undamped and damped vibrations of N-degree-of-freedom systems; continuous systems; approximation of continuous systems by displacement methods; solution methods for the Eigenvalue problem; direct time-integration methods. Prerequisites: AA 242A or equivalent (recommended but not required); basic knowledge of linear algebra and ODEs; no prior knowledge of structural dynamics is assumed.

3 units, Spr (Farhat, C)

AA 244. Introduction to Plasma Physics

Physics of space plasmas. Single-particle motions. Drifts. Kinetic theory, including stability and instability. Plasmas as fluids and fluid drifts. Waves in plasmas. Radiation in a plasma. Diffusion and resistivity. Fluid stability and instability. Kinetic stability and instability.

3 units, Win (Close, S)

AA 252. Techniques of Failure Analysis

Introduction to the field of failure analysis, including fire and explosion analysis, large scale catastrophe projects, traffic accident reconstruction, aircraft accident investigation, human factors, biomechanics and accidents, design defect cases, materials failures and metallurgical procedures, and structural failures. Product liability, failure modes and effects analysis, failure prevention, engineering ethics, and the engineer as expert witness.

3 units, Spr (Murray, S)

AA 253. Product and Systems Development

Modern approaches to aerospace design development for life cycle value. Concepts of air and space systems development in a systems context. Stakeholder value issues and requirements through manufacturing and delivery. Processes and practices for functional analysis, concept and architecture development, trades, domain criteria, interfaces, and verification and validation. Reliability, risk, and safety. Value stream analysis, integrated product and process development, key characteristics, and hardware/software integration aimed at information systems. Tools involve quality function deployment, design structure matrices, and decision mechanisms.

3 units, Spr (Weiss, S; Alonso, J)

AA 254. Information Systems in Aerospace Vehicles

Sensors, processors, activators, and operators, and the media and protocols that integrate them for performance and safety.

2 units, not given this year

AA 256. Mechanics of Composites

Fiber reinforced composites. Stress, strain, and strength of composite laminates and honeycomb structures. Failure modes and failure criteria. Environmental effects. Manufacturing processes. Design of composite structures. Individual design project required of each student, resulting in a usable computer software. Prerequisite: ENGR 14 or equivalent.

3 units, Win (Chang, F)

AA 257. Design of Composite Structures

Hands-on design, analysis, and manufacturing in composites. Composite beams, columns, and plates; application of finite element methods to composite structures; failure analysis and damage tolerance design of composite structures; and impact damage, compression after impact, and bolted and bonded composites joints. Class divided into working teams (design, analysis, manufacturing, and tests) to design and build a composite structure to be tested to failure; the structure may enter the national SAMPE composite bridge design contest. Prerequisite: 256 or consent of instructor.

3 units, not given this year

AA 260. Sustainable Aviation

Quantitative assessment of the impact of aviation on the environment including noise, local, and global emissions, and models used to predict it. Current and future technologies that may allow the air transportation system to meet anticipated growth while reducing or minimizing environmental problems. Atmospheric effects of NOx, CO2, particulates, unburned hydrocarbons, and water vapor deposition at high altitudes and metrics for assessing global climate effects. Noise sources, measurement, and mitigation strategies. Fundamentals of aircraft and engine performance needed to assess current and future concepts. Major national and international policy implications of existing and future technology choices. Recommended: AA 241B.

3 units, not given this year

AA 271A. Dynamics and Control of Spacecraft and Aircraft

The dynamic behavior of aircraft and spacecraft, and the design of automatic control systems for them. For aircraft: non-linear and linearized longitudinal and lateral dynamics; linearized aerodynamics; natural modes of motion; autopilot design to enhance stability, control the flight path, and perform automatic landings. For spacecraft in orbit: natural longitudinal and lateral dynamic behavior and the design of attitude control systems. Prerequisites: AA242A, ENGR 105.

3 units, Spr (Rock, S)

AA 272C. Global Positioning Systems

The principles of satellite navigation using GPS. Positioning techniques using code tracking, single and dual frequency, carrier aiding, and use of differential GPS for improved accuracy and integrity. Use of differential carrier techniques for attitude determination and precision position determination. Prerequisite: familiarity with matrix algebra and MatLab (or another mathematical programming language).

3 units, Win (Staff)

AA 272D. Integrated Navigation Systems

Navigation satellites (GPS, GLONASS), GPS receivers, principles of inertial navigation for ships, aircraft, and spacecraft. Kalman Filters to integrate GPS and inertial sensors. Radio navigation aids (VOR, DME, LORAN, ILS). Doppler navigation systems. Prerequisites: 272C; ENGR 15, 105. Recommended: ENGR 205.

3 units, not given this year

AA 278. Optimal Control and Hybrid Systems

Models for continuous-time and discrete-event dynamic systems. Modeling techniques for hybrid systems. Optimization problems for continuous and discrete dynamic systems. Dynamic programming and the Hamilton-Jacobi equation. Differential games. Automatic verification and controller synthesis for hybrid systems. Hybrid systems simulation. Driving examples from flight management system logic, and automated air traffic systems. Prerequisites: EE 263, ENGR 209.

3 units, not given this year

AA 279. Space Mechanics

Orbits of near-earth satellites and interplanetary probes; transfer and rendezvous; decay of satellite orbits; influence of earth's oblateness; sun and moon effects on earth satellites. Prerequisite: ENGR 15 or equivalent, and familiarity with MatLab (or another mathematical programming language).

3 units, Spr (Barrows, A; Close, S)

AA 283. Aircraft and Rocket Propulsion
Introduction to the design and performance of airbreathing and rocket engines. Topics: the physical parameters used to characterize propulsion system performance; gas dynamics of nozzles and inlets; cycle analysis of ramjets, turbojets, turbofans, and turboprops; component matching and the compressor map; introduction to liquid and solid propellant rockets; multistage rockets; hybrid rockets; thermodynamics of reacting gases. Prerequisites: undergraduate background in fluid mechanics and thermodynamics.
3 units, Win (Cantwell, B)

AA 284A. Advanced Rocket Propulsion
The principles of rocket propulsion system design and analysis. Fundamental aspects of the physics and chemistry of rocket propulsion. Focus is on the design and analysis of chemical propulsion systems including liquids, solids, and hybrids. Nonchemical propulsion concepts such as electric and nuclear rockets. Launch vehicle design and optimization issues including trajectory calculations. Limited enrollment. Prerequisites: 283 or consent of instructor.
3 units, Spr (Karabeyoglu, M)

AA 284B. Propulsion System Design Laboratory
Propulsion systems engineering through the design and operation of a sounding rocket. Students work in small teams through a full project cycle including requirements definition, performance analysis, system design, fabrication, ground and flight testing, and evaluation. Prerequisite: 284A and consent of instructor.
3 units, not given this year

AA 284C. Propulsion System Design Laboratory
Continuation of 284A,B. Prerequisite: 284B, and consent of instructor.
3 units, not given this year

AA 290. Problems in Aero/Astro
(Undergraduates register for 190 or 199.) Experimental or theoretical investigation. Students may work in any field of special interest. Register for section belonging to your research supervisor. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AA 291. Practical Training
Educational opportunities in high-technology research and development labs in aerospace and related industries. Internship integrated into a student's academic program. Research report outlining work activity, problems investigated, key results, and any follow-on projects. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own employment and should see department student services manager before enrolling. May be repeated for credit.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AA 294. Case Studies in Aircraft Design
Presentations by researchers and industry professionals. Registration for credit optional. May be repeated for credit.
1 unit, Spr (Jameson, A)

AA 295. Aerospace Structures and Materials
Presentations by researchers and industry professionals in aerospace structures and materials. May be repeated for credit.
1 unit, Spr (Chang, F)

AA 297. Seminar in Guidance, Navigation, and Control
For graduate students with an interest in automatic control applications in flight mechanics, guidance, navigation, and mechanical design of control systems; others invited. Problems in all branches of vehicle control, guidance, and instrumentation presented by researchers on and off campus. Registration for credit optional. May be repeated for credit.
1 unit, not given this year

AA 300. Engineer Thesis
Thesis for degree of Engineer. Students register for section belonging to their thesis adviser.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AA 301. Ph.D. Dissertation
Prerequisite: completion of Ph.D qualifying exams. Students register for section belonging to their thesis adviser. (Staff)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AA 801. TGR Engineer Thesis
Engineer's thesis or non-doctoral work for a TGR student.
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AFRICAN AND AFRICAN AMERICAN STUDIES (AFRICAAM) COURSES

UNDERGRADUATE COURSES IN AFRICAN AND AFRICAN AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

AFRICAAM 43. Introduction to African American Literature
(Same as AMSTUD 143, ENGLISH 43, ENGLISH 143) (English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. The defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history. GER:DB-Hum, EC-AmerCul
3-5 units, Aut (Rasberry, G)

AFRICAAM 64C. From Freedom to Freedom Now!: African American History, 1865-1965
(Same as HISTORY 64C) (Same as HISTORY 164C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music. GER:DB-SocSci, EC-AmerCul
3 units, Spr (Hobbs, A)

AFRICAAM 75. Black Cinema
How filmmakers represent historical and cultural issues in Black cinema.
2 units, not given this year

AFRICAAM 75B. Black Sitcoms
The portrayal of black life on television in the 70s. Critical framework including concepts of identity, race, gender, and class. In-class viewings. Sitcoms in relation to theoretical work including that of Toni Morrison, Marlon Riggs, Hermann Gray, Ann duCille, and Mark Anthony Neal.
2 units, Aut (Barker-Alexander, J), given occasionally

AFRICAAM 105. Introduction to African and African American Studies
(Same as HISTORY 255B) Interdisciplinary. Central themes in African American culture and history related to race as a definitive American phenomenon. African survivals and interpretations of slavery in the New World, contrasting interpretations of the Black family, African American literature, and art. Possible readings: Frederick Douglass, Harriet Jacobs, Booker T. Washington, W.E.B. DuBois, Richard Wright, Maya Angelou, James Baldwin, Malcolm X, Alice Walker, and bell hooks. Focus may vary each year. GER:DB-Hum, EC-AmerCul
5 units, not given this year

AFRICAAM 107C. The Black Mediterranean: Greece, Rome and Antiquity
(Same as CLASSGEN 107, CSRE 107) Explore problems of race and ethnicity as viable criteria in studying ancient societies and consider the question, What is the Mediterranean?, in relation to premodern evidence. Investigate the role of blackness as a marker of ethnicity; the demography of slavery and its roles in forming social identities; and environmental determinism as a factor in ethnic and racial thinking. Consider Greek and Roman perspec-

tives and behavior, and their impact on later theories of race and ethnicity as well as the Mediterranean as a whole. GER:EC-GlobalCom

4-5 units, Aut (Parker, G)

AFRICAAM 121X. Hip Hop, Youth Identities, and the Politics of Language

(Same as AMSTUD 121X, ANTHRO 121A, CSRE 121X, EDUC 121X, LINGUIST 155) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

3-4 units, Spr (Alim, H)

AFRICAAM 123. Great Works of the African American Tradition

Foundational African and African American scholarly figures and their work from the 19th century to the present. Historical, political, and scholarly context. Dialogues distinctive to African American culture. May be repeated for credit.

5 units, not given this year

AFRICAAM 145A. Poetics and Politics of Caribbean Women's Literature

(Same as CSRE 145A) Mid 20th-century to the present. How historical, economic, and political conditions in Haiti, Cuba, Jamaica, Antigua, and Guadeloupe affected women. How Francophone, Anglophone, and Hispanophone women novelists, poets, and short story writers respond to similar issues and pose related questions. Caribbean literary identity within a multicultural and diasporic context; the place of the oral in the written feminine text; family and sexuality; translation of European master texts; history, memory, and myth; and responses to slave history, colonialism, neocolonialism, and globalization. GER:DB-SocSci, DB-SocSci, EC-Gender

5 units, Win (Duffey, C)

AFRICAAM 146. New Possibilities for Writing and Art

Writing workshop to explore conventional as well as innovative approaches to writing, including digital, sound and movement. How different forms of music can inspire poetry. How still art, live performance, interviews or film shape the way one can think about and compose stories. What those stories and poems look and feel like when put to movement. CWriting experiments, museum visits, and performance of students' works. Guest poets, fiction writers, and artists who blur these boundaries. Students submit written pieces each week to be discussed.

5 units, Spr (Staff), given once only

AFRICAAM 152. DuBois and American Culture

(Same as ENGLISH 152D) His life and career. Focus on first half of his life from his Harvard doctoral dissertation to the end of the Harlem Renaissance in which he played a crucial role. Sources include his books on history and sociology, scholarly essays, novels, and journals that he edited. AAAS WIM course. GER:DB-Hum, EC-AmerCul

5 units, not given this year

AFRICAAM 152G. Global Harlem Renaissance

(Same as AMSTUD 152G, ENGLISH 152G) The explosion of African American artistic expression during 20s and 30s New York known as the Harlem Renaissance. Amiri Baraka once referred to the Renaissance as a kind of vicious modernism, as a BangClash, that impacted and was impacted by political, cultural, and aesthetic changes in the U.S., Europe, the Caribbean, and Latin America. Focus is on the literature, graphic arts, and the music of the era in this global context. GER:DB-Hum, EC-AmerCul

5 units, Aut (Elam, M)

AFRICAAM 169A. Cultural Traffic: Race, Performance, and Globalization

(Same as AMSTUD 169, CSRE 169A, DRAMA 169A, DRAMA 303A) The transnational intersections of race and performance. The question of race understood internationally and how do such definitions travel. Critical race theory and constructions of race through the lens of performance. The transnational meanings of such performances. Students read, study, analyze, and possibly stage theoretical and performance texts from inside and outside the U.S.. Course satisfies DRAMA 302/303 requirement.

3-5 units, Aut (George, N)

AFRICAAM 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges

(Same as ASNAMST 173S, CSRE 173S) Lived experience of people who dwell in the border world of race and nation where they negotiate transcultural and multiethnic identities and politics. Comparative, historical, and global contexts such as family and class. Controversies, such as representations of mixed race people in media and multicultural communities. What the lives of people like Tiger Woods and Barack Obama reveal about how the marginal is becoming mainstream.

5 units, Spr (Murphy-Shigematsu, S)

AFRICAAM 190. Directed Reading

May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

AFRICAAM 199. Honors Project

May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Win (Staff), Spr (Staff)

AFRICAAM 200X. Honors Thesis and Senior Thesis Seminar

Required for seniors. Weekly colloquia with AAAS Director and Associate Director to assist with refinement of research topic, advisor support, literature review, research, and thesis writing. Readings include foundational and cutting-edge scholarship in the interdisciplinary fields of African and African American studies and comparative race studies. Readings assist students situate their individual research interests and project within the larger. Students may also enroll in AFRICAAM 200Y in Winter and AFRICAAM 200Z in Spring for additional research units (up to 10 units total).

3-5 units, Win (Staff)

AFRICAAM 200Y. Honors Thesis and Senior Thesis Research

Winter. Required for students writing an Honors Thesis. Optional for Students writing a Senior Thesis.

3-5 units, Win (Staff)

AFRICAAM 200Z. Honors Thesis and Senior Thesis Research

Spring. Required for students writing an Honors Thesis. Optional for Students writing a Senior Thesis.

3-5 units, Spr (Staff)

AFRICAAM 261E. Mixed Race Literature in the U.S. and South Africa

(Same as AMSTUD 261E, ENGLISH 261E) As scholar Werner Sollors recently suggested, novels, poems, stories about interracial contacts and mixed race constitute an orphan literature belonging to no clear ethnic or national tradition. Yet the theme of mixed race is at the center of many national self-definitions, even in the U.S. post-civil rights and South Africa's post-Apartheid era. Aesthetic engagements with mixed race politics in these trans- and post-national dialogues, beginning in the 1700s and focusing on the 20th and 21st centuries.

5 units, Win (Elam, M; Parker, G)

AFRICAAM 262D. African American Poetics

(Same as AMSTUD 262D, ENGLISH 262D) Examination of African American poetic expressive forms from the 1700s to the 2000s, considering the central role of the genre--from sonnets to spoken word, from blues poetry to new media performance--in defining an evolving literary tradition and cultural identity.

5 units, Win (Elam, M)

GRADUATE COURSES IN AFRICAN AND AFRICAN AMERICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AFRICAAM 233A. Counseling Theories and Interventions from a Multicultural Perspective
(Same as EDUC 233A) In an era of globalization characterized by widespread migration and cultural contacts, professionals face a challenge: how does one practice successfully when working with clients/students from many different backgrounds? The need to examine, conceptualize, and work with individuals according to the multiple ways in which they identify themselves. Multicultural counseling concepts, issues, and research. Literature on counselor and client characteristics such as social status or race/ethnicity and their effects on the counseling process and outcome. Issues in consultation with culturally and linguistically diverse parents and students and work with migrant children and their families.
3-5 units, Spr (LaFromboise, T)

AFRICAAM 245. Understanding Racial and Ethnic Identity Development
(Same as EDUC 245) African American, Native American, Mexican American, and Asian American racial and ethnic identity development; the influence of social, political and psychological forces in shaping the experience of people of color in the U.S. The importance of race in relationship to social identity variables including gender, class, and occupational, generational, and regional identifications. Bi- and multiracial identity status, and types of white racial consciousness.
3-5 units, Win (LaFromboise, T)

AFRICAN AND MIDDLE EASTERN LANGUAGES (AMELANG) COURSES

UNDERGRADUATE COURSES IN AFRICAN AND MIDDLE EASTERN LANGUAGES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

AMELANG 1A. Beginning Arabic, First Quarter
(Formerly AMELANG 120A.) One-year sequence. Emphasis is on reading and writing standard Arabic (fusha).
5 units, Aut (Obeid, K)

AMELANG 1B. Beginning Arabic, Second Quarter
(Formerly AMELANG 120B.) Continuation of 1A. One-year sequence. Emphasis is on reading and writing standard Arabic (fusha).
5 units, Win (Obeid, K)

AMELANG 1C. Beginning Arabic, Third Quarter
(Formerly AMELANG 120C.) Continuation of 1B. One-year sequence. Emphasis is on reading and writing standard Arabic (fusha).Fulfills the University Foreign Language Requirement.
5 units, Spr (Obeid, K)

AMELANG 11A. Intermediate Arabic, First Quarter
(Formerly AMELANG 121A.) Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
4-5 units, Aut (Salti, R)

AMELANG 11B. Intermediate Arabic, Second Quarter
(Formerly AMELANG 121B.) Continuation of 11A. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
4-5 units, Win (Salti, R)

AMELANG 11C. Intermediate Arabic, Third Quarter
(Formerly AMELANG 121C.) Continuation of 11B. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
4-5 units, Spr (Salti, R)

AMELANG 21A. Advanced Arabic, First Quarter
(Formerly AMELANG 122A.) Language proficiency through use of complex and compound sentences. Media Arabic, literary works, the Arabic Internet, films, and cultural productions. Continuation of 11C.
2-4 units, Aut (Aweiss, S)

AMELANG 21B. Advanced Arabic, Second Quarter
(Formerly AMELANG 122B.) Continuation of 21B. Language proficiency through use of complex and compound sentences. Media Arabic, literary works, the Arabic Internet, films, and cultural productions.
2-4 units, Win (Aweiss, S)

AMELANG 21C. Advanced Arabic, Third Quarter
(Formerly AMELANG 122C.) Continuation of 21B. Language proficiency through use of complex and compound sentences. Media Arabic, literary works, the Arabic Internet, films, and cultural productions.
2-4 units, Spr (Aweiss, S)

AMELANG 23A. Reading Arabic, First Quarter
For seniors and graduate students who need advanced ability in Arabic for the PhD or for advanced research in their own field. Prerequisite: three years of Arabic or a demonstrated equivalence.
2-3 units, Aut (Barhoum, K)

AMELANG 23B. Reading Arabic, Second Quarter
(Formerly AMELANG 196B.) Continuation of 23A. For seniors and graduate students who need advanced ability in Arabic for the PhD or for advanced research in their own field. Prerequisite: three years of Arabic or a demonstrated equivalence.
2-3 units, Win (Barhoum, K)

AMELANG 23C. Reading Arabic, Third Quarter
(Formerly AMELANG 196C.) Continuation of 23B. For seniors and graduate students who need advanced ability in Arabic for the PhD or for advanced research in their own field. Prerequisite: three years of Arabic or a demonstrated equivalence.
2-3 units, Spr (Barhoum, K)

AMELANG 24A. Arabic Skills Workshop, First Quarter
Emphasizes the necessary Arabic skills (Reading, Writing, Speaking) needed by graduate students to conduct research in their own respective fields. Prerequisite: four years of Arabic or instructor's permission.
2-3 units, Aut (Staff)

AMELANG 24B. Arabic Skills Workshop, Second Quarter
Continuation of 24A. Emphasizes the necessary Arabic skills (Reading, Writing, Speaking) needed by graduate students to conduct research in their own respective fields. Prerequisite: four years of Arabic or instructor's permission.
2-3 units, Win (Staff)

AMELANG 24C. Arabic Skills Workshop, Third Quarter
Continuation of 24B. Emphasizes the necessary Arabic skills (Reading, Writing, Speaking) needed by graduate students to conduct research in their own respective fields. Prerequisite: four years of Arabic or instructor's permission.
2-3 units, Spr (Staff)

AMELANG 25A. Colloquial Arabic, First Quarter
(Formerly AMELANG 198A.) Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: 2 years of Arabic.
2-4 units, not given this year

AMELANG 25B. Colloquial Arabic, Second Quarter
(Formerly AMELANG 198B.) Continuation of 25A. Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: 2 years of Arabic. Prerequisite: 25A.
2-4 units, Win (Staff)

AMELANG 25C. Colloquial Arabic, Third Quarter
(Formerly AMELANG 198C.) Continuation of 25B. Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: 2 years of Arabic. Prerequisite: 25B
2-4 units, Spr (Staff)

AMELANG 31. The Contemporary Arab World and Culture through Literature
(Formerly AMELANG 161.) Readings from prominent authors dealing with topics such as gender and women, kinship and social concepts, nationalism, and religion. Texts delineating the cultural uniqueness of the Arab world include works by Naguib Mahfouz, Nawal El-Saadawi, Ghassan Kanafani, Tayyeb Salih, Etel Adnan, and short stories and poetry. All texts in English. No knowledge of Arabic required. Limited enrollment. GER:DB-Hum, EC-GlobalCom
4 units, Aut (Barhoum, K)

AMELANG 32. Arab Women Writers and Issues
(Formerly AMELANG 162.) Fiction and non-fiction work. The major cultural factors shaping their feminist attitudes. Readings: Fatima Mernissi, Nawal El-Saadawi, Etel Adnan, Alifa Rifaat, and Sahar Khalifeh. All texts in English. No knowledge of Arabic required; extra unit for readings in Arabic. Limited enrollment. GER:DB-Hum, EC-Gender
4 units, Win (Barhoum, K)

AMELANG 33. The Arab World through Travel Literature
(Formerly AMELANG 163.) Popular colonialist and postcolonialist portrayals of Arab culture and Islam. Recent Western depictions of Arabs and Muslims in travel literature. Readings include Flaubert in Egypt, Guests of the Sheik, Justine, Covering Islam, Nine Parts of Desire, and Motoring with Mohammed. All texts in English. No knowledge of Arabic required; extra unit for readings in Arabic. Limited enrollment. GER:DB-Hum, EC-GlobalCom
4 units, Spr (Staff)

AMELANG 35. The West through Arab Eyes
GER:EC-GlobalCom
4 units, not given this year

AMELANG 36. The Arabic Language and Culture
(Same as LINGUIST 170, LINGUIST 270) Arabic language from historical, social, strategic, and linguistic perspectives. History of the Arabic language and the stability of classical Arabic over the last 15 centuries. Why the functionality of classical Arabic has not changed as Latin, Old English, and Middle English have. Social aspects of the Arabic language, Ferguson¿s notion of diglossia. The main varieties of Arabic, differences among them, and when and where they are spoken. Role of Arabic and culture in current world politics, culture, and economy. Linguistic properties of Arabic such as root-based morphology, lexical ambiguity, and syntactic structure relating it to current linguistic theories.
3 units, not given this year

AMELANG 106A. Beginning Swahili, First Quarter
4 units, Aut (Rutechura, M), Spr (Rutechura, M)

AMELANG 106B. Beginning Swahili, Second Quarter
Continuation of 106A.
4 units, Win (Rutechura, M)

AMELANG 106C. Beginning Swahili, Third Quarter
Continuation of 106B. Fulfills the University foreing language requirement.
4 units, Spr (Rutechura, M)

AMELANG 107A. Intermediate Swahili, First Quarter
Continuation of 106C.
2-4 units, Aut (Rutechura, M)

AMELANG 107B. Intermediate Swahili, Second Quarter
Continuation of 107A.
2-4 units, Win (Rutechura, M)

AMELANG 107C. Intermediate Swahili, Third Quarter
Continuation of 107B.
2-4 units, Spr (Rutechura, M)

AMELANG 108A. Advanced Swahili, First Quarter
Continuation of 107C.
2-4 units, Aut (Rutechura, M)

AMELANG 108B. Advanced Swahili, Second Quarter
Continuation of 108A.
2-4 units, Win (Rutechura, M)

AMELANG 108C. Advanced Swahili, Third Quarter
Continuation of 108B.
2-4 units, Spr (Makana, S)

AMELANG 117A. Beginning Shona, First Quarter
3 units, Aut (Staff)

AMELANG 117B. Beginning Shona, Second Quarter
3 units, Win (Sibanda, G)

AMELANG 117C. Beginning Shona, Third Quarter
3 units, Spr (Staff)

AMELANG 118A. Intermediate Shona, First Quarter
3 units, Aut (Staff)

AMELANG 118B. Intermediate Shona, Second Quarter
(Staff)
3 units, Win (Staff)

AMELANG 118C. Intermediate Shona, Third Quarter
(Staff)
3 units, Spr (Staff)

AMELANG 127. Land and Literature
(Same as JEWISHST 102) Israel has captured the imagination of writers throughout the generations. It has been portrayed as promised land, holy land, homeland, empty land, occupied land, and land of dreams. Ideological views and political events have shaped writers' conception of Israel. Readings include poems, prose, and theoretical texts about place and literature. No knowledge of Hebrew required. GER:DB-Hum, EC-GlobalCom
4 units, Spr (Staff)

AMELANG 128A. Beginning Hebrew, First Quarter
(Same as JEWISHST 101A)
5 units, Aut (Shemtov, V; Greif, E)

AMELANG 128B. Beginning Hebrew, Second Quarter
(Same as JEWISHST 101B)
5 units, Win (Greif, E)

AMELANG 128C. Beginning Hebrew, Third Quarter
(Same as JEWISHST 101C)
5 units, Spr (Porat, G; Greif, E)

AMELANG 129A. Intermediate Hebrew, First Quarter
(Same as JEWISHST 102A)
4 units, Aut (Porat, G)

AMELANG 129B. Intermediate Hebrew, Second Quarter
(Same as JEWISHST 102B)
4 units, Win (Porat, G)

AMELANG 129C. Intermediate Hebrew, Third Quarter
(Same as JEWISHST 102C)
4 units, Spr (Shemtov, V)

AMELANG 136A. Beginning Xhosa, First Quarter
3 units, Aut (Sibanda, G)

AMELANG 136B. Beginning Xhosa, Second Quarter
Continuation of 136A.
3 units, Win (Sibanda, G)

AMELANG 136C. Beginning Xhosa, Third Quarter
Continuation of 136B.
3 units, Spr (Sibanda, G)

AMELANG 137A. Intermediate Xhosa, First Quarter
Continuation of 137C. Fulfills the University foreing language requirement.
3 units, Aut (Staff)

AMELANG 137B. Intermediate Xhosa, Second Quarter
Continuation of 137A.
3 units, Win (Staff)

AMELANG 137C. Intermediate Xhosa, Third Quarter
3 units, Spr (Staff)

AMELANG 140A. Beginning Yiddish, First Quarter
(Same as JEWISHST 104A) Reading, writing, and speaking.
4 units, Aut (Levitow, J)

AMELANG 140B. Beginning Yiddish, Second Quarter
(Same as JEWISHST 104B) Reading, writing, and speaking.
4 units, Win (Levitow, J)

AMELANG 140C. Beginning Yiddish, Third Quarter
(Same as JEWISHST 104C) Reading, writing, and speaking.
4 units, Spr (Levitow, J)

AMELANG 141A. Intermediate Yiddish, First Quarter
4 units, Aut (Levitow, J)

AMELANG 141B. Intermediate Yiddish, Second Quarter
4 units, Win (Staff)

AMELANG 141C. Intermediate Yiddish, Third Quarter
4 units, Spr (Staff)

AMELANG 144A. Beginning Persian, First Quarter
3 units, Aut (Fahimi, S)

AMELANG 144B. Beginning Persian, Second Quarter
Continuation of 144A.
3 units, Win (Fahimi, S)

AMELANG 144C. Beginning Persian, Third Quarter
3 units, Spr (Fahimi, S)

AMELANG 156A. Beginning Zulu, First Quarter
3 units, Aut (Sibanda, G)

AMELANG 156B. Beginning Zulu, Second Quarter
Continuation of 156A.
3 units, Win (Sibanda, G)

AMELANG 156C. Beginning Zulu, Third Quarter
Continuation of 156B.
3 units, Spr (Staff)

AMELANG 157A. Intermediate Zulu, First Quarter
Continuation of 156C. Fulfills the University foreign language requirement.
3 units, Aut (Staff)

AMELANG 157B. Intermediate Zulu, Second Quarter
Continuation of 157A.
3 units, Win (Staff)

AMELANG 157C. intermediate Zulu, Third Quarter
Continuation of 157B.
3 units, Spr (Staff)

AMELANG 170A. Biblical Hebrew, First Quarter
(Same as JEWISHST 107A) The basic lexicon and grammar of Hebrew of the Tanakh or Old Testament.
2-4 units, Aut (Porat, G), Win (Staff)

AMELANG 170B. Biblical Hebrew, Second Quarter
(Same as JEWISHST 107B) Continuation of 170A
2-4 units, Spr (Staff)

AMELANG 170C. Biblical Hebrew, Third Quarter
(Same as JEWISHST 107C) Continuation of 170B.
2-4 units, Spr (Porat, G)

AMELANG 171. The Bible in Modern Hebrew Literature
The role of biblical myths in shaping Israeli identity and the development of a secular Hebrew literature. Readings include modern Hebrew poems and novels which offer new meanings to the stories of Genesis, Exodus, David, and the Song of Songs and make them relevant to the context of modern and postmodern Israeli culture. Readings in Hebrew and English. Prerequisite: intermediate Hebrew. GER:DB-Hum
3-4 units, not given this year

AMELANG 176. Introduction to Ladino: Language, Literature, and Culture
Prerequisite: two quarters of Spanish.
1-4 units, not given this year

AMELANG 177. Middle Eastern Cities in Literature and Film
Sources include short stories, novels, and movies about Beirut, Tel Aviv, Jerusalem, Cairo, and Amman. Focus is on a cultural and intellectual history of each city. Issues such as the role that Middle Eastern cities play in the development of the modern Hebrew and Arabic novels, the city as a center of social and political life, and the city as a space of collective memory. GER:EC-GlobalCom
4-5 units, not given this year

AMELANG 184A. Beginning Turkish, First Quarter
3 units, Aut (Ozisik, N)

AMELANG 184B. Beginning Turkish, Second Quarter
Continuation of 184A.
3 units, Win (Ozisik, N)

AMELANG 184C. Beginning Turkish, Third Quarter
3 units, Spr (Ozisik, N)

AMELANG 185A. Intermediate Turkish, First Quarter
Continuarion of 184C. Fulfills the University foreign language requirement.
3 units, Aut (Ozisik, N)

AMELANG 185B. Intermediate Turkish, Second Quarter
Continuation of 185A.
3 units, Win (Ozisik, N)

AMELANG 185C. Intermediate Turkish, Third Quarter
Continuation of 185B.
3 units, Spr (Ozisik, N)

GRADUATE COURSES IN AFRICAN AND MIDDLE EASTERN LANGUAGES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AMELANG 11G. Intensive Intermediate Arabic, Part A
For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
3-4 units, not given this year

AMELANG 12G. Intensive Intermediate Arabic, Part B
Continuation of 11G. For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
3-4 units, not given this year

AMELANG 13G. Intensive Intermediate Arabic, Part C
Continuation of 12G. For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
3-4 units, not given this year

AMELANG 203A. Beginning Hausa, First Quarter
For grads only.
3 units, Sum (Staff)

AMELANG 203B. Beginning Hausa, Second Quarter
For grads only
3 units, Sum (Staff)

AMELANG 297. Directed Reading in African and Middle Eastern Languages
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AMELANG 395. Graduate Studies in African and Middle Eastern Languages
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

AFRICAN STUDIES (AFRICAST) COURSES

UNDERGRADUATE COURSES IN AFRICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

AFRICAST 111. Education for All? The Global and Local in Public Policy Making in Africa
(Same as AFRICAST 211) Policy making in Africa and the intersection of policy processes and their political and economic dimensions. The failure to implement agreements by international institutions, national governments, and nongovernmental organizations to promote education. Case studies of crowded and poorly equipped schools, overburdened and underprepared teachers, and underfunded education systems. GER:EC-GlobalCom, EC-GlobalCom
5 units, Spr (Samoff, J)

AFRICAST 112. AIDS, Literacy, and Land: Foreign Aid and Development in Africa
(Same as AFRICAST 212) Public policy issues, their roots, and the conflicts they engender. The policy making process: who participates, how, why, and with what results? Innovative approaches to contested policy issues. Foreign roles and their consequences. Case studies such as: a clinic in Uganda that addresses AIDS as a family and community problem; and strategies in Tanzania to increase girls' schooling. GER:EC-GlobalCom
5 units, Win (Samoff, J)

AFRICAST 151. AIDS in Africa
Medical, social, and political aspects of the HIV epidemic in sub-Saharan Africa including: biology, transmission, diagnosis,and

treatment of HIV; mother-to-child transmission and breastfeeding; vaccines; community and activist responses to the HIV epidemic; economics of HIV treatment; governance and health; ethics in research and program implementation.

3 units, not given this year

AFRICAST 151B. Plagues and Politics: Critical Links Between Politics, Economics, and Infectious Diseases in Africa

Infectious diseases have long been associated with regions of poverty and political instability; factors such as international travel, bioterrorism, and global markets may affect the health and security of all nations. Exploration of the complex interactions among politics, economics, and infectious diseases. How do infectious diseases impact the policies and economic growth of a country? How do governmental policies and economic investments influence the proliferation, control, and outcomes of these diseases? Related themes include: the tension between the economic health of a community and the personal health of citizens; the role of the individual versus the government in taking responsibility for health and health-related actions; and the extent to which rich countries can and should help poor countries combat preventable illnesses. Course is part of a collaborative effort among the Stanford Program on International and Crosscultural Education (SPICE), Center for African Studies, Program in Human Biology, School of Education, and School of Medicine to create infectious disease curriculum materials for U.S. high schools. Students contribute to the curriculum development by performing research and developing multimedia projects.

1 unit, Aut (Staff)

AFRICAST 199. Independent Study or Directed Reading

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

AFRICAST 200. The HIV/AIDS Epidemic in Tanzania: A Pre-Field Seminar

Goal is to prepare students for an HIV/AIDS prevention, service-learning experience in Tanzania. Topics include: history of HIV/AIDS epidemic globally and in Tanzania; social and economic impact of AIDS; national and societal responses; ethical issues in crosscultural service learning; teaching for prevention; biology of HIV transmission, disease progression, and prevention; introduction to Tanzanian history and politics; HIV/AIDS and development; social, cultural, and economic context of HIV risk; and strategies for HIV prevention in Tanzania.

1 unit, Spr (Katzenstein, D)

GRADUATE COURSES IN AFRICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AFRICAST 211. Education for All? The Global and Local in Public Policy Making in Africa

(Same as AFRICAST 111) Policy making in Africa and the intersection of policy processes and their political and economic dimensions. The failure to implement agreements by international institutions, national governments, and nongovernmental organizations to promote education. Case studies of crowded and poorly equipped schools, overburdened and underprepared teachers, and underfunded education systems.

5 units, Spr (Samoff, J)

AFRICAST 212. AIDS, Literacy, and Land: Foreign Aid and Development in Africa

(Same as AFRICAST 112) Public policy issues, their roots, and the conflicts they engender. The policy making process: who participates, how, why, and with what results? Innovative approaches to contested policy issues. Foreign roles and their consequences. Case studies such as: a clinic in Uganda that addresses AIDS as a family and community problem; and strategies in Tanzania to increase girls' schooling.

5 units, Win (Samoff, J)

AFRICAST 278. Special Topics (Francophone Literature): From Exoticism to a Discourse of Auto-Representation

(Same as COMPLIT 278, FRENLIT 278) Critical analysis of major issues relating to literatures in French language in and outside France. Focus is on exoticism and and self-representation, with an emphasis on the evolution of mentalities, new sensitivities and the role of literature in developing individual or collective identity. Readings include Le Clézio, Memmi, Malouf, Lopes, Schwarz-Bart, Delaygue, Glissant, Todorov, Kane and others. Primary sources, secondary sources and film. Taught in French.

3-5 units, not given this year

AFRICAST 299. Independent Study or Directed Reading

1-10 units, Aut (Staff), Win (Samoff, J), Spr (Staff)

AFRICAST 300. Contemporary Issues in African Studies

Guest scholars present analyses of major African themes and topics. Brief response papers required. May be repeated for credit.

1 unit, Aut (Hubbard, L; Samoff, J), Win (Hubbard, L), Spr (Hubbard, L)

AFRICAST 301A. The Dynamics of Change in Africa

(Same as HISTORY 346) Crossdisciplinary colloquium; required for the M.A. degree in African Studies. Addresses critical issues in African Studies by exploring intersections of the organization of power, structure of the economy, and patterns of social stratification. Interpretive debates on Africa's engagement with the slave trade, impact of colonialism, decolonization, democratization and civil wars, health and society, and Africa's engagement with globalization. The process of knowledge production and its social location, and the current state of knowledge.

4-5 units, Aut (Roberts, R)

AFRICAST 302. Research Workshop

Required for African Studies master's students. Student presentations.

1 unit, Spr (Roberts, R)

AMERICAN STUDIES (AMSTUD) COURSES

UNDERGRADUATE COURSES IN AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

AMSTUD 1B. Media, Culture, and Society

(Same as COMM 1B) The institutions and practices of mass media, including television, film, radio, and digital media, and their role in shaping culture and social life. The media's shifting relationships to politics, commerce, and identity. GER:DB-SocSci

5 units, Win (Turner, F)

AMSTUD 2. Introduction to American National Government and Politics

(Same as POLISCI 2) The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. The major areas of public policy in the current practice of the ideal of democracy. GER:DB-SocSci

5 units, Win (Fiorina, M; Frisby, T)

AMSTUD 35N. A Union of Diversities: Charles Ives and American Musical Traditions

(Stanford Introductory Seminar) (Same as MUSIC 35N) Preference to freshmen. The life and work of Charles Ives, and the polarized reception his compositions received. Music includes Ives' Victorian songs and his symphonic works; his philosophical and political writings, historic recordings, oral and photographic histories, and live performances. Hands-on work with original manuscripts and editions. Recommended: ability to read music. GER:DB-Hum

3 units, Spr (Barth, G)

AMSTUD 101. American Fiction into Film: How Hollywood Scripts and Projects Black and White Relations

Movies and the fiction that inspires them; power dynamics behind production including historical events, artistic vision, politics, and racial stereotypes. What images of black and white does Hollywood produce to forge a national identity? How do films promote equality between the races? What is lost or gained in film adaptations of books? GER:EC-AmerCul

3-5 units, Aut (Mesa, C)

AMSTUD 114N. Visions of the 1960s
(Stanford Introductory Seminar) Preference to sophomores. Introduction to the ideas, sensibility, and, to a lesser degree, the politics of the American 60s. Topics: the early 60s vision of a beloved community; varieties of racial, generational, and feminist dissent; the meaning of the counterculture; and current interpretive perspectives on the 60s. Film, music, and articles and books. GER:DB-Hum, EC-AmerCul

5 units, Aut (Gillam, R)

AMSTUD 120. Digital Media in Society
(Same as COMM 120, COMM 220) (Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors. GER:DB-SocSci

4-5 units, Spr (Turner, F)

AMSTUD 121. Masterpieces of American Literature
(Same as ENGLISH 21, ENGLISH 121) (English majors and others taking 5 units, register for 121.) A survey of some of the definitive texts of American writing, such as Leaves of Grass, Benito Cereno, Adventures of Huckleberry Finn, The Waste Land, The Sun Also Rises, The Golden Apples, and The Crying of Lot 49. GER:DB-Hum

3-5 units, Spr (Rampersad, A)

AMSTUD 121X. Hip Hop, Youth Identities, and the Politics of Language
(Same as AFRICAAM 121X, ANTHRO 121A, CSRE 121X, EDUC 121X, LINGUIST 155) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

3-4 units, Spr (Alim, H)

AMSTUD 123D. American Literature, 1855 to World War I
(Same as ENGLISH 123D) A survey of American writers from Whitman to T.S. Eliot, including Emily Dickinson, Mark Twain, Stephen Crane, Frank Norris, Kate Chopin, Theodore Dreiser, and Henry James. Topics include the tension between romance and realism, the impact of naturalism and modernism, as well as race, gender, and the literary evolution of the American language. GER:DB-Hum

5 units, Aut (Rampersad, A)

AMSTUD 123G. Mark Twain: A Fresh Look at an Icon and Iconoclast, 100 Years after His Death
(Same as ENGLISH 123G) The vitality and versatility of a writer who has been called America's Rabelais, Cervantes, Homer, Tolstoy, and Shakespeare. Journalism, travel books, fiction, drama, and sketches by Mark Twain; how Twain engaged such issues as personal and national identity, satire and social justice, imperialism, race and racism, gender, performance, travel, and technology. What are Twain's legacies in 2010, the centennial of his death, the 175th anniversary of his birth, and the 125th anniversary of his most celebrated novel? Guests include actor Hal Holbrook. GER:DB-Hum, EC-AmerCul

3-5 units, not given this year

AMSTUD 137. The Dialogue of Democracy
(Same as COMM 137, COMM 237, POLISCI 232T, POLISCI 332T) All forms of democracy require some kind of communication so people are aware of issues and make decisions. Competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small-scale discussions or sound bites on television? Or social media? What is the role of technology in changing democratic practices, to mobilize, to persuade, to solve public problems? Readings from political theory about democratic ideals from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. Contemporary examinations of the media and the Internet to see how those practices are changing and how the ideals can or cannot be realized. GER:EC-EthicReas

4-5 units, Win (Fishkin, J)

AMSTUD 140. Stand Up Comedy and the Great American Joke Since 1945
Development of American stand up comedy in the context of social and cultural eruptions after 1945, including the Borscht Belt, the Chitlin' Circuit, the Cold War, censorship battles, and civil rights and other social movements of the 60s. The artistry of stories, monologues, jokes, impersonations, persona, social satire, scatology, obscenity, riffs, rants, shtick, and more by such artists as Lenny Bruce, Dick Gregory, Richard Pryor, George Carlin, Margaret Cho, Sarah Silverman, Jon Stewart, Stephen Colbert, as well as precursors such as Mark Twain, minstrelsy and vaudeville and related films, TV shows, poems and other manifestations of similar sensibilities and techniques.

3-5 units, Aut (Obenzinger, H)

AMSTUD 143. Introduction to African American Literature
(Same as AFRICAAM 43, ENGLISH 43, ENGLISH 143) (English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. The defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history. GER:DB-Hum, EC-AmerCul

3-5 units, Aut (Rasberry, G)

AMSTUD 146. Asian American Culture and Community
(Same as COMPLIT 146, ASNAMST 146S, CSRE 146S) An examination of the history of Asians in America via one case history: the International Hotel in San Francisco. Background history of Asians in America, and the specifics of the I Hotel case as involving the convergence of global and local economies, urban redevelopment, and housing issues for minorities. Focus on the convergence of community and cultural production. Service learning component involving community work at the Manilatown Heritage Foundation in San Francisco. Service Learning Course (certified by Haas Center). GER:DB-Hum

5 units, Aut (Palumbo-Liu, D)

AMSTUD 150. American Literature and Culture to 1855
(Same as ENGLISH 123) Sources include histories, poetry, autobiography, captivity and slave narratives, drama, and fiction. Authors include Mather, Bradstreet, Rowlandson, Franklin, Brockden Brown, Emerson, Douglass, Hawthorne, and Melville. GER:DB-Hum, EC-AmerCul

5 units, Spr (Richardson, J)

AMSTUD 150A. Colonial and Revolutionary America
(Same as HISTORY 150A) (Same as HISTORY 50A. History majors and others taking 5 units, register for HISTORY 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution. GER:DB-SocSci, EC-AmerCul

5 units, Aut (Winterer, C)

AMSTUD 150B. 19th-Century America
(Same as HISTORY 150B) (Same as HISTORY 50B. History majors and others taking 5 units, register for 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture. GER:DB-SocSci, EC-AmerCul

5 units, Win (Campbell, J)

AMSTUD 150C. The United States in the Twentieth Century
(Same as HISTORY 150C) (Same as HISTORY 50C. History majors and others taking 5 units, register for 150C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the chang-

ing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War. GER:DB-SocSci, EC-AmerCul

5 units, Spr (McGarry, D)

AMSTUD 152A. Mutually Assured Destruction: American Culture and the Cold War

(Same as ENGLISH 152A) The temperature of the early Cold War years via readings of Soviet and U.S. propaganda; documentary film and film noir; fiction by Bellow, Ellison, O'Connor, and Mailer; social theory by Arendt, the New York Intellectuals, and the Frankfurt School; and political texts such as Kennan's Sources of Soviet Conduct, the Truman Doctrine speech, and the National Security Council Report 68. Major themes include the discourse of totalitarianism, MacCarthyism, strategies of containment, the nuclear threat, the figure of the outsider and the counterculture, and the cultural shift from sociological to psychological idioms. GER:DB-Hum

5 units, Aut (Rasberry, G)

AMSTUD 152G. Global Harlem Renaissance

(Same as AFRICAAM 152G, ENGLISH 152G) The explosion of African American artistic expression during 20s and 30s New York known as the Harlem Renaissance. Amiri Baraka once referred to the Renaissance as a kind of vicious modernism, as a BangClash, that impacted and was impacted by political, cultural, and aesthetic changes in the U.S., Europe, the Caribbean, and Latin America. Focus is on the literature, graphic arts, and the music of the era in this global context. GER:DB-Hum, EC-AmerCul

5 units, Aut (Elam, M)

AMSTUD 156H. Women and Medicine in US History: Women as Patients, Healers and Doctors

Women's bodies in sickness and health, and encounters with lay and professional healers from the 18th century to the present. Historical consttruction of thought about women's bodies and physical limitations; sexuality; birth control and abortion; childbirth; adulthood; and menopause and aging. Women as healers, including midwives, lay physicians, the medical profession, and nursing. GER:EC-Gender

5 units, Aut (Horn, M)

AMSTUD 156H. Women and Medicine in US History: Women as Patients, Healers and Doctors

Women's bodies in sickness and health, and encounters with lay and professional healers from the 18th century to the present. Historical consttruction of thought about women's bodies and physical limitations; sexuality; birth control and abortion; childbirth; adulthood; and menopause and aging. Women as healers, including midwives, lay physicians, the medical profession, and nursing. GER:EC-Gender

5 units, Aut (Horn, M)

AMSTUD 160. Perspectives on American Identity

Required for American Studies majors. Changing interpretations of American identity and Americanness. GER:DB-Hum, EC-AmerCul

5 units, Win (Gillam, R), Spr (Richardson, J)

AMSTUD 161. WOMEN IN MODERN AMERICA

(Same as CSRE 162, HISTORY 161) The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements. GER:DB-SocSci, EC-Gender

4-5 units, Spr (Freedman, E)

AMSTUD 164C. From Freedom to Freedom Now: African American History, 1865-1965

(Same as HISTORY 164C) (Same as HISTORY 64C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music. GER:DB-SocSci, EC-AmerCul

5 units, Spr (Hobbs, A)

AMSTUD 165. History of Higher Education in the U.S.

(Same as EDUC 165, EDUC 265, HISTORY 158C) Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities. (SSPEP-APA)

3-5 units, Aut (Gordon, L)

AMSTUD 166. Introduction to African American History: The Modern African American Freedom Struggle

(Same as HISTORY 166) Focus is on political thought and protest movements after 1930. Individuals who have shaped and been shaped by modern African American struggles for freedom and justice. Sources include audiovisual materials. Research projects required for fifth unit. GER:DB-SocSci, EC-AmerCul

4-5 units, Win (Carson, C)

AMSTUD 167. The Hollywood Musical

(Same as FILMSTUD 167, FILMSTUD 367) The sense of physical, emotional, aesthetic, and social liberation in this most colorful of film genres. Musicals as a place for the staging of issues of identity, including the impact of African American and Jewish culture, and issues of gay reception and interpretation. Attention to technologies of sound and color, the relation to vaudeville and Broadway, and ethnic and aesthetic diversity. Musicals as the epitome of filmic illusionism and the Hollywood studio system; the implications of their seduction of audiences; the meaning of spectacle, the centrality of performance. Busby Berkeley, Fred Astaire, Judy Garland, Bob Fosse, Stanley Donen, Gene Kelly, Vincente Minnelli.

4 units, Spr (Bukatman, S)

AMSTUD 169. Cultural Traffic: Race, Performance, and Globalization

(Same as AFRICAAM 169A, CSRE 169A, DRAMA 169A, DRAMA 303A) This course will examine the transnational intersections of race and performance. It will consider the question of s race understood internationally and how do such definitions travel. We examine critical race theory and study constructions of race through the lens of performance. The course will interrogate the transnational meanings of such performances. Students in this course will read, study, analyze and potentially even stage theoretical and performance texts from both inside and outside of the United States. Course also satisfies Drama 302/303 requirement.

3-5 units, Aut (George, N)

AMSTUD 179. Introduction to American Law

(Same as LAWGEN 106, POLISCI 122, PUBLPOL 302A) For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general. GER:DB-SocSci

3-5 units, Aut (Friedman, L)

AMSTUD 183. Border Crossings and American Identities

(Same as CSRE 183) How novelists, filmmakers, and poets perceive racial, ethnic, gender, sexual preference, and class borders in the context of a national discussion about the place of Americans in the world. How Anna Deavere Smith, Sherman Alexie, or Michael Moore consider redrawing such lines so that center and margin, or self and other, do not remain fixed and divided. How linguistic borderlines within multilingual literature by Caribbean, Arab, and Asian Americans function. Can Anzaldúa's conception of borderlands be constructed through the matrix of language, dreams, music, and cultural memories in these American narratives? Course includes examining one's own identity. GER:DB-Hum, EC-AmerCul

5 units, Aut (Duffey, C)

AMSTUD 183C. Feminism and American Literature

(Same as ENGLISH 183C, JEWISHST 153C) How writers have endeavored to enlarge the canvas on which women can paint their lives. Fiction, journalism, and poetry engaging how women come to understand who they might become; women's role in the home and outside the home; motherhood, marriage, work; etc. Writing

by Euro-American, African-American, Asian-American and Latino writers. Particular focus on feminists' use of humor to undercut demeaning assumptions, stereotypes and texts. Readings will include feminist parodies of advice manuals, cookbooks, literary criticism and fairy tales. GER:DB-Hum, EC-Gender

5 units, Spr (Fishkin, S)

AMSTUD 185. American Studies Internship

Restricted to declared majors. Practical experience working in a field related to American Studies for six to ten weeks. Students make internship arrangements with a company or agency, under the guidance of a sponsoring faculty member, and with the consent of the director or a program coordinator of American Studies. Required paper focused on a topic related to the internship and the student's studies. May be repeated for credit.

1-3 units, Aut (Staff), Win (Fishkin, S), Spr (Staff), Sum (Staff)

AMSTUD 186. Tales of Three Cities: New York, Chicago, Los Angeles

(Same as ENGLISH 186) How urban form and experience shape literary texts and how literary texts participate in the creation of place, through the literature of three American cities as they ascended to cultural and iconographical prominence: New York in the early to mid 19th century; Chicago in the late 19th and early 20th centuries; and Los Angeles in the mid to late 20th century. GER:DB-Hum

5 units, Win (Richardson, J)

AMSTUD 195. Individual Work

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AMSTUD 214. The American 1960s: Thought, Protest, and Culture

The meaning of the American 60s emphasizing ideas, culture, protest, and the new sensibility that emerged. Topics: black protest, the new left, the counterculture, feminism, the new literature and journalism of the 60s, the role of the media in shaping dissent, and the legacy of 60s protest. Interpretive materials from film, music, articles, and books. GER:DB-Hum, EC-AmerCul

5 units, Aut (Gillam, R)

AMSTUD 240. Sister Arts: Image and Text in America

(Same as ARTHIST 240) Seminar focuses equally on painting and literature in American history. Classes meet twice per week: one session devoted to a literary text, and the other to a visual artifact. The course is organized topically, placing text and images into dialogue with each other, asking for example, how Glen Ligon's contemporary reworking of nineteenth century runaway slave posters relates to Toni Morrison's Beloved, or how Melville's story of urban life, Bartleby the Scrivener, alludes to Hudson River School painting.

5 units, Win (Wolf, B)

AMSTUD 240A. Pre-Honors Seminar

Methods, interpretations, and issues pertinent to honors work in American Studies. Open to juniors interested in honors.

2-5 units, Spr (Staff)

AMSTUD 250. Senior Research

Research and writing of senior honors thesis under the supervision of a faculty member. The final grade for the thesis is assigned by the chair based on the evaluations of the primary thesis adviser and a second reader appointed by the program. Prerequisite: consent of chair.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AMSTUD 251. Topics in Constitutional History

(Same as HISTORY 251G, POLISCI 222S) Ideas of rights in American history emphasizing the problem of defining constitutional rights, the free exercise of religion, freedom of expression, and the contemporary debate over rights talk and the idiom of human rights. GER:DB-SocSci, EC-AmerCul

5 units, Win (Rakove, J)

AMSTUD 251C. The American Enlightenment

(Same as HISTORY 251C) 18th-century America was like a laboratory for exciting new social, political, religious, scientific, and artistic theories that we collectively call the Enlightenment. Readings in original texts and studies of material culture to examine how 18th-century Americans applied Enlightenment thinking to some of the most important problems and questions of their time. What was the best kind of government, and how could this be known? Was the new world of America fundamentally different or the same as Europe, and did animals, plants,and people improve or worsen there? What creatures (children, apes, women, slaves) were considered unreasonable in the Age of Reason, and why? What was the place of religion and passion in the Age of Reason? GER:DB-Hum

5 units, Win (Winterer, C)

AMSTUD 258. Topics in the History of Sexuality: Sexual Violence

(Same as CSRE 192E, HISTORY 258, HISTORY 358) Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence. GER:DB-SocSci, EC-Gender

4-5 units, Win (Freedman, E)

AMSTUD 260G. Century's End: Race, Gender, and Ethnicity at the Turn of the Century

(Same as ENGLISH 260G, JEWISHST 250G) How race, gender and ethnicity were constructed and construed in American culture from 1890 to 1914. Readings include stories, poetry, drama, and journalism by Euro-American, African-American, Asian-American, Jewish-American and Native American writers that illuminate how race, gender and ethnicity inflected such issues as the performance of identity, the purpose of education, the uses of dialect, and the dynamics of violence during this period. GER:EC-AmerCul

5 units, Win (Fishkin, S)

GRADUATE COURSES IN AMERICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AMSTUD 201. History of Education in the United States

(Same as EDUC 201, HISTORY 158B) How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching. (SSPEP)

3-5 units, Win (Gordon, L)

AMSTUD 257. Journalism and Imaginative Writing in America

(Same as COMM 278, ENGLISH 257) Walt Whitman spent twenty-five years as a journalist before publishing his first book of poems. Mark Twain was a journalist for twenty years before publishing his first novel. Topics include examination of how writers¿ backgrounds in journalism shaped the poetry or fiction for which they are best known; study of recent controversies surrounding writers who blurred the line between journalism and fiction. Writers include Whitman, Fanny Fern, Twain, Pauline Hopkins, Theodore Dreiser, Charlotte Perkins Gilman, Ernest Hemingway, Meridel LeSueur.

5 units, Spr (Fishkin, S)

AMSTUD 261A. Geography, Time, and Trauma in Asian American Literature

(Same as ASNAMST 187, ENGLISH 261A) The notion that homes can be stable locations for cultural, racial, ethnic, and similarly situated identity categories. Tthe possibility that there really is no place like home for Asian American subjects. How geography, landscape, and time situate traumas within fictional Asian American narratives.

5 units, Aut (Sohn, S)

AMSTUD 261E. Mixed Race Literature in the U.S. and South Africa

(Same as AFRICAAM 261E, ENGLISH 261E) As scholar Werner Sollors recently suggested, novels, poems, stories about interracial contacts and mixed race constitute an orphan literature belonging to no clear ethnic or national tradition. Yet the theme of mixed race is at the center of many national self-definitions, even in the U.S. post-civil rights and South Africa’s post-Apartheid era. Aesthetic engagements with mixed race politics in these trans- and post-

national dialogues, beginning in the 1700s and focusing on the 20th and 21st centuries.

5 units, Win (Elam, M; Parker, G)

AMSTUD 261F. Gender and Sexuality in Asian American Literature

(Same as ASNAMST 188, ENGLISH 261F) How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings include literary criticism, and feminist and queer theory.

5 units, Win (Sohn, S)

AMSTUD 262C. African American Literature and the Retreat of Jim Crow

(Same as ENGLISH 262C) After the unprecedented carnage of WWII, the postwar era witnessed the slow decline of the segregated Jim Crow order and the onset of landmark civil rights legislation. What role did African American literature and culture play in this historical process? What does this shift in racial theory and praxis mean for black literary production, a tradition constituted by the experience of slavery and racial oppression? Focus on these questions against the backdrop of contemporaneous developments: the onset of the Cold War, decolonization and the formation of the Third World, and the emergence of the new liberalism.

5 units, Spr (Rasberry, G)

AMSTUD 262D. African American Poetics

(Same as AFRICAAM 262D, ENGLISH 262D) Examination of African American poetic expressive forms from the 1700s to the 2000s, considering the central role of the genre--from sonnets to spoken word, from blues poetry to new media performance--in defining an evolving literary tradition and cultural identity.

5 units, Win (Elam, M)

ANTHROPOLOGY (ANTHRO) COURSES

UNDERGRADUATE COURSES IN ANTHROPOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ANTHRO 1. Introduction to Cultural and Social Anthropology

(Same as ANTHRO 201) Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Yanagisako, S), Sum (Roque, A)

ANTHRO 3. Introduction to Prehistoric Archeology

(Same as ARCHLGY 1) Aims, methods, and data in the study of human society's development from early hunters through late prehistoric civilizations. Archaeological sites and remains characteristic of the stages of cultural development for selected geographic areas, emphasizing methods of data collection and analysis appropriate to each. GER:DB-SocSci, EC-GlobalCom

3-5 units, Aut (Rick, J)

ANTHRO 4. Language and Culture

Comparative approach, using examples from many languages. Emphasis is on generally non-Western speech communities. Topics include: the structure of language; the theory of signs; vocabulary and culture; grammar, cognition, and culture (linguistic relativism and determinism); encodability of cultural information in language; language adaptiveness to social function; the ethnography of speaking; registers; discourse (conversation, narrative, verbal art); language and power; language survival and extinction; and linguistic ideology (beliefs about language). GER:DB-SocSci

4-5 units, Aut (Fox, J)

ANTHRO 6. Human Origins

(Same as ANTHRO 206, HUMBIO 6) The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them. GER:DB-NatSci

5 units, not given this year

ANTHRO 7. Introduction to Forensic Anthropology

The application of anthropological and archaeological methods to forensics. Topics include the recovery and identification of individuals via skeletal and DNA analysis, reconstruction of premortem and postmortem histories of remains, analysis of mass graves, human rights issues, surveillance tape analysis, analysis of crime scene materials, and expert witness testimony. Legal and ethical dimensions. GER:DB-NatSci

3 units, Spr (Jobin, M)

ANTHRO 12. Anthropology and Art

Modernity. How the concept of art appears timeless and commonsensical in the West, and with what social consequences. Historicizing the emergence of art. Modernist uses of primitive, child art, asylum, and outsider art. GER:DB-Hum

5 units, not given this year

ANTHRO 14. Introduction to Anthropological Genetics

For upper division undergraduates. The extent and pattern of variation among human genomes, the origin of these patterns in human evolution, and the social and medical impact of recent discoveries. Topics include: the Human Genome Project; human origins; ancient DNA; genetic, behavioral, linguistic, cultural, and racial diversity; the role of disease in shaping genetic diversity; DNA forensics; genes and reproductive technology. GER:DB-NatSci

3 units, Win (Jobin, M)

ANTHRO 15. Sex and Gender

Commonality and diversity of gender roles in crosscultural perspective. Cultural, ecological, and evolutionary explanations for such diversity. Theory of the evolution of sex and gender, changing views about men's and women's roles in human evolution, conditions under which gender roles vary in contemporary societies, and issues surrounding gender equality, power, and politics. GER:DB-SocSci, EC-Gender

3 units, Win (Bird, R)

ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America

What does it mean to be a Native American in the 21st century? Beyond traditional portrayals of military conquests, cultural collapse, and assimilation, the relationships between Native Americans and American society. Focus is on three themes leading to in-class moot court trials: colonial encounters and colonizing discourses; frontiers and boundaries; and sovereignty of self and nation. Topics include gender in native communities, American Indian law, readings by native authors, and Indians in film and popular culture. GER:DB-SocSci, EC-AmerCul

5 units, not given this year

ANTHRO 18. Peopling of the Globe: Changing Patterns of Land Use and Consumption over the Last 50,000 Years

(Same as ARCHLGY 12, EARTHSYS 21) Fossil, genetic, and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. The data and issues regarding human dispersal, migration, and colonization of continents and islands around the world. Problems related to the timing and cause of colonizing events, and questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and the contemporary environmental crisis. GER:DB-SocSci

3-5 units, Aut (Bird, D)

ANTHRO 22. Archaeology of North America
Why and how people of N. America developed. Issues and processes that dominate or shape developments during particular periods considering the effects of history and interactions with physical and social environment. Topics include the peopling of the New World, explaining subsequent diversity in substance and settlement adaptations, the development of social complexity, and the impact of European contact. GER:DB-SocSci, EC-AmerCul
3-5 units, Win (Truncer, J)

ANTHRO 22N. Ethnographies of North America: An Introduction to Cultural and Social Anthropology
(Stanford Introductory Seminar) Preference to freshmen. Ethnographic look at human behavior, including cultural transmission, social organization, sex and gender, culture change, and related topics in N. America. Films. GER:DB-SocSci
3-4 units, Win (Wilcox, M)

ANTHRO 25N. Contemporary Japanese Popular Culture
(Stanford Introductory Seminar) Preference to freshmen. Focus is on the intersection between politics and popular culture in contemporary Japan. Social and political implications of practices of popular culture. Topics include representations of gender in J-pop, manga, and anime, the otaku culture and its pathologization. Theories of popular culture in general, and a variety of contemporary anthropological studies on Japanese popular culture in particular as well.
1-3 units, Aut (Inoue, M)

ANTHRO 26N. Hauntings, Visions, and Prophecy
(Stanford Introductory Seminar) Preference to freshmen. The conditions under which people have experiences that they identify as supernatural: experiences of something that is not physically present. The cultural and psychological dimensions of this very real phenomenon. The course does not make ontological judgments about whether something which is experienced as externally present is in fact externally present: this is a class about culture and psychology, not about metaphysics. Students perform experimental work, using themselves as subjects to understand who, when and how people have experiences that they deem supernatural.
3-5 units, Win (Luhrmann, T)

ANTHRO 30. Linguistic Field Methods
(Same as LINGUIST 174, LINGUIST 274A) Practical training in the collection and analysis of linguistic data from native speakers of a language largely unknown to the investigator. Documentation of endangered languages. Research goals, field trip preparation, ethics (including human subjects, cooperation with local investigators, and governmental permits), working in the community, technical equipment, and analytical strategies. Emphasis is on the use of recording devices and computers in collection and analysis. Prerequisite: introductory course in linguistics.
3-5 units, not given this year

ANTHRO 31. Ecology, Evolution, and Human Health
Ecology, Evolution, and Human Health Human ecology, environments, adaptation and plasticity, and their relationship to health and well-being considered in the broad comparative context. Topics include human population history, subsistence ecology, demography, reproductive decision making, urbanization, migration, infectious disease, the physiology of stress and the inflammatory response, social capital and social networks, nutrition, nutritional deficiencies, growth, and social inequalities. No prior course work in ecological or medical anthropology required. GER:DB-SocSci
3-5 units, Spr (Jones, J)

ANTHRO 32. Theories in Race and Ethnicity
Concepts and theories of race and ethnicity in the social sciences and cultural studies. U.S. based definitions, ideas, and problems of race and ethnicity are compared to those that have emerged in other areas of the world. GER:DB-SocSci
5 units, not given this year

ANTHRO 60A. Stanford Alpine Archaeology Project 2010
Alpine Archaeology is a discipline that applies traditional archaeology in montane contexts. While survey and excavation are standard methodologies, topography and climate bear on archaeological praxes in different ways. Soil chemistry in alpine contexts' testable by pH and other parameters - usually integrates less organic material and more geological material. Material preservation in alpine contexts factors in cold temperature for up to half a year with resulting lower diffusion for reduced oxidation and inhibited deterioration of organic materials. Because of montane environment, this course incorporates elements of paleoclimatology (including glaciation) and geomorphology (including geological processes of long term orogeny and erosion). Alpine ecology is studied including natural vegetation zones from 1000-3000 meters, along with transhumance, trade patterns, deforestation, constricted seasonal agriculture and anthropogenic change as well as restricted mobility along natural cor
3 units, Aut (Hunt, P), Sum (Staff)

ANTHRO 77. Japanese Society and Culture
(Same as ANTHRO 277) Focus is on power, identity, and the politics of knowledge production. How transnational interactions influence Japanese identity. How anthropological knowledge has contributed to understanding Japanese culture and society. Gender, race and class; contemporary ethnographies. Modernity and globalization. Cultural politics, domestic work, labor management, city planning, ad images, anime, martial art, fashion, theater, leisure, and tourism. GER:DB-SocSci, EC-GlobalCom
5 units, not given this year

ANTHRO 82. Medical Anthropology
(Same as ANTHRO 282) Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Jain, S)

ANTHRO 90A. History of Archaeological Thought
(Same as ARCHLGY 103) Introduction to the history of archaeology and the forms that the discipline takes today, emphasizing developments and debates over the past five decades. Historical overview of culture, historical, processual and post-processual archaeology, and topics that illustrate the differences and similarities in these theoretical approaches.
5 units, Spr (Meskell, L)

ANTHRO 90B. Theory of Cultural and Social Anthropology
Preference to Anthropology majors. Anthropological interpretations of other societies contain assumptions about Western societies. How underlying assumptions and implicit categories have influenced the presentation of data in major anthropological monographs. Emphasis is on Karl Marx, Emile Durkheim, Max Weber, and anthropological analyses of non-Western societies. GER:DB-SocSci
5 units, Win (Ebron, P)

ANTHRO 90C. Theory of Ecological and Environmental Anthropology
(Same as HUMBIO 118) Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America. GER:DB-SocSci, WIM
5 units, Win (Bird, D)

ANTHRO 90D. Social Theory in the Anthropological Sciences
Required of majors. Foundational course in the history of social theory in anthropology from the late 19th century to the present. Major approaches to human culture and society: symbolic, social, material, and psychological. Questions about the role of theory in anthropology and how it can be applied to human issues. (HEF IV) GER:DB-SocSci
5 units, not given this year

ANTHRO 91. Method and Evidence in Anthropology
This course provides a broad introduction to various ways of designing anthropological questions and associated methods for collecting evidence and supporting arguments. We review the inherent links between how a question is framed, the types of evidence that can address the question, and way that data are collected. Research activities such as interviewing, participant observation, quantitative observation, archival investigation, ecological survey, linguistic methodology, tracking extended cases, and demographic methods are reviewed. Various faculty and specialists will be brought in to discuss how they use different types of evidence and methods for supporting arguments in anthropology.
5 units, Win (Fox, J)

ANTHRO 92A. Undergraduate Research Proposal Writing Workshop
Practicum. Students develop independent research projects and write research proposals. How to formulate a research question; how to integrate theory and field site; and step-by-step proposal writing.
2-3 units, Aut (Babul, E)

ANTHRO 92B. Undergraduate Research Proposal Writing Workshop
Practicum. Students develop independent research projects and write research proposals. How to formulate a research question; how to integrate theory and field site; and step-by-step proposal writing.
2-3 units, Win (Babul, E)

ANTHRO 93. Prefield Research Seminar
For Anthropology majors only; non-majors register for 93B. Preparation for anthropological field research in other societies and the U.S. Data collection techniques include participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and the use of documentary materials. Strategies of successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Prerequisites: two ANTHRO courses or consent of instructor.
5 units, Spr (Inoue, M)

ANTHRO 93B. Prefield Research Seminar: Non-Majors
Preparation for anthropological field research in other societies and the U.S. Data collection techniques include participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and the use of documentary materials. Strategies for successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Service Learning Course (certified by Haas Center).
5 units, Spr (Coll, K)

ANTHRO 94. Postfield Research Seminar
Goal is to produce an ethnographic report based on original field research gathered during summer fieldwork, emphasizing writing and revising as steps in analysis and composition. Students critique classmates' work and revise their own writing in light of others' comments. Ethical issues in fieldwork and ethnographic writing, setting research write-up concerns within broader contexts.
5 units, Aut (Coll, K)

ANTHRO 95. Research in Anthropology
Independent research conducted under faculty supervision, normally taken junior or senior year in pursuit of a senior paper or an honors project. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 95B. Senior Paper
Taken in the final quarter before graduation. Independent study and work on senior paper for students admitted to the program. Prerequisite: consent of program adviser and instructor.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 96. Directed Individual Study
Prerequisite: consent of instructor.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 97. Internship in Anthropology
Opportunity for students to pursue their specialization in an institutional setting such as a laboratory, clinic, research institute, or government agency. May be repeated for credit. Service Learning Course (certified by Haas Center).
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 98B. Digital Methods in Archaeology
(Same as ANTHRO 298B) This is a course on digital technologies in archaeology used for documentation, visualization, and analysis of archaeological spaces and objects. Emphasizes hands-on approaches to image manipulation, virtual reality, GIS, CAD, and photogrammetry modeling methods. GER:DB-EngrAppSci
3-5 units, Win (Rick, J)

ANTHRO 98E. Catalhoyuk and Neolithic Archaeology
Catalhoyuk as a case study to understand prehistoric social life during the Neolithic in Anatolia and the Near East. Developments in agriculture, animal domestication, material technology, trade, art, religion, skull cults, architecture, and burial practices. Literature specific to Catalhoyuk and other excavations throughout the Anatolian and Levantine regions to gain a perspective on diversity and variability throughout the Neolithic. The reflexive methodology used to excavate Catalhoyuk, and responsibilities of excavators to engage with larger global audiences of interested persons and stakeholders.
3-5 units, not given this year

ANTHRO 100A. India's Forgotten Empire: The Rise and Fall of Indus Civilization
How and why cities with public baths, long-distance trade, sophisticated technologies, and writing emerged, maintained themselves, and collapsed in the deserts of present-day Pakistan and India from 2500 to 1900 B.C. GER:DB-SocSci, DB-SocSci, EC-GlobalCom
3 units, Spr (Truncer, J)

ANTHRO 100C. Chavin de Huantar Research Seminar
For participants in fieldwork at Chavín de Huantar. Archaeological research techniques, especially as applied at this site. Students work on data from the previous field season to produce synthetic written materials. Maybe repeated for credit.
2-5 units, Aut (Rick, J)

ANTHRO 101. The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology
The prehispanic cultures of Mesoamerica through archaeology and ethnohistory, from the archaic period to the Spanish conquest in the 16th century. GER:DB-SocSci, EC-GlobalCom
3-5 units, Win (Robertson, I)

ANTHRO 101A. Archaeology as a Profession
(Same as ARCHLGY 107A) Academic, contract, government, field, laboratory, museum, and heritage aspects of the profession.
5 units, Aut (Williams, B)

ANTHRO 102A. Ancient Civilizations: Complexity and Collapse
(Same as ANTHRO 202A) How archaeology contributes to understanding prehistoric civilizations. How and why complex social institutions arose, and the conditions and processes behind their collapse. The development of monumental architecture, craft specialization, trade and exchange, and social stratification using examples from the archaeological record. (HEF II, III; DA-B) GER:DB-SocSci, EC-GlobalCom
3-5 units, Aut (Truncer, J)

ANTHRO 103. The Archaeology of Modern Urbanism
Seminar. Urbanism as a defining feature of modern life. The perspective of archaeology on the history and development of urban cultures. Case studies are from around the globe; emphasis is on the San Francisco Bay Area megalopolis. Cities as cultural sites where economic, ethnic, and sexual differences are produced and transformed; spatial, material, and consumption practices; and the archaeology of communities and neighborhoods. GER:DB-SocSci
5 units, Spr (Voss, B)

ANTHRO 104. Urban Life and Cultural Imagination in South Asia
This course introduces the history of urban development and urban culture in South Asia. The main bulk of the readings are ethnographic accounts and historical works on conflicts, dynamics, and cultural forms in South Asian cities in the 20th century.
3 units, Spr (Hansen, T)

ANTHRO 105. Ancient Cities in the New World
(Same as ANTHRO 205) Preindustrial urbanism as exemplified by prehispanic New World societies. Case studies: the central and southern highlands of Mesoamerica, and the Maya region. Comparative material from highland S. America.
3-5 units, Win (Robertson, I)

ANTHRO 106. Incas and their Ancestors: Peruvian Archaeology
(Same as ANTHRO 206A, ARCHLGY 102B) The development of high civilizations in Andean S. America from hunter-gatherer origins to the powerful, expansive Inca empire. The contrasting ecologies of coast, sierra, and jungle areas of early Peruvian societies from 12,000 to 2,000 B.C.E. The domestication of indigenous plants which provided the economic foundation for monumental cities, ceramics, and textiles. Cultural evolution, and why and how major transformations occurred. (HEF II, III; DA-B) GER:DB-SocSci, EC-GlobalCom
3-5 units, Win (Rick, J)

ANTHRO 109. Archaeology: World Cultural Heritage
(Same as ANTHRO 209) Focus is on issues dealing with rights to land and the past on a global scale including conflicts and ethnic purges in the Middle East, the Balkans, Afghanistan, India, Australia, and the Americas. How should world cultural heritage be managed? Who defines what past and which sites and monuments should be saved and protected? Are existing international agreements adequate? How can tourism be balanced against indigenous rights and the protection of the past? GER:DB-SocSci

5 units, not given this year

ANTHRO 110A. Neandertals and Modern Humans: Origin, Evolution, Interactions
(Same as ANTHRO 210A) The expansion out of Africa of the human species represents the last step in the course of human evolution. It resulted in the colonization of the whole planet and the replacement of archaic forms of humans in Eurasia. One way to investigate why Homo sapiens has been such a successful species is to compare its evolution with that of its closest relative, the Neandertals. Exploring the biocultural processes at work in the two lineages leads to examininations of some of the main issues in paleoanthropology and the most recent methodological advances in the field.

3 units, Win (Hublin, J)

ANTHRO 111. Archaeology of Sex, Sexuality, and Gender
(Same as ANTHRO 211) How archaeologists study sex, sexuality, and gender through the material remains left behind by past cultures and communities. Theoretical and methodological issues; case studies from prehistoric and historic archaeology.

5 units, not given this year

ANTHRO 113. Faunal Analysis: Animal Remains for the Archaeologist
(Same as ANTHRO 213, BIO 166, BIO 266) The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodoloigcal issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

5 units, Spr (Klein, R)

ANTHRO 114. Prehistoric Stone Tools: Technology and Analysis
(Same as ANTHRO 214) Archaeologists rely on an understanding of stone tools to trace much of what we know about prehistoric societies. How to make, illustrate, and analyze stone tools, revealing the method and theory intrinsic to these artifacts. GER:DB-SocSci

5 units, Spr (Robertson, I)

ANTHRO 115. Spirituality and Healing
This course considers the puzzle of symbolic healing. How have societies without the resources of modern medicine approached healing? Why do these rituals have common features around the world? Topics include shamanism, spirit possession, prayer, and the role of placebos in modern biomedicine. Students do ethnographic work and practical explorations along with more traditional scholarly approaches to learning.

3-5 units, Spr (Luhrmann, T)

ANTHRO 115A. Environmental Crises and State Collapse: Lessons from the Past
(Same as HUMBIO 115) The effects and consequences of long-term human interaction with the environment. How and why past societies adapted, or failed to adapt, to changing environmental conditions and relevance to current environmental problems. Demographic, archaeological, and environmental data assessed using case studies from around the world since the late Pleistocene. Development of agriculture, societal collapse, sustainability, and policy response. Prerequisite: Human Biology core or equivalent or consent of instructor.

3 units, Aut (Truncer, J)

ANTHRO 116. Quantitative Data Analysis on Archeological and Anthropological Research
(Same as ANTHRO 216) This course allows graduate students and advanced undergraduates in archaeology and anthropology to acquire practical skills in quantitative data analysis. The structure of the course is flexible enough to accommodate a range of student expertise and interests. Topics include: statistics and graphics in R; database design, resampling methods, diversity measures, contingency table analysis, and introductory methods in spatial analysis. Recommended: familiarity with basic statistical methods is useful but not assumed.

5 units, Spr (Robertson, I)

ANTHRO 117A. Environment and Health: An Impact Assessment
(Same as HUMBIO 117) The effects of environment upon human and animal health and vice versa, including impacts of climate change, local environment (urban/rural health issues), land-use change upon health issues such as asthma, cholera, and malaria. Emphasis is on interdisciplinary approaches including medicine, epidemiology, ecology, and environmental science. Health/environment topics from multiple levels, such as from the standpoint of the individual organism to the ecosystem. How such knowledge is applied to policy and public health. Students construct new conceptual models for health/environment case studies.

3 units, Spr (Salkeld, D)

ANTHRO 118. Heritage, Environment, and Sovereignty in Hawaii
(Same as EARTHSYS 118) This course explores the cultural, political economic, and environmental status of contemporary Hawaiians. What sorts of sustainable economic and environmental systems did Hawaiians use in prehistory? How was colonization of the Hawaiian Islands informed and shaped by American economic interests and the nascent imperialism of the early 20th centrury? How was sovereignty and Native Hawaiian identity been shaped by these forces? How has tourism and the leisure industry affected the natural environment? This course uses archaeological methods, ethnohistorical sources, and historical analysis in an exploration of contemporary Hawaiian social economic and political life.

4 units, Aut (Wilcox, M)

ANTHRO 121. Language and Prehistory
(Same as ANTHRO 221) Language classification and its implications for human prehistory. The role of linguistic data in analyzing prehistoric populations, cultures, contact, and migrations. Comparison of linguistic and biological classifications. Reconstruction, proto-vocabularies, and culture. Archaeological decipherment and the origins and evolution of writing. Archaeological and genetic evidence for human migrations. (DA-A; HEF II,III) GER:DB-SocSci, EC-GlobalCom

3-5 units, not given this year

ANTHRO 121A. Hip Hop, Youth Identities, and the Politics of Language
(Same as AFRICAAM 121X, AMSTUD 121X, CSRE 121X, EDUC 121X, LINGUIST 155) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

3-4 units, Spr (Alim, H)

ANTHRO 123. Readings in Linguistic Anthropology
(Same as ANTHRO 223) One or two major related works on language in its cultural context. Works for 2007-08 involve attempts to correlate linguistic and non-linguistic data for analysis of prehistoric human contact and migrations. May be repeated for credit.

2 units, not given this year

ANTHRO 123A. Human Diversity: A Linguistic Perspective
(Same as HUMBIO 187) The diversity and distribution of human language and its implications for the origin and evolution of the human species. The origin of existing languages and the people who speak them. Where did current world languages come from and how can this diversity be used to study human prehistory? Evidence from related fields such as archaeology and human genetics. Topics: the origin of the Indo-European languages, the peopling of the Americas, and evidence that all human languages share a common origin. GER:DB-SocSci, EC-GlobalCom

3 units, Spr (Ruhlen, M)

ANTHRO 124. Maya Mythology and the Popol Vuh
The mythology and folklore of the ancient Maya, emphasizing the relationship between the 16th-century Quiché Maya mythological epic Popol Vuh (Book of the Council) and classic lowland Maya art, architecture, religion, and politics. General Mesoamerican mythology. Anthropological and other theories of mythology.

Class participates in the creation of a web project on the Popol Vuh.

3-5 units, not given this year

ANTHRO 126. Cities in Comparative Perspective

(Same as URBANST 114) Core course for Urban Studies majors. The city as interdisciplinary object. Discourses about cities such as the projects, practices, plans, representations, and sensibilities that combine to create what people know about urban spaces. Local, national, and transnational spatial scales. Conversations across regional boundaries; geographies of difference. Case studies. GER:DB-SocSci

5 units, Aut (Ebron, P; Roque, A)

ANTHRO 127. City and Sounds

How do people experience modern cities and urban public cultures through auditory channels? How does sound mediate and constitute urban space? How to listen to and write about culture through sound. Students carry out narrative interviews and sound fieldwork in the Bay Area. Readings include urban anthropology, semiotics, art history, social studies of science and technology, media studies, and musicology.

5 units, not given this year

ANTHRO 127A. Cities and the Future: Utopias, Dystopias, and Other Urbanisms to Come

Interdisciplinary seminar for graduate students and advanced undergraduates with experience in the social sciences and humanities and an interest in urban studies. What sort of futures are being imagined for the cities of the 21st- century? How the future of cities, and the cities of the future, are being thought about and acted upon in the present. Its primary objective is to develop sophisticated ways of thinking about the future of cities, since doing so has real significance for the kind of city people want to and eventually may inhabit.

3 units, Win (Zeiderman, A)

ANTHRO 130A. Interpreting Space and Place: An Introduction to Mapmaking

How mapmaking, geographical information systems (GIS), and spatial tools can be applied in social research. Qualitative and quantitative approaches in the use of geospatial information. Methodologies and case examples.

5 units, not given this year

ANTHRO 130B. Introduction to GIS in Anthropology

(Same as ANTHRO 230B) How GIS and spatial tools can be applied in social research. Case studies and student projects address questions of social and cultural relevance using real data sets, including the collection of geospatial data and building of spatial evidence. Analytical approaches and how they can shape a social and cultural interpretation of space and place.

5 units, not given this year

ANTHRO 130D. Spatial Approaches to Social Science

(Same as ANTHRO 230D, POLISCI 241S) This multidisciplinary course combines different approaches to how GIS and spatial tools can be applied in social science research. We take a collaborative, project oriented approach to bring together technical expertise and substantive applications from several social science disciplines. The course aims to integrate tools, methods, and current debates in social science research and will enable students to engage in critical spatial research and a multidisciplinary dialogue around geographic space.

5 units, Win (Rodden, J; Engel, C)

ANTHRO 131. The Politics of Humanitarianism

(Same as ANTHRO 231) Anthropological approaches to contemporary practices of humanitarian intervention. How social theory can inform the politics of humanitarianism, charity, and philanthropy. Focus is on Africa from the colonial era to the present. GER:DB-SocSci

5 units, not given this year

ANTHRO 134. Object Lessons

(Same as ANTHRO 234) Human-object relations in the processes of world making. Objectification and materiality through ethnography, archaeology, material culture studies, and cultural studies. Interpretive connotations around and beyond the object, the unstable terrain of interrelationships between sociality and materiality, and the cultural constitution of objects. Sources include: works by Marx, Hegel, and Mauss; classic Pacific ethnographies of exchange, circulation, alienability, and fetishism; and material culture studies.

5 units, Win (Meskell, L)

ANTHRO 135. Cultural Studies

(Same as ANTHRO 235) Identity, community, and culture; their interactions and formation. GER:DB-SocSci

5 units, not given this year

ANTHRO 135H. CSRE House Seminar: Race and Ethnicity at Stanford

(Same as CSRE 135H) Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.

1-2 units, Aut (Wilcox, M)

ANTHRO 135I. CSRE House Seminar: Race and Ethnicity at Stanford

(Same as CSRE 135I) Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.

1-2 units, Win (Wilcox, M)

ANTHRO 139. Ethnography of Africa

(Same as ANTHRO 239) The politics of producing knowledge in and about Africa through the genre of ethnography, from the colonial era to the present. The politics of writing and the ethics of social imagination. Sources include novels juxtaposed to ethnographies. GER:DB-SocSci

5 units, not given this year

ANTHRO 140A. Ethnographic Archaeologies

(Same as ANTHRO 240A, ARCHLGY 137) How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

4-5 units, Spr (Staff)

ANTHRO 147. Nature, Culture, Heritage

(Same as ANTHRO 247) Seminar. Shared histories of natural and cultural heritage and their subsequent trajectories into the present. How thought about archaeological sites and natural landscapes have undergone transformations due to factors including indigenous rights, green politics, and international tourism. The development of key ideas including conservation, wilderness, sustainability, indigenous knowledge, non-renewability and diversity. Case studies draw on cultural and natural sites from Africa, the Americas and Australia.

5 units, Win (Staff)

ANTHRO 147A. Folklore, Mythology, and Islam in Central Asia

Central Asian cults, myths, and beliefs from ancient time to modernity. Life crisis rites, magic ceremonies, songs, tales, narratives, taboos associated with childbirth, marriage, folk medicine, and calendrical transitions. The nature and the place of the shaman in the region. Sources include music from the fieldwork of the instructor and the Kyrgyz epoch Manas. The cultural universe of Central Asian peoples as a symbol of their modern outlook. GER:DB-SocSci

3-5 units, Spr (Kunanbaeva, A)

ANTHRO 148. Health, Politics, and Culture of Modern China

(Same as ANTHRO 248) One of the most generative regions for medical anthropology inquiry in recent years has been Asia. This seminar is designed to introduce upper division undergraduates and graduate students to the methodological hurdles, representational challenges, and intellectual rewards of investigating the intersections of health, politics, and culture in contemporary China.

4-5 units, not given this year

ANTHRO 148A. Nomads of Eurasia: Culture in Transition

(Same as ANTHRO 248A) Traditional peoples of Central and Inner Asia; their lifestyles and cultural history. Modern research approaches and recent fieldwork data published mainly in Russian and Central Asian languages. Audio-visual materials.

5 units, Win (Kunanbaeva, A)

ANTHRO 150. Identity and Peoples of China

(Same as ANTHRO 250) Who is Chinese? Perspectives on being Chinese from Han and ethnic minorities in China, in Taiwan, and among overseas Chinese. Emphasis is on distinguishing forces

contributing to identity formation from ideological rhetoric about identity. (HEF I, IV) GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

ANTHRO 151. Women, Fertility, and Work

(Same as ANTHRO 251, HUMBIO 148W) How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places. GER:DB-SocSci, EC-Gender

5 units, not given this year

ANTHRO 152A. Urban Poverty and Inequality in Contemporary China

Experiences of poverty and inequality and their relationship to gender, space development, post-socialism, and globalization. How processes of class-making in China's cities are bound up with transformations in the country's sociopolitcal landscape.

5 units, not given this year

ANTHRO 153A. Japan's Postwar Cultural History

(Same as ANTHRO 253A) Cultural and social history of Japan since WWII. Falling birth rates, changing family structure, decreasing and then increasing divorce rates, coping with societal aging, expansion of higher education, solving new educational problems, increasing variability of work situation, introduction of foreign workers. Attention to the legacy of Tokugawa and pre-war Japan as antecedent to postwar developments.

3-5 units, Spr (Befu, H)

ANTHRO 161. Human Behavioral Ecology

(Same as ANTHRO 261) Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting. GER:DB-SocSci

3-5 units, not given this year

ANTHRO 161B. Human Ecology of the Amazon

(Same as ANTHRO 261B, LATINAM 202, LATINAM 302) The ecosystems of the Amazon and their human inhabitants. The biotic and abiotic factors shaping human adaptation to the region. Ethnographic literature used to explore subsistence patterns and the resource use of native Amazonians. Current changes in these economies and lifeways due to acculturation and market forces, and the implications for conservation.

5 units, not given this year

ANTHRO 162. Indigenous Peoples and Environmental Problems

(Same as ANTHRO 262) The social and cultural consequences of contemporary environmental problems. The impact of market economies, development efforts, and conservation projects on indigenous peoples, emphasizing Latin America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas. GER:DB-Hum, EC-GlobalCom

3-5 units, Spr (Durham, W; Hunt, C)

ANTHRO 163. Conservation and Evolutionary Ecology

(Same as ANTHRO 263) Environmental degradation resulting from human behavior, and what can be done about it. Patterns of interaction between people and environments, and why they vary over time and space. Topics include adaptation and behavior, resource acquisition and utilization, conflicts of interest, collective action problems, conspicuous consumption, waste, land management, and public policy. GER:DB-SocSci

5 units, not given this year

ANTHRO 164A. Anthropology of Ecotourism

Ecotourism has been touted as a win-win scenario for both biodiversity conservation and the well-being of local residents. In practice, these lofty ideals of ecotourism have proven difficult to implement. The rapid development of ecotourism over the last two decades. Focus is on the scholarly literature relating to ecotourism from both supporting and critical perspectives.

5 units, not given this year

ANTHRO 164B. Anthropology of Tourism

Multidisciplinary seminar. As the largest scale movement of goods, services, and people that humanity has ever seen, tourism is an immense phenomenon and is currently the world's most immense industry, reaching some of the most remote people and places on the planet. Yet scholars have only begun to focus on the topic in recent decades. Focus is on key anthropological and social science literature relating to tourism from both supporting and critical perspectives; however. Topics include emerging sub-types of tourism including sustainable tourism, ecotourism, agritourism, and geotourism.

5 units, Win (Hunt, C)

ANTHRO 165. Parks and Peoples: The Benefits and Costs of Protected Area Conservation

Seminar. Emphasis is on the social impact of parks and reserves. Integrated conservation and development projects (ICDPs) based on protected areas; alternative ways to derive local social benefits from them. Cases include Yellowstone, Manu, Galápagos, Ngorongoro, and Guanacaste.

5 units, not given this year

ANTHRO 165A. People and Parks: Management of Protected Areas

As resources become scarcer, parks increasingly serve as ideological battlegrounds for contested core human values and often put livelihoods at stake. Their historical development and the complex array of present-day issues associated with the formal protection of biodiversity. The ideas behind parks and the evolution of these ideas.

5 units, not given this year

ANTHRO 166. Political Ecology of Tropical Land Use: Conservation, Natural Resource Extraction, and Agribusiness

(Same as ANTHRO 266) Seminar. The state, private sector, development agencies, and NGOs in development and conservation of tropical land use. Focus is on the socioeconomic and political drivers of resource extraction and agricultural production. Case studies used to examine the local-to-global context from many disciplines. Are maps and analyses used for gain, visibility, accountability, or contested terrain? How are power dynamics, land use history, state-private sector collusion, and neoliberal policies valued? What are the local and extra-local responses? Prerequisite: consent of instructor.

3 units, Win (Curran, L)

ANTHRO 167. Signaling Theory

(Same as ANTHRO 267) (Graduate students register for 267.) Why does the peacock have such a large elaborate tail? Why does conspicuous consumption serve to create markers of distinction? How does the pursuit of social capital generate prestige? Answers to these questions from convergent scholarship in social theory, economic theory, and evolutionary theory. The use of signaling theory to explain disparate social and material phenomena. Authors include Veblen, Bourdieu, and Zahavi. Prerequisite for undergraduates: consent of instructor.

3 units, not given this year

ANTHRO 168A. Risky Environments: The Nature of Disaster

(Same as ANTHRO 268A) This seminar explores topics including environmental movements and countercultures, human agency and geoengineering ecotourism, and indigenous perspectives of changing climates to query how humans view `nature¿ in terms of stability, instability, risk and disaster in the 21st century. Case studies draw upon a broad range of geographical regions including the Arctic, Iceland, Australia, and the Americas. Discussions will draw upon film portrayals and interviews with researchers in addition to readings.

5 units, Win (Staff)

ANTHRO 171. The Biology and Evolution of Language

(Same as ANTHRO 271, HUMBIO 145L) Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and the evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language centers in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory. GER:DB-NatSci

4-5 units, not given this year

ANTHRO 173. Human Dimensions of Global Environmental Change: Resilence, Vulnerability, and Environmental Justice
(Same as HUMBIO 111) The complexity of social and political issues surrounding global environmental change. Emphasis is on synergies precipitated by human-induced climatic change. Case studies and scenarios to explore the vulnerability and resilience in households, communities, regions, and nationmstates most affected by extreme weather conditions. Their concerns, livelihood changes, and diverse responses of rural smallholders, indigenous communities, the state, and local and regional migrants. Central theme is environmental justice.
3 units, Spr (Curran, L)

ANTHRO 174. Beginnings of Social Complexity
(Same as ANTHRO 274) Models and examples of the social evolution of stratification and political centralization in prehistoric human societies. Inferences from the archaeological record concerning the forces and mechanisms behind the rise and fall of complex societies, particularly in S. America. (HEF II; DA-B)
5 units, not given this year

ANTHRO 177. Environmental Change and Emerging Infectious Diseases
(Same as ANTHRO 277, HUMBIO 114) The changing epidemiological environment. How human-induced environmental changes, such as global warming, deforestation and land-use conversion, urbanization, international commerce, and human migration, are altering the ecology of infectious disease transmission, and promoting their re-emergence as a global public health threat. Case studies of malaria, cholera, hantavirus, plague, and HIV. GER:DB-SocSci
3-5 units, Aut (Durham, W; Jones, J)

ANTHRO 179. Cultures of Disease: Cancer
History, politics, science, and anthropology of cancer; political and economic issues of disease and health care in the U.S., including the ethics and economics of health care provision, the pharmaceutical industry, carcinogen production, and research priorities.
5 units, not given this year

ANTHRO 180. Science, Technology, and Gender
Why is engineering often seen as a masculine profession? What have women's experiences been in entering fields of science and technology? How has gender been defined by scientists? Issues: the struggles of women in science to negotiate misogyny and cultural expectation (marriage, children), reproductive issues (surrogate motherhood, visual representations of the fetus, fetal surgery, breast feeding, childbirth practices), how the household became a site of consumerism and technology, and the cultural issues at stake as women join the ranks of scientists. GER:DB-SocSci, EC-Gender
3-5 units, not given this year

ANTHRO 181. Culture and Madness: Anthropological Approaches to Psychiatric Illness
(Same as ANTHRO 281, HUMBIO 146) Interdisciplinary. Culture and social context on the identification, course, and outcome of psychiatric illness. What is known from psychiatry about the nature of illness as a biomedical process and from anthropology about the life course of illness within particular settings. Prerequisite: Human Biology core or equivalent or consent of instructor.
3-5 units, not given this year

ANTHRO 181A. Gender in the Middle East: Iran, Turkey, and Egypt
This course explores the construction of gender in the Middle East. Drawing on the historical, sociological and anthropological research in the region, the course aims to question the stereotypes about the subordination of Muslim women and to offer students a systematic reading and analytical discussion of the political, economic and cultural structures that inform gender relations and practices in the region. The course starts with an examination of early Islam and religious sources with regard to women¿s status, then moves on to nationalist and modernization movements in the 19th and 20th centuries, and finally explores women¿s and men¿s lives in contemporary Egypt, Turkey and Iran. In this framework, we will pay special attention to Islamist mobilizations, family and sexual relations, as well as women's changing livelihoods and labor.
3 units, Spr (Staff)

ANTHRO 182. An Anthropology of Annihilation: Tobacco at the Turn of the Millenium
The cigarette as the world's greatest weapon of mass destruction: 100 million dead worldwide from cigarettes during the 20th century, one billion expected to die in the 21st century. How to understand this toll, its production, management, politicization, and depoliticization? What can anthropological and allied perspectives disclose? How does the catastrophe challenge key precepts within anthropology and other branches of the academy?
3-5 units, Win (Kohrman, M)

ANTHRO 185A. Race and Biomedicine
(Same as ASNAMST 185A) Race, identity, culture, biology, and political power in biomedicine. Biological theories of racial ordering, sexuality and the medicalization of group difference. Sources include ethnography, film, and biomedical literature. Topics include colonial history and medicine, the politics of racial categorization in biomedical research, the protection of human subjects and research ethics, immigration health and citizenship, race-based models in health disparities research and policy, and recent developments in human genetic variation research.
3-5 units, Aut (Lee, S)

GRADUATE COURSES IN ANTHROPOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ANTHRO 201. Introduction to Cultural and Social Anthropology
(Same as ANTHRO 1) Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.
5 units, Win (Yanagisako, S), Sum (Roque, A)

ANTHRO 202A. Ancient Civilizations: Complexity and Collapse
(Same as ANTHRO 102A) How archaeology contributes to understanding prehistoric civilizations. How and why complex social institutions arose, and the conditions and processes behind their collapse. The development of monumental architecture, craft specialization, trade and exchange, and social stratification using examples from the archaeological record. (HEF II, III; DA-B)
3-5 units, Aut (Truncer, J)

ANTHRO 205. Ancient Cities in the New World
(Same as ANTHRO 105) Preindustrial urbanism as exemplified by prehispanic New World societies. Case studies: the central and southern highlands of Mesoamerica, and the Maya region. Comparative material from highland S. America.
3-5 units, Win (Robertson, I)

ANTHRO 206. Human Origins
(Same as ANTHRO 6, HUMBIO 6) The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them.
5 units, not given this year

ANTHRO 206A. Incas and their Ancestors: Peruvian Archaeology
(Same as ANTHRO 106, ARCHLGY 102B) The development of high civilizations in Andean S. America from hunter-gatherer origins to the powerful, expansive Inca empire. The contrasting ecologies of coast, sierra, and jungle areas of early Peruvian societies from 12,000 to 2,000 B.C.E. The domestication of indigenous plants which provided the economic foundation for monumental cities, ceramics, and textiles. Cultural evolution, and why and how major transformations occurred. (HEF II, III; DA-B)
3-5 units, Win (Rick, J)

ANTHRO 209. Archaeology: World Cultural Heritage
(Same as ANTHRO 109) Focus is on issues dealing with rights to land and the past on a global scale including conflicts and ethnic purges in the Middle East, the Balkans, Afghanistan, India, Australia, and the Americas. How should world cultural heritage be managed? Who defines what past and which sites and monuments

should be saved and protected? Are existing international agreements adequate? How can tourism be balanced against indigenous rights and the protection of the past?

5 units, not given this year

ANTHRO 210. Examining Ethnographies

Eight or nine important ethnographies, including their construction, their impact, and their faults and virtues.

5 units, not given this year

ANTHRO 210A. Neandertals and Modern Humans: Origin, Evolution, Interactions

(Same as ANTHRO 110A) The expansion out of Africa of our species represents the last spectacular step in the course of Human Evolution. It resulted in the colonization of the whole planet and the replacement of archaic forms of humans in Eurasia. One way to investigate why Homo sapiens has been such a successful species is to compare its evolution with that of its closest relative, the Neandertals. Exploring the bio-cultural processes at work in the two lineages leads to examine some of the main issues in Paleoanthropology and the most recent methodological advances in the field.

3 units, Win (Hublin, J)

ANTHRO 211. Archaeology of Sex, Sexuality, and Gender

(Same as ANTHRO 111) How archaeologists study sex, sexuality, and gender through the material remains left behind by past cultures and communities. Theoretical and methodological issues; case studies from prehistoric and historic archaeology.

5 units, not given this year

ANTHRO 213. Faunal Analysis: Animal Remains for the Archaeologist

(Same as ANTHRO 113, BIO 166, BIO 266) The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodoloigcal issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

5 units, Spr (Klein, R)

ANTHRO 214. Prehistoric Stone Tools: Technology and Analysis

(Same as ANTHRO 114) Archaeologists rely on an understanding of stone tools to trace much of what we know about prehistoric societies. How to make, illustrate, and analyze stone tools, revealing the method and theory intrinsic to these artifacts.

5 units, Spr (Robertson, I)

ANTHRO 216. Quantitative Data Analysis on Archeological and Anthropological Research

(Same as ANTHRO 116) This course allows graduate and advanced undergraduate students in archaeology and anthropology to acquire practical skills in quantitative data analysis. Some familiarity with basic statistical methods is useful but not assumed; the structure of the course will be flexible enough to accommodate a range of student expertise and interests. Topics covered include: statistics and graphics in R; database design, resampling methods, diversity measures, contingency table analysis, and introductory methods in spatial analysis.

5 units, Spr (Robertson, I)

ANTHRO 221. Language and Prehistory

(Same as ANTHRO 121) Language classification and its implications for human prehistory. The role of linguistic data in analyzing prehistoric populations, cultures, contact, and migrations. Comparison of linguistic and biological classifications. Reconstruction, proto-vocabularies, and culture. Archaeological decipherment and the origins and evolution of writing. Archaeological and genetic evidence for human migrations. (DA-A; HEF II,III)

3-5 units, not given this year

ANTHRO 223. Readings in Linguistic Anthropology

(Same as ANTHRO 123) One or two major related works on language in its cultural context. Works for 2007-08 involve attempts to correlate linguistic and non-linguistic data for analysis of prehistoric human contact and migrations. May be repeated for credit.

2 units, not given this year

ANTHRO 230B. Introduction to GIS in Anthropology

(Same as ANTHRO 130B) How GIS and spatial tools can be applied in social research. Case studies and student projects address questions of social and cultural relevance using real data sets, including the collection of geospatial data and building of spatial evidence. Analytical approaches and how they can shape a social and cultural interpretation of space and place.

5 units, not given this year

ANTHRO 230D. Spatial Approaches to Social Science

(Same as ANTHRO 130D, POLISCI 241S) This multidisciplinary course combines different approaches to how GIS and spatial tools can be applied in social science research. We take a collaborative, project oriented approach to bring together technical expertise and substantive applications from several social science disciplines. The course aims to integrate tools, methods, and current debates in social science research and will enable students to engage in critical spatial research and a multidisciplinary dialogue around geographic space.

5 units, Win (Rodden, J; Engel, C)

ANTHRO 231. The Politics of Humanitarianism

(Same as ANTHRO 131) Anthropological approaches to contemporary practices of humanitarian intervention. How social theory can inform the politics of humanitarianism, charity, and philanthropy. Focus is on Africa from the colonial era to the present.

5 units, not given this year

ANTHRO 234. Object Lessons

(Same as ANTHRO 134) Human-object relations in the processes of world making. Objectification and materiality through ethnography, archaeology, material culture studies, and cultural studies. Interpretive connotations around and beyond the object, the unstable terrain of interrelationships between sociality and materiality, and the cultural constitution of objects. Sources include: works by Marx, Hegel, and Mauss; classic Pacific ethnographies of exchange, circulation, alienability, and fetishism; and material culture studies.

5 units, Win (Meskell, L)

ANTHRO 235. Cultural Studies

(Same as ANTHRO 135) Identity, community, and culture; their interactions and formation.

5 units, not given this year

ANTHRO 239. Ethnography of Africa

(Same as ANTHRO 139) The politics of producing knowledge in and about Africa through the genre of ethnography, from the colonial era to the present. The politics of writing and the ethics of social imagination. Sources include novels juxtaposed to ethnographies.

5 units, not given this year

ANTHRO 240A. Ethnographic Archaeologies

(Same as ANTHRO 140A, ARCHLGY 137) How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

4-5 units, Spr (Staff)

ANTHRO 247. Nature, Culture, Heritage

(Same as ANTHRO 147) Seminar. Shared histories of natural and cultural heritage and their subsequent trajectories into the present. How thought about archaeological sites and natural landscapes have undergone transformations due to factors including indigenous rights, green politics, and international tourism. The development of key ideas including conservation, wilderness, sustainability, indigenous knowledge, non-renewability and diversity. Case studies draw on cultural and natural sites from Africa, the Americas and Australia.

5 units, Win (Staff)

ANTHRO 248. Health, Politics, and Culture of Modern China

(Same as ANTHRO 148) One of the most generative regions for medical anthropology inquiry in recent years has been Asia. This seminar is designed to introduce upper division undergraduates and graduate students to the methodological hurdles, representational challenges, and intellectual rewards of investigating the intersections of health, politics, and culture in contemporary China.

4-5 units, not given this year

ANTHRO 248A. Nomads of Eurasia: Culture in Transition

(Same as ANTHRO 148A) Traditional peoples of Central and Inner Asia; their lifestyles and cultural history. Modern research approaches and recent fieldwork data published mainly in Russian and Central Asian languages. Audio-visual materials.

5 units, Win (Kunanbaeva, A)

ANTHRO 250. Identity and Peoples of China
(Same as ANTHRO 150) Who is Chinese? Perspectives on being Chinese from Han and ethnic minorities in China, in Taiwan, and among overseas Chinese. Emphasis is on distinguishing forces contributing to identity formation from ideological rhetoric about identity. (HEF I, IV)
5 units, not given this year

ANTHRO 251. Women, Fertility, and Work
(Same as ANTHRO 151, HUMBIO 148W) How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places.
5 units, not given this year

ANTHRO 253A. Japan's Postwar Cultural History
(Same as ANTHRO 153A) Cultural and social history of Japan since WWII. Falling birth rates, changing family structure, decreasing and then increasing divorce rates, coping with societal aging, expansion of higher education, solving new educational problems, increasing variability of work situation, introduction of foreign workers. Attention to the legacy of Tokugawa and pre-war Japan as antecedent to postwar developments.
3-5 units, Spr (Befu, H)

ANTHRO 261. Human Behavioral Ecology
(Same as ANTHRO 161) Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting.
3-5 units, not given this year

ANTHRO 261B. Human Ecology of the Amazon
(Same as ANTHRO 161B, LATINAM 202, LATINAM 302) The ecosystems of the Amazon and their human inhabitants. The biotic and abiotic factors shaping human adaptation to the region. Ethnographic literature used to explore subsistence patterns and the resource use of native Amazonians. Current changes in these economies and lifeways due to acculturation and market forces, and the implications for conservation.
5 units, not given this year

ANTHRO 262. Indigenous Peoples and Environmental Problems
(Same as ANTHRO 162) The social and cultural consequences of contemporary environmental problems. The impact of market economies, development efforts, and conservation projects on indigenous peoples, emphasizing Latin America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas.
3-5 units, Spr (Durham, W; Hunt, C)

ANTHRO 263. Conservation and Evolutionary Ecology
(Same as ANTHRO 163) Environmental degradation resulting from human behavior, and what can be done about it. Patterns of interaction between people and environments, and why they vary over time and space. Topics include adaptation and behavior, resource acquisition and utilization, conflicts of interest, collective action problems, conspicuous consumption, waste, land management, and public policy.
5 units, not given this year

ANTHRO 266. Political Ecology of Tropical Land Use: Conservation, Natural Resource Extraction, and Agribusiness
(Same as ANTHRO 166) Seminar. The state, private sector, development agencies, and NGOs in development and conservation of tropical land use. Focus is on the socioeconomic and political drivers of resource extraction and agricultural production. Case studies used to examine the local-to-global context from many disciplines. Are maps and analyses used for gain, visibility, accountability, or contested terrain? How are power dynamics, land use history, state-private sector collusion, and neoliberal policies valued? What are the local and extra-local responses? Prerequisite: consent of instructor.
3 units, Win (Curran, L)

ANTHRO 267. Signaling Theory
(Same as ANTHRO 167) (Graduate students register for 267.) Why does the peacock have such a large elaborate tail? Why does conspicuous consumption serve to create markers of distinction? How does the pursuit of social capital generate prestige? Answers to these questions from convergent scholarship in social theory, economic theory, and evolutionary theory. The use of signaling theory to explain disparate social and material phenomena. Authors include Veblen, Bourdieu, and Zahavi.
3 units, not given this year

ANTHRO 268A. Risky Environments: The Nature of Disaster
(Same as ANTHRO 168A) This seminar explores topics including environmental movements and countercultures, human agency and geoengineering ecotourism, and indigenous perspectives of changing climates to query how humans view `nature¿ in terms of stability, instability, risk and disaster in the 21st century. Case studies draw upon a broad range of geographical regions including the Arctic, Iceland, Australia, and the Americas. Discussions will draw upon film portrayals and interviews with researchers in addition to readings.
5 units, Win (Staff)

ANTHRO 271. The Biology and Evolution of Language
(Same as ANTHRO 171, HUMBIO 145L) Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and the evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language centers in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.
4-5 units, not given this year

ANTHRO 274. Beginnings of Social Complexity
(Same as ANTHRO 174) Models and examples of the social evolution of stratification and political centralization in prehistoric human societies. Inferences from the archaeological record concerning the forces and mechanisms behind the rise and fall of complex societies, particularly in S. America. (HEF II; DA-B)
5 units, not given this year

ANTHRO 277. Japanese Society and Culture
(Same as ANTHRO 77) Focus is on power, identity, and the politics of knowledge production. How transnational interactions influence Japanese identity. How anthropological knowledge has contributed to understanding Japanese culture and society. Gender, race and class; contemporary ethnographies. Modernity and globalization. Cultural politics, domestic work, labor management, city planning, ad images, anime, martial art, fashion, theater, leisure, and tourism.
5 units, not given this year

ANTHRO 277. Environmental Change and Emerging Infectious Diseases
(Same as ANTHRO 177, HUMBIO 114) The changing epidemiological environment. How human-induced environmental changes, such as global warming, deforestation and land-use conversion, urbanization, international commerce, and human migration, are altering the ecology of infectious disease transmission, and promoting their re-emergence as a global public health threat. Case studies of malaria, cholera, hantavirus, plague, and HIV.
3-5 units, Aut (Durham, W; Jones, J)

ANTHRO 281. Culture and Madness: Anthropological Approaches to Psychiatric Illness
(Same as ANTHRO 181, HUMBIO 146) Interdisciplinary. Culture and social context on the identification, course, and outcome of psychiatric illness. What is known from psychiatry about the nature of illness as a biomedical process and from anthropology about the life course of illness within particular settings. Prerequisite: Human Biology core or equivalent or consent of instructor.
3-5 units, not given this year

ANTHRO 282. Medical Anthropology
(Same as ANTHRO 82) Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science.
5 units, Aut (Jain, S)

ANTHRO 290A. Advanced Social Theory in the Anthropological Sciences
Social theories that have influenced anthropology including evolutionism, Marxism, interpretivism, and postmodernism. Implications of debates among theorists for anthropological research.
5 units, not given this year

ANTHRO 293B. Master's Thesis Writing Seminar
May be repeated for credit.
2-4 units, Win (Staff)

ANTHRO 295. Research in Anthropological Sciences
Supervised work with an individual faculty member on the student research project. May be taken for more than one quarter.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 298B. Digital Methods in Archaeology
(Same as ANTHRO 98B) This is a course on digital technologies in archaeology used for documentation, visualization, and analysis of archaeological spaces and objects. Emphasizes hands-on approaches to image manipulation, virtual reality, GIS, CAD, and photogrammetry modeling methods.
3-5 units, Win (Rick, J)

ANTHRO 299. Directed Individual Study
Prerequisite: consent of instructor.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 300. Reading Theory Through Ethnography
Required of and restricted to first-year ANTHRO Ph.D. students. Focus is on contemporary ethnography and related cultural and social theories generated by texts. Topics include agency, resistance, and identity formation, and discourse analysis. Prerequisite: consent of instructor.
5 units, Win (Ebron, P)

ANTHRO 301. History of Anthropological Theory
Required of Anthropology Ph.D. students. The history of cultural and social anthropology in relation to historical and national contexts and key theoretical and methodological issues as these inform contemporary theory and practices of the discipline. Enrollment limited to 15. Prerequisite: consent of instructor.
5 units, Aut (Inoue, M)

ANTHRO 302. Theory and History of Evolution and Ecology
Evolutionary and ecological theory from the 19th century to present. Theory and concepts from evolution and ecology, emphasizing an-thropological applications. Evolutionary theories of human behavior, culture, and societies. Ecological theory behind carrying capacity, sustainable yield, and population growth. Emphasis is on tools of analysis and formulating research questions in anthropology today. Upper division undergrads require consent of instructor.
5 units, Win (Bird, R)

ANTHRO 303. Introduction to Archaeological Theory
The history of archaeological thought emphasizing recent debates. Evolutionary theories, behavioral archaeology, processual and cognitive archaeology, and approaches termed feminist and post-processual archaeology in the context of wider debate in adjacent disciplines. The application and integration of theory on archaeological problems and issues. Prerequisite: consent of instructor.
5 units, Win (Hodder, I)

ANTHRO 304. Data Analysis for Quantitative Research
Univariate, multivariate, and graphical methods used for analyzing quantitative data in anthropological research. Archaeological and paleobiological examples. Recommended: algebra. Prerequisite: consent of instructor.
5 units, Spr (Jones, J)

ANTHRO 306. Anthropological Research Methods
Required of ANTHRO Ph.D. students; open to all graduate students. Research methods and modes of evidence building in ethnographic research. Enrollment limited to 10. Prerequisite: consent of instructor.
5 units, Spr (Yanagisako, S)

ANTHRO 307. Archaeological Methods and Research Design
Methodological aspects of field and laboratory practice from traditional archaeological methods to the latest interdisciplinary analytical techniques. The nature of archaeological data and inference; interpretive potential of these techniques. Prerequisite: consent of instructor.
5 units, Spr (Hodder, I)

ANTHRO 308. Proposal Writing Seminar
Required of second-year Ph.D. students in the culture and society track. The conceptualization of dissertation research problems, the theories behind them, and the methods for exploring them. Participants draft a research prospectus suitable for a dissertation proposal and research grant applications. Limited enrollment. Prerequisite: consent of instructor.
5 units, Spr (Kohrman, M)

ANTHRO 309. Advanced Evolutionary Theory in Anthropological Sciences
History of evolutionary theory from the 19th century to present, emphasizing anthropological applications. Theory and concept in evolutionary biology; evolutionary theories of culture; and interactions of genetic, social, and cultural evolution and their implications. Emphasis is on tools of analysis and the value of evolutionary thinking for formulating research questions in anthropology today. Prerequisite: graduate standing or consent of instructor. (HEF II, III)
5 units, not given this year

ANTHRO 310C. Intersections
Themes of materiality and visuality, aesthetic and other forms of cultural production, and the meanings of creativity and convention. Ethnographic and archaeological material and case studies from worldwide cultural contexts. Prerequisite: consent of instructor.
5 units, not given this year

ANTHRO 310G. Introduction to Graduate Studies
Required graduate seminar. The history of anthropological theory and key theoretical and methodological issues of the discipline. Prerequisite: consent of instructor.
2 units, Aut (Yanagisako, S)

ANTHRO 311. Ethnographic Writing
For graduate students writing or planning to write a dissertation using ethnographic methods. The choices made by the authors of ethnographies in constructing an argument, using data and speaking to an audience of readers. Readings include chapters written by class members currently writing dissertations. Prerequisite: consent of instructor.
3-5 units, not given this year

ANTHRO 311G. Introduction to Culture and Society Graduate Studies in Anthropology
Required graduate seminar for CS track. The history of anthropological theory and key theoretical and methodological issues in cultural anthropology. Prerequistes: for 1st year PhD students in the cultural and society track or by permission of the instructor.
1-3 units, Win (Yanagisako, S), Spr (Ferguson, J)

ANTHRO 320A. Race, Ethnicity, and Language
(Same as EDUC 389X, LINGUIST 253) Seminar. The linguistic construction of race and ethnicity across a wide variety of contexts and communities. The course takes a comparative perspective and highlights how different racial/ethnic formations participate in similar, yet different, ways of doing race though language, interaction and culture. Readings draw heavily from perspectives in linguistic anthropology and sociolinguistics.
3-4 units, Win (Alim, H)

ANTHRO 321. Reading Marx, Reading Weber
Advanced graduate seminar devoted to a critical reading of writings by two 19th-century social theorists who continue to shape anthropology and social analysis more broadly. Enrollment limited to12. No auditing. Prerequisites: graduate standing in Anthropology or consent of the instructor; and graduate level course work in cultural or social anthropology, social theory, or cultural studies.
5 units, Spr (Yanagisako, S)

ANTHRO 322. From Biopolitics to Necropolitics and Beyond
Scholarship produced and informed by Michel Foucault. Focus is on the final period of Foucault's life; how his discussions of biopolitics, subjectification, governmentality, and death have served as touchstones for recent empirical research. Key interventions initially made under these rubrics; how anthropologists and others have applied, challenged, and extended them. Prerequisite: consent of instructor.
5 units, Spr (Staff)

ANTHRO 324. Political Anthropology
An anthropological approach to politics through bringing anthropological ways of thinking and modes of analysis to bear on key

presuppositions of modern Western political thought. Ideas of rights, the individual, society, liberty, democracy, equality, and solidarity; ethnographic accounts used to identify the limits of conventional analytical approaches and to document the forms of politics that such approaches either ignore or misunderstand. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 326. Postcolonial and Indigenous Archaeologies
The role of postcolonial and Indigenous archaeologies as emergeant disciplinary activities within contemporary society. Community based archaeologies; the roles of oral history, landscape, and memory; archaeology as political action; and history in archaeological projects. The emergence of Indigenous archaeology within N. America in relation to limitations imposed by processual or new archaeology; and NAGPRA, Kennewick, essentialism, and terminal narratives within this context. Prerequisite: consent of instructor.

5 units, Win (Wilcox, M)

ANTHRO 327. Language and Political Economy
Theories of language: Saussure, Jakobson, Hymes, Marx, Foucault, Butler, and Derrida. The theorization of language in its linkages to power, social relations, and history. Prerequisites: Linguistics or Anthropology course work. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 331. The Anthropology of Technology
Iconic discipline-building works of the last three decades; readings that lay out and intervene in contemporary debates. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 332. Transformative Design
(Same as ENGR 231) Project-based. How interactive technologies can be designed to encourage behavioral transformation. Topics such as self-efficacy, social support, and mechanism of cultural change in domains such as weight-loss, energy conservation, or safe driving. Lab familiarizes students with hardware and software tools for interaction prototyping. Students teams create functional prototypes for self-selected problem domains. Prerequisite: consent of instructor.

3-5 units, not given this year

ANTHRO 333A. The Cultural Politics of Ambiguity
Contemporary conceptual approaches to understanding the politics and production of certainty, ambiguity, and doubt. The seemingly ambiguous nature of the science of industrial pollution and contamination exonerate corporate and government polluters from rising rates of cancer, while the science of liberal economic models seems to create no alternative to massive economic subsidies of the financial sector. How culpability, exoneration, transformative action, institutional stasis, and political rely on the production of certainty, ambiguity, and doubt. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 334. Trauma and Healing
This course considers class and recent work on culture and psychiatry with an emphasis on trauma. We consider work on the main diagnostic categories like depression and schizophrenia, but also the work on dissociation, war combat, PTSD, and psychosis.

5 units, Win (Luhrmann, T)

ANTHRO 336. Anthropology of Rights
Ideas of rights at the center of contemporary politics around the world. An anthropological perspective on how rights are invoked, claimed, and translated into institutional policies in ethnographic cases. The limitations of liberal notions of rights and innovative forms of politics emerging within and against rights talk. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 337. The Politics of Humanitarianism
What does it mean to want to help, to organize humanitarian aid, in times of crisis? At first glance, the impulse to help issui generis a good one. Helping is surely preferable to indifference and inaction. This does not mean that humanitarian interventions entail no ethical ot political stakes ¿ or that they are beyond engaged critique. We need to critique precisely that which we value, and to ask some hard questions, among them these: What are the differences among humanitarianism, charity, and philanthropy? What of social obligations and solidarities? How does the neoliberal world order currently create structural inequalities that ensure the reproduction of poverty and violence? How does the current order of things resemble or differ from the colonial world order? This course examines the history of humanitarian sensibilities and the emergence of organized action in the ¿cause of humanity¿. In the early years of humanitarian intervention, political neutrality was a key principle;

5 units, Spr (Malkki, L)

ANTHRO 338A. Biohumanities: Continental Philosophy and the Human and Social Sciences
(Same as FRENGEN 338) This course will consider theoretical topics that arose in post-war continental philosophy (for example, Deleuze's ontology, Foucault's biopolitics, and Latour's collective of humans and non-humans) and which have served as a basis for recent attempts to reconcile the human and social sciences with the natural sciences around big picture questions (ecological crisis, biotechnological progress) and around such bridging concepts as human and non-human agency, assemblage, emergence, force, habitus, and mimicry. Focusing on case studies drawn from archaeology, anthropology, history, literature, film and bio-art, the course tries to indicate what sort of topics, research questions, approaches, theories, and concepts might lead to an integration of these various kinds of knowledges.

5 units, Spr (Domanska, E)

ANTHRO 339. Anthropology of Religion
This course presents classic and contemporary work on the anthropology of religion: Durkheim Elementary Forms of the Religious Life; Levy-Bruhl; Primitive Mentality; Douglas Purity and Danger; Evans Pritchard Nuer Religion; and recent ethnographies/scholarly work by Robbins, Keane, Keller, Boyer, Barrett, and others.

5 units, Aut (Staff)

ANTHRO 340. Topics in Linguistic Anthropology
Reading seminar; restricted to Anthropology graduate students. The anthropology of language and semiotics. Focus is on the limits of textualism, and alternative semiotic and epistemic bases for theorizing language and representation. No linguistic anthropology course work required. Prerequisite: consent of instructor.

5 units, Spr (Fox, J)

ANTHRO 343. Culture as Commodity
Focus is on theories of commodification, interests in tourism, national cultures as marketable objects, and how identities are constituted through production and consumption. The formation of global style and taste. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 344. Graphic Medicine
In this course students will study medical cultures through visual communication ranging from x-rays and PET scans to graphic novels. Course will also include literature on visual theory.

5 units, Aut (Jain, S)

ANTHRO 345. New Visions in Medical Anthropology
Recent experimental histories of the field. Emphasis is on how, working within anthropology's classic format, the ethnographic monograph, authors have innovatively responded to the challenges of representing amorphous, unspoken, and often violent relationships between the body and social change. The authors' expository techniques, and how they engage and extend theoretical debate. How to assess works within medical anthropology and its allied fields. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 346A. Sexuality Studies in Anthropology
Current research on sexuality from perspectives including paleoanthropology, archaeology, ethnography, and linguistic anthropology. Readings paired with case studies that explore theoretical and methodological issues. Prerequisite: consent of instructor.

5 units, Win (Voss, B)

ANTHRO 349. Anthropology of Capitalism
Issues in cultural theory and methodology through research on people who have greater material and cultural resources than those usually studied by anthropologists. How ideas about ideology, hegemony, identity, power, and practice are altered in studying those considered to be agents of power rather than the subaltern. Topics: global capitalism, masculinity, white racial subjectivity. Enrollment limited to 20. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 352. Foucault: The Question of Method
Foucault as methodological exemplar for historical and social research. Emphasis is on his historical studies of clinical medicine, prisons, and sexuality, and on applying his methods to empirical studies of topics such as colonialism, race, and liberal governmental rationality.

5 units, not given this year

ANTHRO 355. Cities in Global Perspective
Interdisciplinary approach to examining global cities. The concept of the global city, and the interdependent processes that help produce urban spaces. Situating the transformation of urban spaces within globalization and its differential effects; current explanatory frameworks that pay attention to multiple scales of spatial and economic articulation. Prerequisite: graduate standing.

5 units, Aut (Ebron, P)

ANTHRO 356. The Anthropology of Development
Multidisciplinary. Topics vary annually. Areas include Africa, S. Asia, and Latin America. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 357. Other Minds: Puzzles in Psychiatric and Psychological Anthropology
Problems in the way anthropologists explore other minds anthropologically and the ways in which anthropologists seek to understand the models of other minds held by the people observed. Topics include theory of mind, witchcraft, belief, empathy, psychosis, trauma, Freud, Vygotsky, and cognitive dissonance. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 362. Human Spatial Dynamics: Seminar in Communicating Contemporary Science
This seminar is designed to bring together all students and faculty currently working on issues related to human use of land and spatially defined resources. The focus is to provide a forum for reporting on recent results and question development, providing students with vital skills in designing and communicating the results of research. Undergrads require consent of instructor.

5 units, Aut (Bird, R)

ANTHRO 362A. Introduction to Human Evolution, Ecology, Genetics, and Culture
Themes and topics of lasting heuristic value in the anthropological sciences. Combines the lecture content of 2A and 2B with a discussion section for graduate students. Must be taken in the Autumn Quarter of a student's first year in the graduate program.

5 units, not given this year

ANTHRO 363. Demography and Life History Theory
Problems in demography and theoretical population biology applied to human systems. Emphasis is on establishing relationships between models in theoretical population biology and empirical demographic methodology. Topics include philosophy of models and model building, population dynamics, stable population theory, species interactions in human ecology, models of infectious diseases and their control, cultural evolution. Prerequisites: HUMBIO 137 or consent of instructor.

5 units, not given this year

ANTHRO 364. EcoGroup: Current Topics in Ecological, Evolutionary, and Environmental Anthropology
Seminar; restricted to graduate students. Topics vary with instructor. How to ask appropriate questions, how to derive research hypotheses from theory, how to design methodologies for testing hypotheses, and how to present results by reading and critiquing key contemporary papers in the field. Ph.D. students enrolling in this course to fulfill the department review course requirement must enroll in 5 units. Graduate students enrolling in this course to participate in a topical forum may enroll in 2 units. Course may be repeated for 2 units. Prerequisites: by consent of instructor.

5 units, Aut (Bird, R)

ANTHRO 365. The Theory of the Modern Subject
This course traces the emergence of a coherent theory of the modern subject through readings of philosophical works and social theory from 18th century to the 20th centrury.

5 units, Win (Hansen, T)

ANTHRO 366. Paper Works
Seminar. Focus is on the emerging body of literature on the materiality of the production, circulation, and mediation of paperwork as constituitive of modern forms of governance. Genres of paperworks (notes, memos, files, documents, as well as archives and other mnemonic technologies) both as cultural practices and reflexive objects; how they produce modern social epistemologies of accountability, evidence, the fact, and truth in the fields of law, business, and public administration, as well as in civil society generally. Readings include Max Weber, Bruno Latour, Jacques Derrida, Michel Foucault, Cornelia Vismann, Ann Stoler.

5 units, Spr (Inoue, M)

ANTHRO 370. Advanced Theory and Method in Historical Archaeology
Current debates about theory and method. Prerequisite: consent of instructor.

5 units, Aut (Voss, B)

ANTHRO 371. Proposal Writing for Archaeologists
The craft of writing research and grant proposals. Focus is on proposals for archaeological fieldwork and laboratory research. Students prepare their own research proposals. Restricted to and required of second-year doctoral students in the Department of Anthropology, Archaeology concentration. Others require consent of instructor.

5 units, not given this year

ANTHRO 373. Things: An Archaeology of the Relationships Between Humans and Things
This course examines a variety of approaches that claim to explore the relationships between humans and things. Some of the approaches include Marx and material culture studies; Heidegger; cognitive and phenomenological; Actor Network Theory. But there is a need also to examine behavioral and ecological and Darwinian approaches. Many of these approaches do not adequately deal with the physicality of things as objects and there is a need to seek a way to incorporate such aspects of things into social theory.

5 units, Spr (Hodder, I)

ANTHRO 374. Archaeology of Colonialism/Postcolonialisms
Advanced graduate seminar focused on the archaeology of colonial and postcolonial contexts, both prehistoric and historic. Emphasis on intersections between archaeological research and and subaltern, postcolonial, and transnational feminist/queer theory. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 375. Archaeology and Globalism
The emergence of archaeology as a discipline in the context of the rise of the nation state. Global economies and other issues have created a new context for archaeology. How are archaeology and heritage responding? The idea of world heritage. The impact of postcolonialism. The commodification of the past: the past as theme park, as travel tourism or nostalgia, as exotic and other. Conflict between uses of the past for identity and as theme park; between heritage and resource or play. The impact of the Goddess, New Age, and other movements. Archaeology and human rights issues including forensic archaeology. Prerequisite: consent of instructor.

4-5 units, not given this year

ANTHRO 380. Practice and Performance: Bourdieu, Butler, Giddens, de Certeau
Poststructuralist theories of iteration and mimesis used by social scientists to negotiate the tension between social structure and social practice: Gidden's structuration theory; Bourdieu's practice theory; Butler's theories of gender performativity; and de Certeau's analysis of tactics and strategies. Ethnographic and archaeological case studies that employ methodologies inspired by these approaches. Intersections and contradictions between these theorists' work; their use in anthropological practice. Issues of gender, sexuality, and ethnicity. Prerequisite: consent of instructor.

5 units, not given this year

ANTHRO 380A. Topics in the Anthropology of China and Taiwan
Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

3-5 units, Aut (Brown, M)

ANTHRO 380B. Gender Bias in the Past and Future of Asia: Kinship & Society
Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

3-5 units, Win (Brown, M)

ANTHRO 380C. Gender Bias in the Past and Future of Asia: Governance
Topics vary. May be repeated for credit. Prerequisite: consent of instructor.
3-5 units, Spr (Brown, M)

ANTHRO 400. Dissertation Writers Seminar
Required of fifth-year Ph.D. students returning from dissertation field research and in the process of writing dissertations and preparing for professional employment.
1-3 units, Aut (Malkki, L), Win (Malkki, L), Spr (Malkki, L)

ANTHRO 401A. Qualifying Paper: Topic
Required of second- and third-year Ph.D. students writing the qualifying paper or the qualifying written examination.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 401B. Qualifying Paper: Area
Required of second- and third-year Ph.D. students writing the qualifying paper or the qualifying written examination. May be repeated for credit one time.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 440. Teaching Assistantship
Supervised experience as assistant in one undergraduate course.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 444. Anthropology Colloquium: Graduate Seminar
Required of first-year graduate students. The use of the scientific method in anthropological research. Published papers from subfields illustrate effective research design, the formulation and testing of hypotheses, and comparative methods. Field exercises in interviewing, observation, and taking and using field notes. The ethics of field research and procedures for maintaining physical and mental health in the field. May be repeated for credit.
1 unit, Aut (Yanagisako, S), Win (Yanagisako, S), Spr (Yanagisako, S)

ANTHRO 445. Anthropology Brown Bag Series
Current topics and trends in cultural and social anthropology, cultural archaeology, and archaeology.
1 unit, Aut (Yanagisako, S), Win (Yanagisako, S), Spr (Yanagisako, S)

ANTHRO 446A. Method of Analysis Program in the Social Sciences
(Same as COMM 310) Colloquium series. Creation and application of new methodological techniques for social science research. Presentations on methodologies of use for social scientists across departments at Stanford by guest speakers from Stanford and elsewhere. See http://mapss.stanford.edu.
1 unit, Aut (Jackman, S; Jones, J), Win (Jackman, S; Jones, J), Spr (Jackman, S; Jones, J)

ANTHRO 450. Research Apprenticeship
Supervised work on a research project with an individual faculty member. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 451. Directed Individual Study
Supervised work for a qualifying paper, examination, or project with an individual faculty member.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 452. Graduate Internship
Provides graduate students with the opportunity to pursue their area of specialization in an institutional setting such as a laboratory, clinic, research institute, or government agency.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

APPLIED PHYSICS (APPPHYS) COURSES

UNDERGRADUATE COURSES IN APPLIED PHYSICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

APPPHYS 78Q. Tools of Nanotechnology
(Stanford Introductory Seminar) Preference to sophomores. Topics include: current and future applications of nanotechnology, nanofabrication tools, nanoscale characterization and manipulation tools, scanning probe microscopy (SPM), Stanford nanotechnology research examples, hands-on activities, research lab tours. Prerequisite: high school physics. GER:DB-EngrAppSci
3 units, Aut (Beetz, T)

APPPHYS 79N. Energy Options for the 21st Century
(Stanford Introductory Seminar) Preference to freshmen. Choices for meeting the future energy needs of the U.S. and the world. Basic physics of energy sources, technologies that might be employed, and related public policy issues. Trade-offs and societal impacts of different energy sources. Policy options for making rational choices for a sustainable world energy economy. GER:DB-EngrAppSci
3 units, Aut (Fox, J; Geballe, T)

APPPHYS 136. Biology by the Numbers
(Same as BIOC 236) Skillbuilding in biological quantitative reasoning. Topics include: biological size scales from proteins to ecosystems; biological time scales from enzymatic catalysis and DNA replication to evolution; biological energy, motion, and force from molecular to organismic scales; mechanisms of environmental sensing from bacterial chemotaxis to vision. Prerequisite: Physics 21, 41, or consent of instructor.
3 units, not given this year

APPPHYS 192. Introductory Biophysics
(Same as APPPHYS 292) For advanced undergraduates or beginning graduate students. Quantitative models used in molecular biophysics. The relation of structure to function. Chemical equilibria, cooperativity, and control: elementary statistical mechanics, affinity plots, allostery, models of hemoglobin-oxygen binding, bacterial chemotaxis. Macromolecular conformations: polymer chain models, protein folding, taxonomy of globular proteins, general principles of sequence selection. Chemical kinetics. Multiple barriers: CO-myoglobin kinetics, ion diffusion through channels and ion selectivity, spectroscopy of ion channels-acetylcholine receptor. Supramolecular kinetics: conversion of chemical energy to mechanical force, myosin and kinesin, actin polymers. Nerve impulse propagation: membrane potentials, voltage sensitive ion gates, Hodgkin-Huxley equations, propagation of the nerve impulse.
3 units, alternate years, not given this year

GRADUATE COURSES IN APPLIED PHYSICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

APPPHYS 207. Laboratory Electronics
Lecture/lab emphasizing analog and digital electronics for lab research. RC and diode circuits. Transistors. Feedback and operational amplifiers. Active filters and circuits. Pulsed circuits, voltage regulators, and power circuits. Precision circuits, low-noise measurement, and noise reduction techniques. Circuit simulation tools. Analog signal processing techniques and modulation/demodulation. Principles of synchronous detection and applications of lock-in amplifiers. Common laboratory measurements and techniques illustrated via topical applications. Limited enrollment. Prerequisites: undergraduate device and circuit exposure.
3 units, Win (Fox, J)

APPPHYS 208. Laboratory Electronics
Lecture/lab emphasizing analog and digital electronics for lab research. Continuation of APPPHYS 207 with emphasis on appli-

cations of digital techniques. Combinatorial and synchronous digital circuits. Design using programmable logic. Analog/digital conversion. Microprocessors and real time programming, concepts and methods of digital signal processing techniques. Current lab interface protocols. Techniques commonly used for lab measurements. Development of student lab projects during the last three weeks. Limited enrollment. Prerequisites: undergraduate device and circuit exposure. Recommended: previous enrollment in APPPHYS 207.

3 units, alternate years, not given this year

APPPHYS 215. Numerical Methods for Physicists and Engineers

Review of basic numerical techniques with additional advanced material: derivatives and integrals; linear algebra; linear least squares fitting, FFT and wavelets, singular value decomposition, linear prediction; optimization, nonlinear least squares, maximum entropy methods; deterministic and stochastic differential equations, Monte Carlo methods.

3 units, not given this year

APPPHYS 216. X-Ray and VUV Physics

Research and classical concepts in photon science. Photon-electron interactions; x-ray absorption and Compton scattering. X-ray spectroscopy; EXAFS, SEXAFS, edge structure, magnetic circular dichroism, and linear dichroism. Photoemission spectroscopy and many-electron effects: angle-resolved and integrated photoemission, resonance photoemission, spin-polarized photoemission. Photoelectron diffraction and holography. X-ray interactions with condensed matter: diffraction and scattering. Photon sources: synchrotron, wigglers, and undulators. Photon and electron detectors and analyzers. Prerequisite: familiarity with quantum mechanics.

3 units, alternate years, not given this year

APPPHYS 217. Estimation and Control Methods for Applied Physics

Recursive filtering, parameter estimation, and feedback control methods based on linear and nonlinear state-space modeling. Topics in: dynamical systems theory; practical overview of stochastic differential equations; model reduction; and tradeoffs among performance, complexity, and robustness. Numerical implementations in MATLAB. Contemporary applications in systems biology and quantum precision measurement. Prerequisites: linear algebra and ordinary differential equations.

3 units, alternate years, not given this year

APPPHYS 219. Solid State Physics and the Energy Challenge

Technology issues for a secure energy future; role of solid state physics in energy technologies. Topics include the physics principles behind future technologies related to solar energy and solar cells, solid state lighting, superconductivity, solid state fuel cells and batteries, electrical energy storage, materials under extreme condition, nanomaterials.

3 units, Win (Shen, Z), alternate years, not given next year

APPPHYS 223. Stochastic and Nonlinear Dynamics

(Same as BIO 223) Theoretical analysis of dynamical processes: dynamical systems, stochastic processes, and spatiotemporal dynamics. Motivations and applications from biology and physics. Emphasis is on methods including qualitative approaches, asymptotics, and multiple scale analysis. Prerequisites: ordinary and partial differential equations, complex analysis, and probability or statistical physics.

3 units, alternate years, not given this year

APPPHYS 225. Probability and Quantum Mechanics

Structure of quantum theory emphasizing states, measurements, and probabilistic modeling. Generalized quantum measurement theory; parallels between classical and quantum probability; conditional expectation in the Schrödinger and Heisenberg pictures; covariance with respect to symmetry groups; reference frames and super-selection rules. Classical versus quantum correlations; nonlocal aspects of quantum probability; axiomatic approaches to interpretation. Prerequisites: undergraduate quantum mechanics, linear algebra, and basic probability and statistics.

3 units, alternate years, not given this year

APPPHYS 226. Physics of Quantum Information

Laws and concepts of quantum information science. Postulates of quantum mechanics: symmetrization postulate, quantum indistinguishability and multi-particle interference, commutation relation and quantum measurement, reduction postulate and impossibility of measuring, cloning and deleting a single wavefunction. Quantum information theory: von Neumann entropy, Holevo information and Schumacher data compression. Decoherence: Linbladian, quantum error correction, and purification of entanglement.

3 units, alternate years, not given this year

APPPHYS 227. Quantum Device Physics of Atomic and Semiconductor Systems

Concepts and constituent technologies of quantum information systems. Quantum cryptography: single photon and entangled photon-pair-based quantum key distributions, quantum teleportation, quantum repeater. Quantum computer: Deutsch-Josza algorithm, Grover algorithm, Shor algorithm, quantum simulation, quantum circuits. Quantum hardwares: atomic physics, nuclear magnetic resonance, spintronics and quantum optics.

3 units, Spr (Mabuchi, H; Yamamoto, Y), alternate years, not given next year

APPPHYS 232. Advanced Imaging Lab in Biophysics

(Same as BIO 132, BIO 232, BIOPHYS 232, MCP 232) Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.

4 units, Spr (Block, S; Smith, S; Stearns, T)

APPPHYS 270. Magnetism and Long Range Order in Solids

Cooperative effects in solids. Topics include the origin of magnetism in solids, crystal electric field effects and anisotropy, exchange, phase transitions and long-range order, ferromagnetism, antiferromagnetism, metamagnetism, density waves and superconductivity. Emphasis is on archetypal materials. Prerequisite: PHYSICS 172 or MATSCI 209, or equivalent introductory condensed matter physics course.

3 units, Aut (Fisher, I), alternate years, not given next year

APPPHYS 272. Solid State Physics I

The properties of solids. Theory of free electrons, classical and quantum. Crystal structure and methods of determination. Electron energy levels in a crystal: weak potential and tight-binding limits. Classification of solids: metals, semiconductors, and insulators. Types of bonding and cohesion in crystals. Lattice dynamics, phonon spectra, and thermal properties of harmonic crystals. Pre- or corequisites: PHYSICS 120 and 121; and PHYSICS 130 and 131, or equivalents.

3 units, Win (Reis, D)

APPPHYS 273. Solid State Physics II

Electronic structure of solids. Electron dynamics and transport. Semiconductors and impurity states. Surfaces. Dielectric properties of insulators. Electron-electron, electron-phonon, and phonon-phonon interactions. Anharmonic effects in crystals. Electronic states in magnetic fields and the quantum Hall effect. Magnetism, superconductivity, and related many-particle phenomena. Prerequisite: 272.

3 units, Spr (Kivelson, S)

APPPHYS 275. Probing the Nanoscale

Theory, operation, and applications of nanoprobes of interest in physics and materials science. Lectures by experts. Topics include scanning tunneling microscopy, spectroscopy, and potentiometry; atomic manipulation; scanning magnetic sensors and magnetic resonance; scanning field-effect gates; scanning force probes; and ultra-near-field optical scanning.

3 units, alternate years, not given this year

APPPHYS 280. Phenomenology of Superconductors

Phenomenology of superconductivity viewed as a macroscopic quantum phenomenon. Topics include the superconducting pair wave function, London and Ginzburg-Landau theories, the Josephson effect, type I type II superconductivity, and the response of superconductors to currents, magnetic fields, and RF electromagnetic radiation. Introduction to thermal fluctuation effects in superconductors and quantum superconductivity.

3 units, alternate years, not given this year

APPPHYS 290. Directed Studies in Applied Physics
Special studies under the direction of a faculty member for which academic credit may properly be allowed. May include lab work or directed reading.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

APPPHYS 291. Practical Training
Opportunity for practical training in industrial labs. Arranged by student with research adviser's approval. Summary of activities required.

3 units, Sum (Staff)

APPPHYS 292. Introductory Biophysics
(Same as APPPHYS 192) For advanced undergraduates or beginning graduate students. Quantitative models used in molecular biophysics. The relation of structure to function. Chemical equilibria, cooperativity, and control: elementary statistical mechanics, affinity plots, allostery, models of hemoglobin-oxygen binding, bacterial chemotaxis. Macromolecular conformations: polymer chain models, protein folding, taxonomy of globular proteins, general principles of sequence selection. Chemical kinetics. Multiple barriers: CO-myoglobin kinetics, ion diffusion through channels and ion selectivity, spectroscopy of ion channels-acetylcholine receptor. Supramolecular kinetics: conversion of chemical energy to mechanical force, myosin and kinesin, actin polymers. Nerve impulse propagation: membrane potentials, voltage sensitive ion gates, Hodgkin-Huxley equations, propagation of the nerve impulse.

3 units, alternate years, not given this year

APPPHYS 294. Cellular Biophysics
(Same as BIO 294) Physical biology of dynamical and mechanical processes in cells. Emphasis is on qualitative understanding of biological functions through quantitative analysis and simple mathematical models. Sensory transduction, signaling, adaptation, switches, molecular motors, actin and microtubules, motility, and circadian clocks. Prerequisites: differential equations and introductory statistical mechanics.

3 units, Spr (Fisher, D), alternate years, not given next year

APPPHYS 302. Experimental Techniques in Condensed Matter Physics
Cryogenics; low signal measurements and noise analysis; data collection and analysis; examples of current experiments. Prerequisites: PHYSICS 170, 171, and 172, or equivalents.

3 units, alternate years, not given this year

APPPHYS 304. Lasers Laboratory
Theory and practice. Theoretical and descriptive background for lab experiments, detectors and noise, and lasers (helium neon, beams and resonators, argon ion, cw dye, titanium sapphire, semiconductor diode, and the Nd:YAG). Measurements of laser threshold, gain, saturation, and output power levels. Laser transverse and axial modes, linewidth and tuning, Q-switching and modelocking. Limited enrollment. Prerequisites: EE 231 and 232, or consent of instructor.

3 units, Win (Byer, R)

APPPHYS 305. Nonlinear Optics Laboratory
Laser interaction with matter. Laser devices provide radiation to explore the linear and nonlinear properties of matter. Experiments on modulation, harmonic generation, parametric oscillators, modelocking, stimulated Raman and Brillouin scattering, coherent anti-Stokes scattering, other four-wave mixing interactions such as wavefront conjugation and optical bistability. Optical pumping and spectroscopy of atomic and molecular species. Limited enrollment. Prerequisites: 304, EE 231 and 232, or consent of instructor.

3 units, Spr (Byer, R)

APPPHYS 315. Methods in Computational Biology
Methods of bioinformatics and biomolecular modeling from the standpoint of biophysical chemistry. Methods of genome analysis; cluster analysis, phylogenetic trees, microarrays; protein, RNA and DNA structure and dynamics, structural and functional homology; protein-protein interactions and cellular networks; molecular dynamics methods using massively parallel algorithms.

3 units, Spr (Doniach, S), alternate years, not given next year

APPPHYS 324. Introduction to Accelerator Physics
Physics of particle beams in linear and circular accelerators. Transverse beam dynamics, acceleration, longitudinal beam dynamics, synchrotron radiation, free electron lasers, collective instabilities and nonlinear effects. Topics of current research in accelerator physics. Selected laboratory measurements at SLAC to augment the lecture material.

3 units, Aut (Ruth, R), alternate years, not given next year

APPPHYS 376. Literature of Cavity Quantum Electrodynamics
Historical development and contemporary frontiers of cavity quantum electrodynamics in the optical and microwave domains. Topics include effects of boundary conditions on spontaneous emission, development of strong coupling in experimental systems, fundamental theoretical models, linear and nonlinear phenomenology in the strong coupling regime, optical bistability, input-output theory, photon statistics and single-photon sources, and modern developments in circuit QED. Journal club format; student presentations.

3 units, alternate years, not given this year

APPPHYS 383. Introduction to Atomic Processes
Atomic spectroscopy, matrix elements using the Coulomb approximation, summary of Racah algebra, oscillator and line strengths, Einstein A coefficients. Radiative processes, Hamiltonian for two- and three-state systems, single- and multi-photon processes, linear and nonlinear susceptibilities, density matrix, brightness, detailed balance, and electromagnetically induced transparency. Inelastic collisions in the impact approximation, interaction potentials, Landau-Zener formulation. Continuum processes, Saha equilibrium, autoionization, and recombination.

3 units, Aut (Bucksbaum, P)

APPPHYS 387. Quantum Optics and Measurements
Basic concerns and fundamental postulates in quantum theory of measurements. Quantum non-demolition measurements, nonlinear measurements and continuous measurements. Non-local quantum correlation and Bell's inequality. Generation, detection, and application of single photons and entangled photon-pairs. Reservoir theory of an open dissipative system. Laser phase transition versus BCS transition in microcavities.

3 units, Win (Yamamoto, Y), alternate years, not given next year

APPPHYS 389. Boise-Einstein Condensation and Lasers
Topics include comparison of physics of Bose-Einstein Condensation (BEC) to physics of lasers, system differences and similarities between the quantum statistical properties of BEC and of lasers, BEC of non-interacting particles, Bogoliubov theory of interacting BEC and Gross-Pitaevskii equation, superfluidity and quantized vortices, quantum theory of laser, quantum noise and coherence functions, quantum correlation and squeezing.

3 units, alternate years, not given this year

APPPHYS 390. Dissertation Research

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

APPPHYS 470. Condensed Matter Seminar
Current research and literature; offered by faculty, students, and outside specialists. May be repeated for credit.

1 unit, Aut (Moler, K), Win (Moler, K), Spr (Moler, K)

APPPHYS 483. Optics and Electronics Seminar
Current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited outside speakers. May be repeated for credit.

1 unit, Aut (Byer, R), Win (Staff), Spr (Staff)

APPPHYS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ARCHAEOLOGY (ARCHLGY) COURSES

UNDERGRADUATE COURSES IN ARCHAEOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ARCHLGY 1. Introduction to Prehistoric Archeology
(Same as ANTHRO 3) Aims, methods, and data in the study of human society's development from early hunters through late prehistoric civilizations. Archaeological sites and remains characteristic of the stages of cultural development for selected geographic

areas, emphasizing methods of data collection and analysis appropriate to each. GER:DB-SocSci, EC-GlobalCom

3-5 units, Aut (Rick, J)

ARCHLGY 12. Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years

(Same as ANTHRO 18, EARTHSYS 21) Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis. GER:DB-SocSci

3-5 units, Aut (Bird, D)

ARCHLGY 99A. Historical Archaeology in the Archive, Lab, and Underground: Methods

The practice of historical archaeology through methodologies including archival research, oral history, material culture analysis, and archaeological excavation. Students use these methods to analyze the history and archaeology of a local park, the Thornewood Open Space Preserve.

5 units, not given this year

ARCHLGY 102B. Incas and their Ancestors: Peruvian Archaeology

(Same as ANTHRO 106, ANTHRO 206A) The development of high civilizations in Andean S. America from hunter-gatherer origins to the powerful, expansive Inca empire. The contrasting ecologies of coast, sierra, and jungle areas of early Peruvian societies from 12,000 to 2,000 B.C.E. The domestication of indigenous plants which provided the economic foundation for monumental cities, ceramics, and textiles. Cultural evolution, and why and how major transformations occurred. (HEF II, III; DA-B) GER:DB-SocSci, EC-GlobalCom

3-5 units, Win (Rick, J)

ARCHLGY 103. History of Archaeological Thought

(Same as ANTHRO 90A) Introduction to the history of archaeology and the forms that the discipline takes today, emphasizing developments and debates over the past five decades. Historical overview of culture, historical, processual and post-processual archaeology, and topics that illustrate the differences and similarities in these theoretical approaches.

5 units, Spr (Meskell, L)

ARCHLGY 104C. The Archaeology of Ancient China

(Same as ARCHLGY 304C) Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China.

5 units, not given this year

ARCHLGY 106A. Museums and Collections

(Same as ARCHLGY 306A) Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.

5 units, Spr (Newble, L)

ARCHLGY 107A. Archaeology as a Profession

(Same as ANTHRO 101A) Academic, contract, government, field, laboratory, museum, and heritage aspects of the profession.

5 units, Aut (Williams, B)

ARCHLGY 111. Emergence of Chinese Civilization from Caves to Palaces

(Same as CHINGEN 141, CHINGEN 241) Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.

3-4 units, Spr (Staff)

ARCHLGY 112. Roman Archaeolgy and Heritage: The Case of Tarragona (Spain) in The European Context

(Same as ARCHLGY 312) Tarragona (Tarraco) was one of the most important provincial capitals of the Roman Empire. Its well preserved monumental ruins served to build a mediaeval town. Today preserves an important archaeological set included in the list of the World Heritage by the UNESCO. Its archaeological research and the restoration of its monuments permit its use as a model to explain the modern tendencies in archaeological heritage management in Europe. Course objectives: to contextualize the archaeology of Tarragona in the European cultural historiography; to show its experience to build urban strategies and architectural projects to preserve and to give value to the archaeological heritage; and to explore how to make compatible the touristic use a monumental site, and the needs of modern development adapted to the lives of common people.

5 units, Spr (Staff)

ARCHLGY 115. Introduction to Archaeological Geophysical Prospection

(Same as ARCHLGY 315) The use of subsurface geophysical survey techniques is a fast-growing area in archaeological field work. Geophysical techniques commonly used which provide fast and non-invasive imaging of archaeological features. Focus is on a conceptual understanding of the geophysical processes behind these techniques. Techniques applied during hands-on, field-based acquisition with electrical resistivity, magnetic, electromagnetic induction, and ground penetrating radar instruments at local archaeological sites.

2-5 units, Aut (Crook, N)

ARCHLGY 117. Ceramics: Art and Science

(Same as CLASSART 114) From clay to culture. Design, technology, manufacture, and consumption of ceramics. Guest lecturers, site visits, and hands-on studio work.

3-5 units, Spr (Shanks, M)

ARCHLGY 119. Environmental Archaeology

Goals are to introduce undergraduates to methods of environmental archaeology, and to review key cases of past human actions affecting the environment and of human responses to environmental change. The main methods of paleoclimatic reconstruction, soil analysis and geomorphology, archaeobotany and zooarchaeology. Emphasis is on human actions affecting the environment and human responses to environmental change.

5 units, Win (Staff)

ARCHLGY 133. Landscape Archaeologies

(Same as ARCHLGY 333) People shape the world around them and are shaped by it. How is this essential interaction examined by archaeologists? And how can a meaningful engagement with space and place be discovered in the archaeological record? Landscape foundations, human ecology, typologies, perception and bodily experience, monuments, networks, settlement systems, political landscapes, frontiers, placelessness and mobility, place histories, and the effects of revolutionary advances in data collection and organization on how archaeologists and anthropologists approach spatial data and human interaction with space and landscape. Field exercises.

5 units, Spr (Staff)

ARCHLGY 137. Ethnographic Archaeologies

(Same as ANTHRO 140A, ANTHRO 240A) How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

4-5 units, Spr (Staff)

ARCHLGY 190. Archaeology Directed Reading/Independent Study

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ARCHLGY 199. Honors Independent Study

Independent study with honors faculty adviser.

5 units, Win (Staff), Spr (Staff)

ARCHLGY 201. Art and Archaeology of Korea
(Same as KORGEN 170, KORGEN 270) Introduction to art and archaeology of Korean peninsula and adjacent continental northeast Asia from Bronze Age to early twentieth century. Topics include archaeology of the proto-Three Kingdoms period, state formation and Sinicization, introduction of Buddhism and its development to the Unified Silla period, the sophisticated tastes of the Koryo aristocrats, and the literati culture of Choson.
3-5 units, Win (Staff)

GRADUATE COURSES IN ARCHAEOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ARCHLGY 302. Constructing National History in East Asian Archaeology
(Same as CHINLIT 218) Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.
2-4 units, Spr (Staff)

ARCHLGY 304C. The Archaeology of Ancient China
(Same as ARCHLGY 104C) Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China.
5 units, not given this year

ARCHLGY 306A. Museums and Collections
(Same as ARCHLGY 106A) Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.
5 units, Spr (Newble, L)

ARCHLGY 312. Roman Archaeolgy and Heritage: The Case of Tarragona (Spain) in The European Context
(Same as ARCHLGY 112) Tarragona (Tarraco) was one of the most important provincial capitals of the Roman Empire. Its well preserved monumental ruins served to build a mediaeval town. Today preserves an important archaeological set included in the list of the World Heritage by the UNESCO. Its archaeological research and the restoration of its monuments permit its use as a model to explain the modern tendencies in archaeological heritage management in Europe. Course objectives: to contextualize the archaeology of Tarragona in the European cultural historiography; to show its experience to build urban strategies and architectural projects to preserve and to give value to the archaeological heritage; and to explore how to make compatible the touristic use a monumental site, and the needs of modern development adapted to the lives of common people.
5 units, Spr (Staff)

ARCHLGY 315. Introduction to Archaeological Geophysical Prospection
(Same as ARCHLGY 115) The use of subsurface geophysical survey techniques is a fast-growing area in archaeological field work. Geophysical techniques commonly used which provide fast and non-invasive imaging of archaeological features. Focus is on a conceptual understanding of the geophysical processes behind these techniques. Techniques applied during hands-on, field-based acquisition with electrical resistivity, magnetic, electromagnetic induction, and ground penetrating radar instruments at local archaeological sites.
2-5 units, Aut (Crook, N)

ARCHLGY 333. LANDSCAPE ARCHAEOLOGIES
(Same as ARCHLGY 133) People shape the world around them and are shaped by it. How is this essential interaction examined by archaeologists? And how can a meaningful engagement with space and place be discovered in the archaeological record? Landscape foundations, human ecology, typologies, perception and bodily experience, monuments, networks, settlement systems, political landscapes, frontiers, placelessness and mobility, place histories, and the effects of revolutionary advances in data collection and organization on how archaeologists and anthropologists approach spatial data and human interaction with space and landscape will be discussed in lecture and seminar format and studied through field exercises.
5 units, Spr (Staff)

ART HISTORY (ARTHIST) COURSES

UNDERGRADUATE COURSES IN ART HISTORY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ARTHIST 1. Introduction to the Visual Arts
Multicultural rather than historical approach. WIM GER:DB-Hum, WIM
5 units, Aut (Marrinan, M)

ARTHIST 2. Asian Art and Culture
(Same as JAPANGEN 60) The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in architecture, painting, woodblock prints, sculpture, and in such forms as garden design and urban planning. GER:DB-Hum, EC-GlobalCom
5 units, alternate years, not given this year

ARTHIST 3. Introduction to the History of Architecture
From antiquity to the 20th century, mostly Western with some non-Western topics. Buildings and general principles relevant to the study of architecture. GER:DB-Hum
5 units, Win (Beischer, T)

ARTHIST 99A. Student Guides at the Cantor Center for the Visual Arts
Open to all Stanford students. Public speaking, inquiry methods, group dynamics, theme development, and art-related vocabulary. Introduction to museum administration; art registration, preparation and installation; rights and reproduction of images; exhibition planning; and art storage, conservation, and security. Students research, prepare, and present discussions on art works of their choice.
1 unit, Aut (Young, P)

ARTHIST 101. Archaic Greek Art
(Same as ARTHIST 301, CLASSART 101, CLASSART 201) The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientalizing phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E. GER:DB-Hum
4 units, Aut (Maxmin, J)

ARTHIST 102. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles
(Same as ARTHIST 302, CLASSART 102) The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries. GER:DB-Hum
4 units, Win (Maxmin, J)

ARTHIST 105. Introduction to Medieval Art
(Same as ARTHIST 305) Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals. GER:DB-Hum
4 units, not given this year

ARTHIST 106. Byzantine Art and Architecture, 300-1453 C.E.
(Same as ARTHIST 306) Art-historical developments, and monuments and works of art. Topics include: the transition from naturalism to abstraction; imperial art and court culture; pilgrimage and cult of saints; and secular art and luxury objects. GER:DB-Hum

4 units, Aut (Pentcheva, B)

ARTHIST 106A. Art of Pilgrimage and Crusade
(Same as ARTHIST 306A) Focus is on the artistic production of Mediterranean 12th-13th centuries exploring the phenomena of pilgrimage and Crusade. The rise of the Normans; the establishment of the pilgrimage to Santiago de Compostella as part of the Reconquista of Spain; the Crusader capture of Jerusalem in 1099 and the subsequent formation of Crusader states in the eastern Mediterranean; the rise of the Ayyubids and the emergence of the Italian city-state trade. The interconnection between the rise of narrative and conquest; the emergence of monumental sculpture; and the clash between tactile and optical visuality.

4 units, not given this year

ARTHIST 108. Virginity and Power: Mary in the Middle Ages
(Same as ARTHIST 308) The most influential female figure in Christianity whose state cult was connected with the idea of empire. The production and control of images and relics of the Virgin and the development of urban processions and court ceremonies though which political power was legitimized in papal Rome, Byzantium, Carolingian and Ottonian Germany, Tuscany, Gothic France, and Russia. GER:DB-Hum

4 units, not given this year

ARTHIST 111. Introduction to Italian Renaissance, 1420-1580
(Same as ARTHIST 311) New techniques of pictorial illusionism and the influence of the humanist revival of antiquity in the reformulation of the pictorial arts in 15th-century Italy. How different Italian regions developed characteristic artistic cultures through mutual interaction and competition. GER:DB-Hum

4 units, not given this year

ARTHIST 114. Vision and Emblem: Netherlandish Painting from Van Eyck to Brueghel
(Same as ARTHIST 314) How 15th-century pictorial illusionism transformed the devotional image and portraiture, calling for a new kind of engagement with the image on the part of the beholder. How 16th-century humanist knowledge influenced the creation of new pictorial subjects and representational forms. The reflection of religious crises triggered by the Reformation in art. GER:DB-Hum GER:DB-Hum

4 units, Spr (Hansen, M)

ARTHIST 117. Picturing the Papacy: Renaissance to Neoclassicism
(Same as ARTHIST 317) Campaigns of renovations aimed at restoring Rome to its former legendary splendor. The use of art and architecture to glorify the papacy and negotiate attacks on the institution. Art and papal nepotism from the 15th to 18th century. GER:DB-Hum

4 units, Aut (Hansen, M)

ARTHIST 118. Titian, Veronese, Tintoretto
(Same as ARTHIST 318) The course addresses the ways in which Venetian painters of the sixteenth century redefined paradigms of color, disegno, and invention. Themes to be examined include civic piety, new kinds of mythological painting, the intersection between naturalism and eroticism, and the relationship between art and rituals of church and statecraft.

4 units, not given this year

ARTHIST 120. Art and Culture of Northern Europe in the 17th Century
(Same as ARTHIST 320) Painting and graphic arts by artists in Flanders and Holland from 1600 to 1680, a period of political and religious strife. Historical context; their relationship to developments in the rest of Europe and contributions to the problem of representation. Preferences for particular genres such as portraits, landscapes, and scenes of everyday life; the general problem of realism as manifested in the works studied. GER:DB-Hum

4 units, not given this year

ARTHIST 121. 18th-Century Art in Europe, ca 1660-1780
(Same as ARTHIST 321) Major developments in painting across Europe including the High Baroque illusionism of Bernini, the founding of the French Academy, and the revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional discussion for graduate students. GER:DB-Hum

4 units, not given this year

ARTHIST 121S. 19TH CENTURY EUROPEAN PAINTING
Lecture and discussion of the major movements of 19th century Europe. Critical and theoretical readings, object analysis of Cantor Arts Center collections.

4 units, Sum (Salzman, M)

ARTHIST 122. The Age of Revolution
(Same as ARTHIST 322) Painting in Europe during the French Revolution and the Napoleonic conquest. As political events altered social formations, practices in the visual arts were similarly affected by shifts in patronage, public, and the social function of image making. An attempt to align ruptures in the tradition of representation with the unfolding historical situation. The first manifestations of a romantic alternative to the canons of classical beauty and stylistic restraint. GER:DB-Hum

4 units, not given this year

ARTHIST 124. The Age of Naturalism, ca 1830-1874
(Same as ARTHIST 324) The origins, development, and triumph of naturalist painting in Europe. The creative tensions that emerged between traditional forms of history painting and the challenge of modern subjects drawn from contemporary life. Emphasis is on the development of open-air painting as an alternative to traditional studio practice, and to the rise of new imaging technologies, such as lithography and photography, as popular alternatives to the hand-wrought character and elitist appeal of high art. GER:DB-Hum

4 units, not given this year

ARTHIST 126. Post-Naturalist Painting
(Same as ARTHIST 326) How conceptual models from language, literature, new technologies, and scientific theory affected picture making following the collapse of the radical naturalism of the 1860s and 1870s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvases by Matisse and Picasso (1905), the related developments in England, Germany, Belgium, and Austria. Recommended: some prior experience with 19th-century art. GER:DB-Hum

4 units, not given this year

ARTHIST 132. American Art and Culture, 1528-1860
(Same as ARTHIST 332) The visual arts and literature of the U.S. from the beginnings of European exploration to the Civil War. Focus is on questions of power and its relation to culture from early Spanish exploration to the rise of the middle classes. Cabeza de Vaca, Benjamin Franklin, John Singleton Copley, Phillis Wheatley, Charles Willson Peale, Emerson, Hudson River School, American Genre painters, Melville, Hawthorne and others. GER:DB-Hum

4 units, not given this year

ARTHIST 142. Architecture Since 1900
(Same as ARTHIST 342) The development of competing versions of modern and postmodern architecture and design in Europe and America, from the early 20th century to the present. Recommended: 141. GER:DB-Hum

4 units, not given this year

ARTHIST 143A. American Architecture
(Same as ARTHIST 343A) A historically based understanding of what defines American architecture. What makes American architecture American, beginning with indigenous structures of pre-Columbian America. Materials, structure, and form in the changing American context. How these ideas are being transformed in today's globalized world. GER:DB-Hum

4 units, not given this year

ARTHIST 147. The Visual Culture of Modernism and its Discontents, ca. 1850-1925
(Same as ARTHIST 347) Focus is on the visual arts and related fields in Europe (especially France but also Russia and Germany) during the late 19th and early 20th centuries. Beginning with Paris in the period of Haussmann, Baudelaire and Manet, modernism in art and visual culture presents a compelling dream of utopian possibilities that involved multifaceted and often contradictory ap-

proaches to the changes brought about by industrialization, urbanization, and the rise of mass culture.

4 units, Win (Staff)

ARTHIST 153A. American Art, 1900-1945

(Same as ARTHIST 353A) Painting, sculpture, photography, and design. Focus is on the emergence of diverse cultural forms in the search for a modern, American form of artistic expression. Topics include: Robert Henri and the Ash Can school; the Armory Show and the influence of European modernism; Marcel Duchamp and plumbing; futurism, cubism, and the machine aesthetic; Stuart Davis and jazz; Dorothea Lange and documentary photography; Alfred Stieglitz and his Seven Americans; Thomas Hart Benton and regionalism; the arts of the WPA; and the role of artists in wartime propaganda. GER:DB-Hum

4 units, not given this year

ARTHIST 155. American Art Since 1945

(Same as ARTHIST 355) Major figures, movements, and concepts of American art with examples from Europe from WW II to the present. Topics: the ideology and aesthetics of high modernism, the relationship between art and popular culture, the death of painting, the question of postmodernism. Artists: Pollock, Newman, Stella, Johns, Warhol, Andre, Rainer, Smithson, Hesse, Serra, Kruger, Sherman. GER:DB-Hum

4 units, not given this year

ARTHIST 158A. History of Photography

(Same as ARTHIST 358A) From its invention in 1839 to the present. Emphasis is on the evolution of photography as a fine art. Photographs as a universal democratic art form to record familial events and express personal creativity. Development of photography as it relates to other art forms, journalism, architecture, portraiture, landscape, documentation, time, and personal expression. The technology of photography; photographic techniques. GER:DB-Hum

4 units, Win (Dawson, R)

ARTHIST 159B. How Photography Exists

(Same as ARTHIST 359B) Photographs as things; the different physical forms gathered under the label photograph and the varying lives they lead: silver salts, halftone screens, wire transfers, color transparencies, one-hour processing, the anatomy of xerography, compression algorithms, the rebirth of instant films; school portraits, family slideshows, Viewmasters, flea markets, dental records, mugshots, news broadcasts, social media, server farms. Includes direct examination of materials in university repositories. Students to investigate and take positions on digital technologies and the present status of photographs.

4 units, Spr (Fay, B)

ARTHIST 160A. Twentieth-Century African American Art

(Same as ARTHIST 360A) Paintings, sculptures, photography, and mixed media works. Styles, cultural and social histories, patronage, and critical reception. The problems of studying the production of artists of color as a separate field; alternatives to the category of African American art; and the outlook for new critical methodologies. GER:DB-Hum

4 units, not given this year

ARTHIST 161. American Art 1900-1945

(Same as ARTHIST 361) U.S. artistic production and aesthetic developments from the turn of the century until the end of WW II. Roughly chronological in scope, the course eschews any single tendency or medium in order to elaborate the disjunctive formation of modernism in America. Painting and photography figure simultaneously; abstraction in its various guises, artists' films, the Armory Show, formations of race and gender, Black Mountain and MoMA all move through intransigent debates that pit social commitment against the pursuit of an ethos of autonomy.

4 units, not given this year

ARTHIST 162A. Spectacle & Revolution: European Art c.1968

(Same as ARTHIST 362A) Focus is on art and artists contemporary to the radical student movements of the 1960s, which exploded postwar tensions between traditional societies and new mass cultures. Topics include artists Joseph Beuys, VALIE EXPORT, and Gerhard Richter, and movements Fluxus, Situationism, Nouveau Realisme, and Arte povera. Course is reading intensive. Readings include Guy Debord, Umberto Eco, Pierre Restany, and many artists' writings. Prerequisites: AH1

4 units, Aut (Staff)

ARTHIST 173. Issues in Contemporary Art

(Same as ARTHIST 373) Major figures, themes, and movements of contemporary art from the 80s to the present. Readings on the neo-avant garde; postmodernism; art and identity politics; new media and technology; globalization and participatory aesthetics. Prerequisite: ARTHIST 155, or equivalent with consent of instructor. GER:DB-Hum

4 units, not given this year

ARTHIST 176. Feminism and Contemporary Art

(Same as ARTHIST 376) The impact of second wave feminism on art making and art historical practice in the 70s, and its reiteration and transformation in contemporary feminist work. Topics: sexism and art history, feminist studio programs in the 70s, essentialism and self-representation, themes of domesticity, the body in feminist art making, bad girls, the exclusion of women of color and lesbians from the art historical mainstream, notions of performativity. GER:DB-Hum

4 units, not given this year

ARTHIST 182. Arts of China, 900-1500: Cultures in Competition

(Same as ARTHIST 382) The era from the Five Dynasties and Song to the mid-Ming period was marked by competition in cultural arenas such as between Chinese and formerly nomadic regimes, or between official court art modes and scholar-official and literati groups. Topics include: innovations in architectural and ceramic technologies; developments in landscape painting and theory; the proliferation of art texts and discourses; the rise of educated artists; official arts and ideologies of the Song, Liao, Jin, Yuan, and Ming regimes; new roles for women as patrons and cultural participants; and Chan and popular Buddhist imagery. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

ARTHIST 185. Art in China's Modern Era

(Same as ARTHIST 385) From the late Ming period (ca. 1600) to early 20th century Chinese arts. Topics include: urban arts and print culture; commodification of art; painting theories; self portrayals; art sponsorship, collecting, and ideological programs at the Qing imperial court; media and modernity in Shanghai; art and politics in early 20th century China. GER:DB-Hum

4 units, Win (Vinograd, R)

ARTHIST 185B. Contemporary Chinese Art: Sites and Strategies

(Same as ARTHIST 385B) Issues and developments in contemporary Chinese art over the past two decades. Questions of personal and national identity, politics and history, globalization and mass culture, consumerism and urban transformation, and the body, sexuality, and gender, as represented in formats including painting, photography, and installation and multimedia art. Museum visits. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

ARTHIST 186. Theme and Style in Japanese Art

(Same as ARTHIST 386, JAPANGEN 186, JAPANGEN 286) Monuments in traditional Japanese architecture, sculpture, garden design, painting, prints, and pots, through the 19th century. Chronological framework emphasizes the role of these objects play in visualizing the ideals of the society they represent. GER:DB-Hum

4 units, not given this year

ARTHIST 187. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868

(Same as ARTHIST 387, JAPANGEN 185) Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan. GER:DB-Hum, EC-GlobalCom

4 units, Aut (Takeuchi, M)

ARTHIST 188A. The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism

(Same as ARTHIST 388A) The recent rapid urbanization and architectural transformation of Asia; focus is on the architecture of Japan and China since the mid-19th century. History of forms,

theories, and styles that serve as the foundation for today's buildings and cityscapes. How Eastern and Western ideas of modernism have merged or diverged and how these forces continue to shape the future of Japanese and Chinese architecture and urban form. GER:DB-Hum

4 units, Spr (Beischer, T)

ARTHIST 190. African Art and Writing Traditions

(Same as ARTHIST 390) Classic African graphic writings south of the Sahara in historical and social context. What makes an African graphic writing system, and how they are used as visual art, and as markers of identity, religion, and moral philosophy. Civilizations include Mali, Asante, Yoruba, Ejagham, and Kongo.

4 units, not given this year

ARTHIST 191. Afro-Atlantic Religion, Art, and Philosophy

(Same as ARTHIST 391) Afro-American graphic writing and other forms of visual communication including ancient rupestrian art and rock painting in Africa, and present-day forms in the Americas. The diversity of daily life, religion, social organization, politics, and culture with African origin in the diaspora. Focus is on major contemporary Afro-Atlantic religions including: Palo Monte and Abakua in Cuba; Gaga in the Dominican Republic; Revival, Obeah, and Kumina in Jamaica; Vodun in Haiti; and Candomble and Macumba in Brazil.

4 units, not given this year

ARTHIST 192. Introduction to African Art

(Same as ARTHIST 392) Form, space, media, medium, and visual expression in African art. Rock art to contemporary art production. Majors works and art expression in terms of function and historical context. GER:DB-Hum

4 units, not given this year

ARTHIST 194. Iconography of African Art

(Same as ARTHIST 394) African art from 25,000 years ago to the present emphasizing social, historical, and ideological concerns in visual systems and traditions and aesthetic form. Critical grounding in anthropology and cultural studies. GER:DB-Hum

4 units, Aut (Martinez-Ruiz, B)

ARTHIST 195. Introduction to Black Atlantic Visual Traditions

(Same as ARTHIST 395) African cultural expression in the Americas. How politics, religion, and culture influence the art of the Black Atlantic. Focus is on the period when cultures were brought from Africa to the Americas through the slave trade and came into contact and conflict with western colonial powers. GER:DB-Hum

4 units, not given this year

ARTHIST 196. African Visual Art & Graphic Communication in the Americas

(Same as ARTHIST 396) The class addresses the modes of visual expression used among the Bakongo people in Central Africa and their descendents in Cuba, Haiti, and Brazil and argues that together these constitute identifiable graphic writing systems. After providing a brief overview of the forms of graphic expression in use within Kongo and Kongo Atlantic cultures, the class focuses on the most central of the traditional cosmograms, Dikenga. By mapping the meanings and forms of Dikenga, the essay attempts to demonstrate its continuity throughout the Kongo diaspora. Finally, the class highlights the rich cosmology, cosmogony, and moral philosophy that have consistently informed the use and meaning of Dikenga in its central role in religious narratives, moral philosophy and religious education among the Bakongo in Atlantic world.

4 units, Win (Martinez-Ruiz, B)

ARTHIST 203. Greek Art In and Out of Context

(Same as CLASSART 109) The cultural contexts in which art served religious, political, commercial, athletic, sympotic, and erotic needs of Greek life.

4-5 units, Aut (Maxmin, J)

ARTHIST 204A. Appropriations of Greek Art

(Same as CLASSART 110) Upper division seminar. The history of the appropriation of Greek art by Rome, the Renaissance, Lord Elgin, and Manet. Enrollment limited to 6. Prerequisite: ARTHIST 102 or consent of instructor.

4-5 units, Spr (Maxmin, J)

ARTHIST 206. Virginity and Power: Mary in the Middle Ages

The most influential female figure in Christianity whose state cult was connected with the idea of empire. The production and control of images and relics of the Virgin and the development of urban processions and court ceremonies though which political power was legitimized in papal Rome, Byzantium, Carolingian and Ottonian Germany, Tuscany, Gothic France, and Russia.

5 units, not given this year

ARTHIST 208. Hagia Sophia

By employing a methodology based in psychoacoustics, semiotics, and phenomenology, this course explores the relationship among sound, water, marble, meaning, and religious experience in the sixth-century church of Hagia Sophia built by emperor Justinian in Constantinople. Medieval sources describing the interior and ritual. Students make short movies exploring the shimmer of marble in buildings on campus and study the acoustics of domed buildings through computer auralization done at Stanford's CCRMA (Center for Computer Research in Music and Acoustics).

5 units, Win (Pentcheva, B)

ARTHIST 213. Renaissance Print Culture: From Durer to Goltzius

Prints became vehicles for the spreading of artistic inventions as well as political and religious propaganda during the societal upheavals of the 16th century. How the new medium of reproducible images changed attitudes towards visuality. Prints as self-reflective performances of virtuosity. Class taught at the Cantor Arts Center.

5 units, Win (Hansen, M)

ARTHIST 235A. Art and the Machine Age

Artistic and intellectual responses to modernization. Topics include: artistic uses of the machine as a metaphor for nature, the body, and sexuality; adaptation of mechanical technologies to art making; appreciation of machines as works of art; and how changing technologies in the industrial sphere impacted the artist's role in the cultural sphere. The place of the machine in architecture; historical role of industrial design; machine-themed museum exhibitions; and works by Fernand Léger, Le Corbusier, Rube Goldberg, Charles Sheeler, Charlie Chaplin, Raymond Loewy, and George Gershwin.

5 units, not given this year

ARTHIST 240. Sister Arts: Image and Text in America

(Same as AMSTUD 240) Seminar focuses equally on painting and literature in American history. Classes meet twice per week: one session devoted to a literary text, and the other to a visual artifact. The course is organized topically, placing text and images into dialogue with each other, asking for example, how Glen Ligon's contemporary reworking of nineteenth century runaway slave posters relates to Toni Morrison's Beloved, or how Melville's story of urban life, Bartleby the Scrivener, alludes to Hudson River School painting.

5 units, Win (Wolf, B)

ARTHIST 242. Henri Matisse

Themes, methods, and media in the production of Matisse, the familiar yet enigmatic 20th-century master. The phases of his career; critical responses to his work. Research project and presentation. Recommended: reading knowledge of French.

5 units, not given this year

ARTHIST 256A. Critical Race Art History

Primer for the comparative study of the representation of race in Western art. Whiteness, a construction that has been dependent upon blackness and alterity from its beginnings. Stereotyped ethnicities, nationalities, and territories, such as the Red Indian, the Jew, and Orientalism. Style as an image making strategy shaped by patronage and reception.

5 units, not given this year

ARTHIST 259. The Fifties: Abstract Expressionism to Beat Culture

Abstract expressionism and beat culture as the two dominant models of art making in the U.S. in the 50s, conventionally if not exclusively associated with cultural production in New York and San Francisco. Compares and contrasts existential, ideological, and formal valences relative to the backdrop of postwar American affluence, and the Cold War and its rhetorics of individual freedom and expression. The politics and criticism of abstract expressionism and its relation to the New York Intellectuals in the 30s versus beat culture and the emergence of the counterculture in the 60s.

5 units, not given this year

ARTHIST 260A. Photography and Performance
(Same as DRAMA 157H, DRAMA 257H) Intersections of performance and photography in theories, artistic practices, and daily lives: from photoconceptualism to surveillance and family portraits. How does performance remain differently through documentation? What does it mean to understand photographs as performances? Topics include stillness, traces, posing, and theatricality. Written and practical assignments. GER:DB-Hum
4 units, Win (Fay, B; Elswit, K)

ARTHIST 282A. Imagining the Imperial: Images of the Court in Late Ming Dynasty Public Culture
Themes of palace and court life popular in vernacular painting, print illustrated books, and fiction. Dimensions of the imperial palace and court in late Ming public imaginary, including strategies of historical displacement, disguised political critique, commerce in imperial objects, the taste for scandal, and mythologies of court life.
5 units, not given this year

ARTHIST 287. Pictures of the Floating World: Images from Japanese Popular Culture
(Same as JAPANLIT 287) Printed objects produced during the Edo period (1600-1868), including the Ukiyo-e (pictures of the floating world) and lesser-studied genres such as printed books (ehon) and popular broadsheets (kawaraban). How a society constructs itself through images. The borders of the acceptable and censorship; theatricality, spectacle, and slippage; the construction of play, set in conflict against the dominant neo-Confucian ideology of fixed social roles. Prerequisites: 2, 186, 187, 188. GER:DB-Hum
5 units, Spr (Takeuchi, M)

ARTHIST 287A. The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime
(Same as JAPANGEN 287A) The tea ceremony, a premodern multimedia phenomenon, integrates architecture, garden design, ceramics, painting, calligraphy, and treasured objects into a choreographed ritual wherein host, objects, and guests perform roles on a tiny stage. Aesthetic, philosophical, and political dimensions. The evolution of tea taste including its inception in Zen monasteries, use for social control during the 16th century, the development of a class of tea connoisseurs, and 20th-century manipulation by the emerging industrialist class.
5 units, not given this year

ARTHIST 290. Mapping Africa: Cartography and Architecture
Visual forms of spatial representation of Africa and implications for understanding the cultures they depict. Examples include early Renaissance cartography and written accounts by explorers, travelers, geographers, and missionaries. African concepts of design, meaning in architecture, and spatial solutions. Case studies of African models.
5 units, Aut (Martinez-Ruiz, B)

ARTHIST 292. African Art and Museum Display
African art and its intersection with art concepts, museum politics, art display, and colonialism. African art collections in major institutions around the world. Methodologies. Final class exhibition using art from the Cantor Arts Center collection.
5 units, not given this year

ARTHIST 292A. Researching Africa: Problem and Theory in African Art
5 units, not given this year

ARTHIST 293. Latino American Avant Garde
African contribution to modern art practices in Latino America. Mexico, Brazil, and Cuba as models. Cultural and historical context.
5 units, Win (Martinez-Ruiz, B)

ARTHIST 294. Caribbean and Latin American Art
Visual culture from 1505 to 1889 and its relation to current debates on cultural identity, hybridity, syncretism, and creolization. Examination of paintings, travel books and printmaking by artists including De Bry, Belisario, Rugendas, Debret, and Landaluce. Close visual analysis of works at the Cantor Arts Center and the Green Library at Stanford University.
5 units, not given this year

ARTHIST 296. Junior Seminar: Methods & Historiography of Art History
Historiography and methodology.
5 units, Aut (Pentcheva, B)

ARTHIST 297. Honors Thesis Writing
May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTHIST 298. Individual Work: Art History
For approved independent research with individual faculty members. Letter grades only.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTHIST 299. Research Project: Art History
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN ART HISTORY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ARTHIST 301. Archaic Greek Art
(Same as ARTHIST 101, CLASSART 101, CLASSART 201) The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientalizing phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.
4 units, Aut (Maxmin, J)

ARTHIST 302. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles
(Same as ARTHIST 102, CLASSART 102) The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries.
4 units, Win (Maxmin, J)

ARTHIST 305. Introduction to Medieval Art
(Same as ARTHIST 105) Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals.
4 units, not given this year

ARTHIST 306. Byzantine Art and Architecture, 300-1453 C.E.
(Same as ARTHIST 106) Art-historical developments, and monuments and works of art. Topics include: the transition from naturalism to abstraction; imperial art and court culture; pilgrimage and cult of saints; and secular art and luxury objects.
4 units, Aut (Pentcheva, B)

ARTHIST 306A. Art of Pilgrimage and Crusade
(Same as ARTHIST 106A) Focus is on the artistic production of Mediterranean 12th-13th centuries exploring the phenomena of pilgrimage and Crusade. The rise of the Normans; the establishment of the pilgrimage to Santiago de Compostella as part of the Reconquista of Spain; the Crusader capture of Jerusalem in 1099 and the subsequent formation of Crusader states in the eastern Mediterranean; the rise of the Ayyubids and the emergence of the Italian city-state trade. The interconnection between the rise of narrative and conquest; the emergence of monumental sculpture; and the clash between tactile and optical visuality.
4 units, not given this year

ARTHIST 308. Virginity and Power: Mary in the Middle Ages
(Same as ARTHIST 108) The most influential female figure in Christianity whose state cult was connected with the idea of empire. The production and control of images and relics of the Virgin and the development of urban processions and court ceremonies though which political power was legitimized in papal Rome, Byzantium, Carolingian and Ottonian Germany, Tuscany, Gothic France, and Russia.
4 units, not given this year

ARTHIST 311. Introduction to Italian Renaissance, 1420-1580
(Same as ARTHIST 111) New techniques of pictorial illusionism and the influence of the humanist revival of antiquity in the reformulation of the pictorial arts in 15th-century Italy. How different Italian regions developed characteristic artistic cultures through mutual interaction and competition.

4 units, not given this year

ARTHIST 314. Vision and Emblem: Netherlandish Painting from Van Eyck to Brueghel
(Same as ARTHIST 114) How 15th-century pictorial illusionism transformed the devotional image and portraiture, calling for a new kind of engagement with the image on the part of the beholder. How 16th-century humanist knowledge influenced the creation of new pictorial subjects and representational forms. The reflection of religious crises triggered by the Reformation in art. GER:DB-Hum

4 units, Spr (Hansen, M)

ARTHIST 317. Picturing the Papacy: Renaissance to Neoclassicism
(Same as ARTHIST 117) Campaigns of renovations aimed at restoring Rome to its former legendary splendor. The use of art and architecture to glorify the papacy and negotiate attacks on the institution. Art and papal nepotism from the 15th to 18th century.

4 units, Aut (Hansen, M)

ARTHIST 318. Titian, Veronese, Tintoretto
(Same as ARTHIST 118) The course addresses the ways in which Venetian painters of the sixteenth century redefined paradigms of color, disegno, and invention. Themes to be examined include civic piety, new kinds of mythological painting, the intersection between naturalism and eroticism, and the relationship between art and rituals of church and statecraft.

4 units, not given this year

ARTHIST 320. Art and Culture of Northern Europe in the 17th Century
(Same as ARTHIST 120) Painting and graphic arts by artists in Flanders and Holland from 1600 to 1680, a period of political and religious strife. Historical context; their relationship to developments in the rest of Europe and contributions to the problem of representation. Preferences for particular genres such as portraits, landscapes, and scenes of everyday life; the general problem of realism as manifested in the works studied.

4 units, not given this year

ARTHIST 321. 18th-Century Art in Europe, ca 1660-1780
(Same as ARTHIST 121) Major developments in painting across Europe including the High Baroque illusionism of Bernini, the founding of the French Academy, and the revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional discussion for graduate students.

4 units, not given this year

ARTHIST 322. The Age of Revolution
(Same as ARTHIST 122) Painting in Europe during the French Revolution and the Napoleonic conquest. As political events altered social formations, practices in the visual arts were similarly affected by shifts in patronage, public, and the social function of image making. An attempt to align ruptures in the tradition of representation with the unfolding historical situation. The first manifestations of a romantic alternative to the canons of classical beauty and stylistic restraint.

4 units, not given this year

ARTHIST 324. The Age of Naturalism, ca 1830-1874
(Same as ARTHIST 124) The origins, development, and triumph of naturalist painting in Europe. The creative tensions that emerged between traditional forms of history painting and the challenge of modern subjects drawn from contemporary life. Emphasis is on the development of open-air painting as an alternative to traditional studio practice, and to the rise of new imaging technologies, such as lithography and photography, as popular alternatives to the hand-wrought character and elitist appeal of high art.

4 units, not given this year

ARTHIST 326. Post-Naturalist Painting
(Same as ARTHIST 126) How conceptual models from language, literature, new technologies, and scientific theory affected picture making following the collapse of the radical naturalism of the 1860s and 1870s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvases by Matisse and Picasso (1905), the related developments in England, Germany, Belgium, and Austria. Additional weekly discussion for graduate students. Recommended: some prior experience with 19th-century art.

4 units, not given this year

ARTHIST 332. American Art and Culture, 1528-1860
(Same as ARTHIST 132) The visual arts and literature of the U.S. from the beginnings of European exploration to the Civil War. Focus is on questions of power and its relation to culture from early Spanish exploration to the rise of the middle classes. Cabeza de Vaca, Benjamin Franklin, John Singleton Copley, Phillis Wheatley, Charles Willson Peale, Emerson, Hudson River School, American Genre painters, Melville, Hawthorne and others.

4 units, not given this year

ARTHIST 342. Architecture Since 1900
(Same as ARTHIST 142) The development of competing versions of modern and postmodern architecture and design in Europe and America, from the early 20th century to the present. Recommended: 141.

4 units, not given this year

ARTHIST 343A. American Architecture
(Same as ARTHIST 143A) A historically based understanding of what defines American architecture. What makes American architecture American, beginning with indigenous structures of pre-Columbian America. Materials, structure, and form in the changing American context. How these ideas are being transformed in today's globalized world.

4 units, not given this year

ARTHIST 347. The Visual Culture of Modernism and its Discontents, ca. 1850-1925
(Same as ARTHIST 147) Focus is on the visual arts and related fields in Europe (especially France but also Russia and Germany) during the late 19th and early 20th centuries. Beginning with Paris in the period of Haussmann, Baudelaire and Manet, modernism in art and visual culture presents a compelling dream of utopian possibilities that involved multifaceted and often contradictory approaches to the changes brought about by industrialization, urbanization, and the rise of mass culture.

4 units, Win (Staff)

ARTHIST 353A. American Art, 1900-1945
(Same as ARTHIST 153A) Painting, sculpture, photography, and design. Focus is on the emergence of diverse cultural forms in the search for a modern, American form of artistic expression. Topics include: Robert Henri and the Ash Can school; the Armory Show and the influence of European modernism; Marcel Duchamp and plumbing; futurism, cubism, and the machine aesthetic; Stuart Davis and jazz; Dorothea Lange and documentary photography; Alfred Stieglitz and his Seven Americans; Thomas Hart Benton and regionalism; the arts of the WPA; and the role of artists in wartime propaganda.

4 units, not given this year

ARTHIST 355. American Art Since 1945
(Same as ARTHIST 155) Major figures, movements, and concepts of American art with examples from Europe from WW II to the present. Topics: the ideology and aesthetics of high modernism, the relationship between art and popular culture, the death of painting, the question of postmodernism. Artists: Pollock, Newman, Stella, Johns, Warhol, Andre, Rainer, Smithson, Hesse, Serra, Kruger, Sherman.

4 units, not given this year

ARTHIST 358A. History of Photography
(Same as ARTHIST 158A) From its invention in 1839 to the present. Emphasis is on the evolution of photography as a fine art. Photographs as a universal democratic art form to record familial events and express personal creativity. Development of photography as it relates to other art forms, journalism, architecture, portraiture, landscape, documentation, time, and personal expression. The technology of photography; photographic techniques.

4 units, Win (Dawson, R)

ARTHIST 359B. How Photography Exists
(Same as ARTHIST 159B) Photographs as things; the different physical forms gathered under the label photograph and the varying lives they lead: silver salts, halftone screens, wire transfers, color transparencies, one-hour processing, the anatomy of xerography, compression algorithms, the rebirth of instant films; school portraits, family slideshows, Viewmasters, flea markets, dental records, mugshots, news broadcasts, social media, server farms. Includes direct examination of materials in university repositories. Students to investigate and take positions on digital technologies and the present status of photographs.
4 units, Spr (Fay, B)

ARTHIST 360A. Twentieth-Century African American Art
(Same as ARTHIST 160A) Paintings, sculptures, photography, and mixed media works. Styles, cultural and social histories, patronage, and critical reception. The problems of studying the production of artists of color as a separate field; alternatives to the category of African American art; and the outlook for new critical methodologies.
4 units, not given this year

ARTHIST 361. American Art 1900-1945
(Same as ARTHIST 161) Course surveys US artistic production and aesthetic developments from the turn of the century until the end of World War II. Roughly chronological in scope, it eschews any single tendency or medium in order to elaborate the disjunctive formation of modernism in America. Painting and photography figure simultaneously; abstraction in its various guises, artists' films, the Armory Show, formations of race and gender, Black Mountain and MoMA all move through intransigent debates that pit social commitment against the pursuit of an ethos of autonomy.
4 units, not given this year

ARTHIST 362A. Spectacle & Revolution: European Art c.1968
(Same as ARTHIST 162A) Focus is on art and artists contemporary to the radical student movements of the 1960s, which exploded postwar tensions between traditional societies and new mass cultures. Topics include artists Joseph Beuys, VALIE EXPORT, and Gerhard Richter, and movements Fluxus, Situationism, Nouveau Realisme, and Arte povera. Course is reading intensive. Readings include Guy Debord, Umberto Eco, Pierre Restany, and many artists¿ writings. Prerequisites: AH1
4 units, Aut (Staff)

ARTHIST 373. Issues in Contemporary Art
(Same as ARTHIST 173) Major figures, themes, and movements of contemporary art from the 80s to the present. Readings on the neo-avant garde; postmodernism; art and identity politics; new media and technology; globalization and participatory aesthetics. Prerequisite: ARTHIST 155, or equivalent with consent of instructor.
4 units, not given this year

ARTHIST 376. Feminism and Contemporary Art
(Same as ARTHIST 176) (Same as ARTHIST 176) The impact of second wave feminism on art making and art historical practice in the 70s, and its reiteration and transformation in contemporary feminist work. Topics: sexism and art history, feminist studio programs in the 70s, essentialism and self-representation, themes of domesticity, the body in feminist art making, bad girls, the exclusion of women of color and lesbians from the art historical mainstream, notions of performativity.
4 units, not given this year

ARTHIST 382. Arts of China, 900-1500: Cultures in Competition
(Same as ARTHIST 182) The era from the Five Dynasties and Song to the mid-Ming period was marked by competition in cultural arenas such as between Chinese and formerly nomadic regimes, or between official court art modes and scholar-official and literati groups. Topics include: innovations in architectural and ceramic technologies; developments in landscape painting and theory; the proliferation of art texts and discourses; the rise of educated artists; official arts and ideologies of the Song, Liao, Jin, Yuan, and Ming regimes; new roles for women as patrons and cultural participants; and Chan and popular Buddhist imagery.
4 units, not given this year

ARTHIST 385. Art in China's Modern Era
(Same as ARTHIST 185) From the late Ming period (ca. 1600) to early 20th century Chinese arts. Topics include: urban arts and print culture; commodification of art; painting theories; self portrayals; art sponsorship, collecting, and ideological programs at the Qing imperial court; media and modernity in Shanghai; art and politics in early 20th century China.
4 units, Win (Vinograd, R)

ARTHIST 385B. Contemporary Chinese Art: Sites and Strategies
(Same as ARTHIST 185B) Issues and developments in contemporary Chinese art over the past two decades. Questions of personal and national identity, politics and history, globalization and mass culture, consumerism and urban transformation, and the body, sexuality, and gender, as represented in formats including painting, photography, and installation and multimedia art. Museum visits.
4 units, not given this year

ARTHIST 386. Theme and Style in Japanese Art
(Same as ARTHIST 186, JAPANGEN 186, JAPANGEN 286) Monuments in traditional Japanese architecture, sculpture, garden design, painting, prints, and pots, through the 19th century. Chronological framework emphasizes the role of these objects play in visualizing the ideals of the society they represent.
4 units, not given this year

ARTHIST 387. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
(Same as ARTHIST 187, JAPANGEN 185) Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan.
4 units, Aut (Takeuchi, M)

ARTHIST 388A. The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism
(Same as ARTHIST 188A) The recent rapid urbanization and architectural transformation of Asia; focus is on the architecture of Japan and China since the mid-19th century. History of forms, theories, and styles that serve as the foundation for today's buildings and cityscapes. How Eastern and Western ideas of modernism have merged or diverged and how these forces continue to shape the future of Japanese and Chinese architecture and urban form.
4 units, Spr (Beischer, T)

ARTHIST 390. African Art and Writing Traditions
(Same as ARTHIST 190) Classic African graphic writings south of the Sahara in historical and social context. What makes an African graphic writing system, and how they are used as visual art, and as markers of identity, religion, and moral philosophy. Civilizations include Mali, Asante, Yoruba, Ejagham, and Kongo.
4 units, not given this year

ARTHIST 391. Afro-Atlantic Religion, Art, and Philosophy
(Same as ARTHIST 191) Afro-American graphic writing and other forms of visual communication including ancient rupestrian art and rock painting in Africa, and present-day forms in the Americas. The diversity of daily life, religion, social organization, politics, and culture with African origin in the diaspora. Focus is on major contemporary Afro-Atlantic religions including: Palo Monte and Abakua in Cuba; Gaga in the Dominican Republic; Revival, Obeah, and Kumina in Jamaica; Vodun in Haiti; and Candomble and Macumba in Brazil.
4 units, not given this year

ARTHIST 392. Introduction to African Art
(Same as ARTHIST 192) Form, space, media, medium, and visual expression in African art. Rock art to contemporary art production. Majors works and art expression in terms of function and historical context.
4 units, not given this year

ARTHIST 394. Iconography of African Art
(Same as ARTHIST 194) African art from 25,000 years ago to the present emphasizing social, historical, and ideological concerns in visual systems and traditions and aesthetic form. Critical grounding in anthropology and cultural studies.
4 units, Aut (Martinez-Ruiz, B)

ARTHIST 395. Introduction to Black Atlantic Visual Traditions
(Same as ARTHIST 195) African cultural expression in the Americas. How politics, religion, and culture influence the art of the Black Atlantic. Focus is on the period when cultures were brought from Africa to the Americas through the slave trade and came into contact and conflict with western colonial powers.

4 units, not given this year

ARTHIST 396. African Visual Art & Graphic Communication in the Americas
(Same as ARTHIST 196) The class addresses the modes of visual expression used among the Bakongo people in Central Africa and their descendents in Cuba, Haiti, and Brazil and argues that together these constitute identifiable graphic writing systems. After providing a brief overview of the forms of graphic expression in use within Kongo and Kongo Atlantic cultures, the class focuses on the most central of the traditional cosmograms, Dikenga. By mapping the meanings and forms of Dikenga, the essay attempts to demonstrate its continuity throughout the Kongo diaspora. Finally, the class highlights the rich cosmology, cosmogony, and moral philosophy that have consistently informed the use and meaning of Dikenga in its central role in religious narratives, moral philosophy and religious education among the Bakongo in Atlantic world.

4 units, Win (Martinez-Ruiz, B)

ARTHIST 409. Iconoclasm
Iconoclasm, iconophobia, and aniconism as markers of cultural transformation of the Mediterranean in the 7th-9th centuries. The identity crisis in the region as the Arabs established the Umayyad caliphate, conquering the Holy Land, Egypt, and Spain. The West consolidated around the Carolingians versus the East split between the Byzantines and the Arabs. How each of these three empires emerged from the ashes of late antique culture and carved an identity out of a common cultural foundation.

5 units, not given this year

ARTHIST 410. Aesthetics of the Icon
How medieval objects were experienced through sight, touch, sound, smell, and taste; how this multisensory richness has been reduced to visual studies of medieval art. Focus is on the Byzantine icon to restore its synaesthetic power; how its performance is tied to culturally-specific modes of seeing. Byzantine liturgy, prayer, epigrams, and literary genres of description such as ekphrasis.

5 units, not given this year

ARTHIST 411. Animation, Performance, Presence in Medieval Art
Focus is on phenomenology and aesthetics. Rather than a mimesis understood as pictorial naturalism, Medieval art promoted mimesis as simulation of divine presence expressed through phenomenal changes. The shadow, sound, smell, taste, and touch moved the viewer/participant in ways richer than a reductive regime of the eye. Concepts of representation, lifelikeness, performance, and presence in the Byzantine East, Latin West, and Islam.

5 units, Win (Pentcheva, B)

ARTHIST 412. Problems in Italian Mannerism
Questions of the bella maniera, anti-classicism, and center and periphery in mannerist art in light of developments in scholarship from the 70s to the present. Authors include Arasse, Cropper, Cole, Nova, Summers, and Vickers.

5 units, not given this year

ARTHIST 413. Michelangelo
Michelangelo's long career in light of recent scholarship. Topics include the status of the cult image, the paragon between poetry and the pictorial arts, painting and questions of literary genre, and Counter Reformation reactions to his art.

5 units, not given this year

ARTHIST 414. Italian Mannerism
Questions of the bella maniera, anti-classicism, and center and periphery in mannerist art in light of developments in scholarship from the 70s to the present. Authors include Arasse, Cropper, Cole, Nova, Summers, and Vickers.

5 units, not given this year

ARTHIST 428. Eakins and Vermeer
Questions of gender, visuality, and power in two major realist painters of the 17th and 19th centuries. How Vermeer and Eakins confronted and sometimes evaded the central historical issues of their day: modernization, class, sexuality, nationality, and the status of the artist.

5 units, not given this year

ARTHIST 431. Landscape and Power
This seminar explores American landscape art from its origins in Hudson River School painting to the Land Art movement of the late 20th century. Images of nature are read as narratives of individual and national identity. Topics include gender and the landscape; nation building and the frontier; politics and parks; the landscape as anti-art; poetry and the environment. Students work with images from the collection of American landscape art at the de Young Museum in Golden Gate Park.

5 units, Aut (Wolf, B)

ARTHIST 444. Photograph, Document, Archive
Debates over the ontological status of the photograph as document from the 19th century to the present; archival conceptions of photographic meaning. Problems of realism, indexicality, positivism, tourism, social commentary, power, and subjectivity. Protagonists: Frith, Atget, Hine, Sander, Rodchenko, Siskind, Lange, Bernd and Hilla Becher, Richter, Rosler, Sekula. Readings: Warburg, Kracauer, Benjamin, Brik, Tret'iakov, Sontag, Barthes, Buchloh, Tagg, Nesbit, Armstrong, Stimson, Nickel, Kelsey.

5 units, not given this year

ARTHIST 447. The Historiography of Cubism
Students are introduced to historiography and method in the history of art through a consideration of the multiple constructions of French Cubism as a complex of styles, a set of theoretical problems, and a historical phenomenon. How important issues raised by the art of Picasso and Braque as well as Léger, Delaunay, Gleizes, Metzinger, Villon, and other figures of early 20th-century modernism have been debated by art historians over the past 75 years, since the publication of Alfred Barr's Cubism and Abstract Art in 1936. Undergraduates require consent of the instructor.

5 units, Spr (Staff)

ARTHIST 462A. Pictures and Politics: Art of the 1980s
The rise of postmodernism in art between 1977-1994. Artistic responses to the increased mediation of experience by images and products, including the rejection of the possibility of authentic identity as well as heavy investment in the politics of identities. Topics include pictures generation, neo-expressionism, graffiti art, AIDS crisis, identity politics, and relational aesthetics. Readings include authors: Barthes, Baudrillard, Bhaba, Bishop, Buchloh, Crimp, Foucault, Kwon, Linker, and Mulvey. Undergraduates require consent of instructor, and must have completed ARTHIST 1.

5 units, Win (Staff)

ARTHIST 470. Globalization and the Visual Arts
Enrollment restricted to graduate students. Globalization as the most important paradigm for the production, circulation, and reception of contemporary art since the 1990s. The expanding terrain of the art world; biennial culture; new economies of scale and the art market along with its critique in the discourses of empire and multitudes. Debates on the thematics of hybridity; post-Fordism; the flat world and capital flows; exteriority and site specificity; and new models of collectivism in recent art.

5 units, not given this year

ARTHIST 475. Media Cultures of the Cold War
(Same as COMM 386) The intersection of politics, aesthetics, and new media technologies in the U.S. between the end of WW II and the fall of the Berlin Wall. Topics include the aesthetics of thinking the unthinkable in the wake of the atom bomb; abstract expressionism and modern-man discourse; game theory, cybernetics, and new models of art making; the rise of television, intermedia, and the counterculture; and the continuing influence of the early cold war on contemporary media aesthetics. Readings from primary and secondary sources in art history, communication, and critical theory.

3-5 units, not given this year

ARTHIST 476. Postmodernism and the Visual Arts
Enrollment restricted to graduate students. The debates on postmodernism as a cultural dominant (Jameson) emerging in the criticism of the last half of the twentieth century. Theories of periodization and historicity; authorship, appropriation; allegory and narrative; simulation; difference; late capitalism and the postindustrial society; and cybercultures relative to the art of the 1970s-80s. Spe-

cial attention paid to the culture wars and the importance of postmodernism for contemporary discussions of neoliberalism. Authors include Barthes, Baudrillard, Crimp, Foster, Foucault, Jameson, Habermas, Harvey, Krauss, Lyotard, Owens.

5 units, not given this year

ARTHIST 481. Colloquium on Song and Yuan Dynasty Painting Studies

In-depth discussion and analysis of recent art historical studies, exhibitions, and conferences on Chinese painting and related arts of the Song and Yuan eras (10th-14th c.) . Topics will include: approaches to Five Dynasties painting; archaeological discoveries and Liao painting; political implications of painting in the late 11th century; recent studies of cultural patronage and production at the Huizong court; court women as art sponsors in the Song era; court painting and urban culture in Southern Song Lin'an (Hangzhou); Jin and late Song literati painting; Buddhist painting in the Ningbo region; Song-Yuan Daoist painting; art patronage and collecting at the Yuan court; historiographic, connoisseurial, and authenticity issues. Open to graduate students, and undergraduates with permission of the instructor.

5 units, Aut (Vinograd, R)

ARTHIST 482. Chinese Art of the 1970's and 1980's

Departing from the Maoist ideology of Cultural Revolution era art, Chinese art of the 1970's and '80's culminated in the '85 New Wave movement, and paved the way for the 1990s and beyond. Investigating art world events against the background of economic liberalization and emerging globalization. Topics include changing official art directives, agendas of art schools and institutions, the emergence of amateur and professional artists, the upsurge in art publications and the boom of artist groups and exhibitions, the definition of a new literati painting by ink painters, and transmedia experiments by avant-gardists. The post-socialist cultural fever in philosophy, literature, music, theater, and film after 1976 examined as the backdrop for artistic activities. Open to graduate students, and undergraduates with permission of the instructor.

5 units, Win (Vinograd, R)

ARTHIST 482B. Imagining the Imperial: Images of the Court in Late Ming Dynasty Public Culture Part II

Exploration in representations of palace and court life in Ming period vernacular painting, illustrated books, and fiction. Topics include the status of the court in the Ming public imaginary, strategies of historical displacement, disguised political critique, commerce in imperial objects, and scandals, rumors and myths surrounding court life

5 units, not given this year

ARTHIST 483. Shanghai Visual Culture: Contested Modernities

Held in conjunction with Modern Ink Painters exhibition at the Cantor Center and the Shanghai Visual Culture exhibition at the Asian Art Museum of San Francisco. Aspects of late 19th- and early 20th-century Shanghai visual culture and its historiography. Topics include the interplay and competition of ink painting with new media such as lithography, photography, illustrated periodicals, and film; images of gendered modernity, from courtesan to new woman; situating the national and the cosmopolitan; the cultural politics of painting; art institutions, education, and exhibitions. Museum visits; and individual or group research projects. Open to undergraduates with consent of instructor.

5 units, not given this year

ARTHIST 485. The Situation of the Artist in Traditional Japan

(Same as JAPANGEN 220) Topics may include: workshop production such as that of the Kano and Tosa families; the meaning of the signature on objects including ceramics and tea wares; the folk arts movement; craft guilds; ghost painters in China; individualism versus product standardization; and the role of lineage. How works of art were commissioned; institutions supporting artists; how makers purveyed their goods; how artists were recognized by society; the relationship between patrons' desires and artists' modes of production.

5 units, not given this year

ARTHIST 486. Connoisseurship & Research Methods in Chinese Painting

addresses problems of attribution, dating, and authenticity in Chinese painting and calligraphy studies. Related issues of style analysis, technical studies, documentation, catalogues and other art literature are considered within the larger context of collecting history.

5 units, Spr (Vinograd, R)

ARTHIST 502. Methods and Historiography of Art History

Restricted to graduate students. From the origins of the discipline in 19th-century Germany to recent debates on visual studies. Iconology, formalism, semiotics, psychonalysis, and Marxist and feminist approaches to the work of art. Limited enrollment.

5 units, Aut (Hansen, M)

ARTHIST 507. Medieval Image Theory

The Middle Ages saw the development of a theoretical framework on visual representation in response to charges of idolatry. The defenders of religious images drew on the dogma of Incarnation; as the Virgin gave human flesh to the Logos/Christ, the image offered a material manifestation of the divine. Focus is on the change in perception and staging of the image. Early in the period, the icon or relic expressed the presence of the sacred; later in the period, visual representation was designed to trigger an emotional response that led the viewer to a union with the divine.

5 units, not given this year

ARTHIST 600. Art History Bibliography and Library Methods

1 unit, Aut (Blank, P)

ARTHIST 610. Teaching Praxis

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTHIST 620. Area Core Examination Preparation

For Art History Ph.D. candidates. Prerequisite: consent of instructor.

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ARTHIST 640. Dissertation Proposal Preparation

(Staff)

5 units, Aut (Staff), Win (Staff), Spr (Staff, 1), Sum (Staff)

ARTHIST 650. Dissertation Research

(Staff)

5 units, Aut (Staff, 1), Win (Staff), Spr (Staff, 1), Sum (Staff)

ARTHIST 660. Independent Study

For graduate students only. Approved independent research projects with individual faculty members.

1-15 units, Aut (Staff, 1), Win (Staff), Spr (Staff, 1), Sum (Staff)

ARTHIST 660E. Extended Seminar

May be repeated for credit. (Staff)

4 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTHIST 670. Dissertation Seminar

For graduate students writing and researching dissertations and dissertation proposals. How to define research projects, write grant proposals, and organize book-length projects.

3-5 units, not given this year

ARTHIST 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff, 1), Sum (Staff)

ART STUDIO (ARTSTUDI) COURSES

UNDERGRADUATE COURSES IN ART STUDIO

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ARTSTUDI 10. Contemporary Art Practices: Public Art, Territories, and the Politics of Food
A focus on contemporary art practices in public art, urban studies, and food-themed art projects. Students will survey artist's processes and topics such as urban locales, politicized territories, cultural identities and globalization of pivotal foods throughout history. Class will examine the artistic tactics of Suzanne Lacy, Daniel Martinez, Teddy Cruz, Rirkrit Tiravanija, among others. Students design proposal-based art, and (not required but encouraged) create food themed projects. Guests include curator Julio Morales, Torolab, historian Dawn Mabalon, other Stanford faculty. Field trips. Art majors and non-majors welcome.
2 units, Aut (Reyes, J)

ARTSTUDI 10AX. Filmmaking
Production skills and project development in documentary filmmaking. The fundamentals of filmmaking using digital video production techniques focused on documentary storytelling. Shooting in mini-DV format and editing with Final Cut Pro software, students actualize their ideas in an audiovisual medium from conceptualization through post-production and exhhibition.
2 units, not given this year

ARTSTUDI 12AX. Drawing Intensive: Revisiting Nature
As increasing technological advances can further separate us from direct impressions of nature, this class is designed to reconnect and enhance our relationship to the natural world and our surrounding environment. To do this we will develop visual skills and critical thinking through careful observation and classical drawing techniques. Inspired by Stanford's natural and manicured landscapes, students will enjoy the great outdoors while learning elements of perspective, composition, light, and form. Students will learn about master landscape artists, investigate the built and natural environment of the campus, and experiment with various drawing techniques, mediums, and styles.
2 units, Aut (Hewicker, S)

ARTSTUDI 14. Drawing the Imaginative Figure: Characters, Alter-Egos, Avatars and You
Drawing course where students create alter egos, fictional selves, and characters, utilize inspiration from fiction, true stories, and outrageous lies for stand-ins to express ideas and spawn imagery. An exploration of who one would rather be (and not be) and what one would rather say if only it were not so polite or it just did not sound peculiar in one's voice, but primarily to explore these things because it is fun to extend limits by playing pretend. Drawing from models costumed and posed in character from stories read aloud, fictionalized self-portrait assignments, assignments of animal or inanimate object that represents an aspect of us. Course incorporates found and self-written text, zines, and comics. Art majors and non-majors welcome. Recommended: drawing experience.
2 units, Aut (Katz, D)

ARTSTUDI 17. Fakes, Fictions, and Drama: The Constructed Image Staged and Imagined
Thematically focused photography course surveys ideas surrounding the staged photograph and its relationship to narrative and fiction. Workshop open studio format with slide lectures on historical and contemporary figures working within this genre of photography. Assignments include construction of scenes and collaborative photo shoots. Through discussions, demonstrations, and the creation of photographs, students explore the potential of the constructed image in their own work as well as its role in contemporary photo-based practices. Emphasis placed on conceptualizing ideas prior to making exposures. Art majors and non-majors welcome.
2 units, Win (Mazinani, S)

ARTSTUDI 18. Stories of Stuff: Art Making in the Global Economy
Focus is on the relationship of contemporary art to the material flows of the global economy. Seminar style discussion of art practices that deal with material politics and a studio based engagement with some specific materials in question. Students are required to conduct research on the material that they choose to work on, or with, in their final project. The form and media in which this project is realized is open and not limited to sculpture. Open to majors and non-majors.
2 units, Spr (Chapple, E)

ARTSTUDI 60. Design I : Fundamental Visual Language
Formal elements of visual expression (color, composition, space, and process) through hands-on projects. Two- and three-dimensional media. Emphasis is on originality and inventiveness. Content is realized abstractly. Centered in design; relevant to visual art study and any student seeking to develop visual perception. (lower level)
3-4 units, Aut (Edmark, J), Win (Edmark, J), Spr (Staff)

ARTSTUDI 70. Introduction to Photography
Critical, theoretical, and practical aspects of creative photography through camera and lab techniques. Field work. Cantor Art Center and Art Gallery exhibitions. 35mm camera required. (lower level)
4 units, Aut (Felzmann, L), Win (Felzmann, L), Spr (Felzmann, L), Sum (Staff)

ARTSTUDI 80. Color
Hands-on study of color to develop color sensitivity and the ability to manipulate color to exploit its expressive potential. Guided experimentation and observation. Topics include color relativity, color and light, color mixing, color harmony, and color and content. (lower level)
3-4 units, Aut (Edmark, J)

ARTSTUDI 130. Interactive Art I: Objects
The basics of sensors, processors, and actuators needed to create artworks that interact, record, and communicate. Emphasis is on the sculpture and interactive dimensions. (lower level)
4 units, Spr (DeMarinis, P)

ARTSTUDI 131. Sound Art I
Acoustic, digital and analog approaches to sound art. Familiarization with techniques of listening, recording, digital processing and production. Required listening and readings in the history and contemporary practice of sound art. (lower level)
4 units, Aut (DeMarinis, P)

ARTSTUDI 136. Future Media, Media Archaeologies
Hand-on. Media technologies from origins to the recent past. Students create artworks based on Victorian era discoveries and inventions, early developments in electronic media, and orphaned technologies. Research, rediscover, invent, and create devices of wonder and impossible objects. Readings in history and theory. How and what media technologies mediate. (lower level)
3-4 units, not given this year

ARTSTUDI 138. Sound and Image
Practices that combine audio and visual media. Topics include synesthesias, visual music, film soundtracks, and immersive multimedia practices that combine sound, music, still and moving images, projections, and performance. (lower level)
4 units, not given this year

ARTSTUDI 139. INTERMEDIA WORKSHOP
(Same as MUSIC 155) Students develop and produce intermedia works. Musical and visual approaches to the conceptualisation and shaping of time-based art. Exploration of sound and image relationship. Study of a wide spectrum of audiovisual practices including experimental animation, video art, dance, performance, non-narrative forms, interactive art and installation art. Focus on works that use music/sound and image as equal partners. Limited enrollment. Prerequisites: consent of instructors, and one of FILMPROD 114, ARTSTUDI 131, 138, 167, 177, 179, or MUSIC 123, or equivalent.
3-4 units, Spr (Kapuscinski, J; DeMarinis, P)

ARTSTUDI 140. Drawing I
Functional anatomy and perspective as they apply to problems of drawing the form in space. Individual and group instruction as students work from still life set-ups, nature, and the model. Emphasis is on the development of critical skills and perceptual drawing techniques for those with little or no previous experience with

pastels, inks, charcoal, conte, and pencil. Lectures alternate with studio work. (lower level)

4 units, Aut (Bean, K), Win (Chagoya, E), Spr (Xie, X)

ARTSTUDI 141. Drawing II

Intermediate/advanced. Observation, invention, and construction. Development of conceptual and material strategies, with attention to process and purpose. May be repeated for credit. Prerequisite: 140 or consent of instructor. (upper level)

4 units, Spr (Bean, K)

ARTSTUDI 145. Painting I

Introduction to techniques, materials, and vocabulary in oil painting. Still life, landscape, and figure used as subject matter. Emphasis is on painting and drawing from life. (lower level)

4 units, Aut (Xie, X), Win (Bean, K), Spr (Xie, X)

ARTSTUDI 146. Painting II

Symbolic, narrative, and representational self-portraits. Introduction to the pictorial strategies, painting methods, and psychological imperatives of Dürer, Rembrandt, Cézanne, Kahlo, Beckmann, Schiele, and Munch. Students paint from life, memory, reproductions, and objects of personal significance to create a world in which they describe themselves. May be repeated for credit. Prerequisites: 140, 145, or consent of instructor. (upper level)

4 units, Win (Bean, K), Spr (Chagoya, E)

ARTSTUDI 147S. Painting and Drawing

4 units, Sum (Bean, K)

ARTSTUDI 148. Monotype

Introduction to printmaking using monotype, a graphic art medium used by such artists as Blake, Degas, Gauguin, and Pendergast. May be repeated for credit. Prerequisite: 140. (lower level)

4 units, Spr (Chagoya, E)

ARTSTUDI 148A. Lithography

The classic technique of printing from limestones. Techniques to draw an image on the stone, etch and fix the image on the stone, and print it in numbered editions. Students work on a variety of stone sizes. Field trips to local publishers of lithography or lithography exhibitions. (lower level)

4 units, Win (Kain, K)

ARTSTUDI 148B. Introduction to Printmaking Techniques

Techniques such as monotype, monoprint, photocopy transfers, linocut and woodcut, intaglio etching. Demonstrations of these techniques. Field trips to local print collections or print exhibitions. (lower level)

4 units, Aut (Kain, K)

ARTSTUDI 149. Collage

The generative principles of this characteristic 20th-century art form. Along with assemblage (its three dimensional equivalent) and montage (its counterpart in photography, film, and video), collage introduced crucial aesthetic issues of the modern and postmodern eras. Typically, collage creates an expressive visual language through juxtaposition and displacement, and through materiality, difference, and event. Issues of location (where it happens), object (what it is), process (how it is realized), and purpose (why it is). Prerequisites: 140, 145, or consent of instructor. (upper level)

4 units, Win (Ebtekar, A)

ARTSTUDI 149A. Printmaking Relief

Various relief printmaking techniques explored with concentrated work in the processes of woodcut, linoleum cut and other related relief approaches. Students are exposed to contemporary practices in printmaking through visits to museums, print workshops, publishers, artists' studios, and other venues.

4 units, not given this year

ARTSTUDI 149B. Print Sliding Off the Page

An exploration of how printmaking has influenced visual and political culture in the 21st century. A seminar and workshop introducing mono print, photography and photo transfers. Artists (Angus Fairhurst, Helen Chadwick, Romare Beardon, Barbera Kruger) were advocates of self representation and exploring traditional techniques. Field trips to SF MOMA, Cantor Museum, and an artist studio. Guest lecture Stanford Art Gallery. Enrollment limited to 9.

4 units, Aut (Staff)

ARTSTUDI 151. Sculpture I

Traditional and non-traditional approaches to sculpture production through working with materials including wood, metal, and plaster. Conceptual and technical skills, and safe and appropriate use of tools and materials. Impact of material and technique upon form and content; the physical and expressive possibilities of diverse materials. Historical and contemporary forming methods provide a theoretical basis for studio work. Field trips; guest lecturers.

4 units, Win (Staff), Spr (Staff)

ARTSTUDI 152. Sculpture II

Builds upon 151. Installation and non-studio pieces. Impact of material and technique upon form and content; the physical and expressive possibilities of diverse materials. Historical and contemporary forming methods provide a theoretical basis for the studio work. Field trips; guest lecturers. (upper level)

4 units, Spr (Berlier, T)

ARTSTUDI 153. Ecology of Materials

Studio-based sculpture course. Materials used in sculpture and environmental concerns surrounding them. Artists concerned with environmental impact and the interconnection of art with other fields. The impact of material and technique upon form and content; understanding the physical and expressive possibilities of diverse materials. Conceptual and technical considerations. Group discussions, critiques, readings, video presentations, a field trip to a local artist-in-residence program, and visiting lecturers. (lower level)

4 units, Aut (Berlier, T)

ARTSTUDI 154. Kinetic Sculpture

Course developed in conjunction with Lively Arts and SICA to bring students in closer dialogue with artists working interdisciplinary on collaborative projects. Students work with visiting artist Trimpin, a MacArthur genius, in the design and construction of collaborative kinetic projects. The kinetic sculptures created in class are used for Trimpin's installation and performance work, The Gurs Zyklus (The Gurs Cycle), a world premiere at Memorial Auditorium in May. Students use both the Sculpture Lab facilities and the PRL. Engineers, sculptors, artists, majors and non-majors are welcome. (lower level)

4 units, Win (Berlier, T)

ARTSTUDI 155. Social Sculpture

Collect real time data via sensors to create artistic interventions. Focus is on art in the public sphere, in the landscape with references to cultural or social context. Articulation of artistic concepts is through site specific work and public interventions. Quick prototypes of sensors are created through Cycling74's (MAX/MSP/Jitter) visual programming environment.

4 units, Aut (Staff)

ARTSTUDI 160. Design II: The Bridge

The historical spectrum of design including practical and ritual. The values and conceptual orientation of visual fundamentals. Two- and three-dimensional projects sequentially grouped to relate design theory to application, balancing imaginative and responsible thinking. Prerequisite: ARTSTUDI 60. Corequisite: ME 203 (upper level)

3-4 units, Win (Kahn, M), Spr (Edmark, J)

ARTSTUDI 161. Catalysts for Design

Nature and science as sources of design inspiration. Projects in natural pattern formation, biological growth and form, Fibonacci numbers and the golden section, planar and spatial symmetry, mechanics, chaos, and fractals. Emphasis is on importance of creative synthesis to the design process. Projects take the form of physical constructions as opposed to renderings or computer models. Field trips. (lower level)

3-4 units, not given this year

ARTSTUDI 163. Paper

Beyond conventional use of paper as a foundation for mark making to its potential as a medium in its own right. Students experiment with papers to develop facility with techniques of folding, scoring, curling, cutting, tearing, piercing, embossing, layering, and binding to create three-dimensional forms, patterned/textured surfaces, reliefs, interactive dynamic structures such as pop-ups, containers, and book forms. (upper level)

3-4 units, not given this year

ARTSTUDI 166. Design in Motion
Design areas for which movement and transformation are essential. Experimentation with mechanical means such as linking, hinging, inflating, and rotating. Projects in lighting, automata, tools and utensils, chain reactions, toys and games, festival props, and quasi-architecture emphasize the creation of works in which motion is a significant agent for aesthetic gratification. No experience in mechanical engineering required. (lower level)
3-4 units, not given this year

ARTSTUDI 167. Introduction to Animation
Projects in animation techniques including flipbook, cut-out/collage, stop-motion such as claymation, pixilation, and puppet animation, rotoscoping, and time-lapse. Films. Computers used as post-production tools, but course does not cover computer-generated animation. (lower level)
3-4 units, Win (Edmark, J)

ARTSTUDI 169. Professional Design Exploration
Six to eight mature projects are stimulated by weekly field trips into significant areas of design activity or need. (upper level)
4 units, not given this year

ARTSTUDI 170. Projects in Photography
Students pursue a topic of their own definition. Further exploration of darkroom and other printing techniques; contemporary theory and criticism. (lower level)
4 units, Aut (Felzmann, L), Win (Felzmann, L)

ARTSTUDI 172. Alternative Processes
Priority to advanced students. Technical procedures and the uses of primitive and hand-made photographic emulsions. Enrollment limited to 10. Prerequisites: 70, 170, 270, or consent of instructor. (upper level)
4 units, Spr (Leivick, J)

ARTSTUDI 173. Introduction to Digital Photography and Visual Images
Students use Adobe Lightroom to organize and edit images, manipulate and correct digital files, print photographs, create slide shows, and post to the Internet. How to use digital technology to concentrate on visual thinking rather than darkroom techniques. (lower level)
4 units, Aut (Dawson, R), Spr (Dawson, R)

ARTSTUDI 175A. Light as a Sculptural Element
The application of light as a transformative medium in visual art practices. Artists such as Thomas Wilfred, Nam June-Paik, James Turrell, Ann Hamilton, Won Ju Lim, Diana Thater, Wolfgang Laib, Cai Guo-Qiang, Robert Irwin, Shirin Neshat, Bill Viola, and Olafur Eliasson. (upper level)
4 units, not given this year

ARTSTUDI 177. Video Art I
Students create experimental video works. Conceptual, formal, and performance-based approaches to the medium. The history of video art since the 70s and its influences including experimental film, television, minimalism, conceptual art, and performance and electronic art. Topics: camera technique, lighting, sound design, found footage, cinematic conventions, and nonlinear digital editing. (lower level)
4 units, Aut (Barber, J)

ARTSTUDI 177A. Video Art II
Advanced. Video, criticism, and contemporary media theory investigating the time image. Students create experimental video works, addressing the integration of video with traditional art media such as sculpture and painting. Nonlinearity made possible by Internet and DVD-based video. Prerequisite: 177 or consent of instructor. (upper level)
4 units, Spr (Staff)

ARTSTUDI 178. Art and Electronics
Analog electronics and their use in art. Basic circuits for creating mobile, illuminated, and responsive works of art. Topics: soldering; construction of basic circuits; elementary electronics theory; and contemporary electronic art. (lower level)
4 units, Win (Wight, G)

ARTSTUDI 179. Digital Art I
Contemporary electronic art focusing on digital media. Students create works exploring two- and three-dimensional, and time-based uses of the computer in fine art. History and theoretical underpinnings. Common discourse and informative resources for material and inspiration. Topics: imaging and sound software, web art, and rethinking the comptuer as interface and object. (lower level)
4 units, Aut (Wight, G)

ARTSTUDI 179A. Digital Art II
Advanced. Interactive art works using multimedia scripting software. Experimental interfaces, computer installation work, and mobile technologies. Contemporary media art theory and practice. (upper level)
4 units, Win (Staff)

ARTSTUDI 184. Art and Biology
The relationship between biology and art. Rather than how art has assisted the biological sciences as in medical illustration, focus is on how biology has influenced art making practice. New technologies and experimental directions, historical shifts in artists' relationship to the living world, the effects of research methods on the development of theory, and changing conceptions of biology and life. Projects address these themes and others that emerge from class discussions and presentations. (upper level)
4 units, Spr (Staff)

ARTSTUDI 184A. Along the Track of the Yellowstone Hotspot: Fusion of Art and Science
(Same as BIO 122) The 20-million-year-old track of the Yellowstone hotspot through western North America, using the field setting to investigate ecology, evolution, and geology through an aesthetic and documentary media lens. Students create: experiential ways to learn about the natural world; a scientific yet personal intimacy about how ecosystems work and how they change; and ways to convey their observations to the public. Required trip to Yellowstone National Park.
4 units, not given this year

ARTSTUDI 185. Topics in Media Studies: Street Media
Literal and figurative meanings of street and how they provide potential to media technologies and invite innovative forms of artistic practice. Contemporary art as the juncture where street movements and new media collide. Small projects. (upper level)
4 units, Spr (Wight, G)

ARTSTUDI 230. Interdisciplinary Art Survey
The diversity of artistic concepts and strategies; artists who use the different media taught in the department's studio program such as painting, drawing, video and digital art, printmaking, photography, and sculpture. Field trips to local museums and collections, artists studios, and libraries. Student research. Priority to Art Studio majors and minors. (upper level)
4 units, Win (Gordon, J)

ARTSTUDI 246. Individual Work: Drawing and Painting
Prerequisites: two quarters of painting or drawing and consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 249. Advanced Undergraduate Seminar
Capstone experience for majors in Studio Art. Interdisciplinary. Methods of research, crossmedia critiques, and strategies for staging and presenting work. Guest artists from the Bay Area. (upper level)
3-4 units, Spr (Bell, C)

ARTSTUDI 250. Individual Work: Sculpture
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 260. Individual Work: Design
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 262. The Chair
Students design and fabricate a highly refined chair. The process is informed and supported by historical reference, anthropometrics, user testing, form studies, material investigations, and construction of scale models and full-size prototypes. Prerequisites: ARSTUDI 160 and ME 203, or consent of instructor. (upper level)
4 units, Spr (Edmark, J)

ARTSTUDI 265. Design for Exploration
A collaboration with the Exploratorium in San Francisco. Students investigate and experiment with all aspects of the creation of interactive museum exhibits. On-site exhibit floor sessions and prototyping workshops. Lectures from museum staff on exhibit design. Students design and construct exhibits for temporary placement on

the floor of the Exploratorium. Prerequisites: ME 203 or consent of instructor. (upper level)
3-4 units, not given this year

ARTSTUDI 268. Design Synthesis
Mature semi-elective problems in composite and multimedia design areas. May be repeaed for credit. Prerequisites: two design courses above 160. (upper level)
4-6 units, not given this year

ARTSTUDI 269. Advanced Creative Studies
Seminar based on elective design projects in areas of individual specialization. May be repeated for credit. Prerequisite: consent of instructor. (upper level)
1-15 units, Aut (Kahn, M)

ARTSTUDI 270. Advanced Photography Seminar
Student continues with own work, showing it in weekly seminar critiques. May be repeated for credit. (upper level)
1-5 units, Win (Leivick, J), Spr (Leivick, J)

ARTSTUDI 271. The View Camera: Its Uses and Techniques
For students of photography who wish to gain greater control and refine skills in image making. 4x5 view cameras provided. Enrollment limited to 8. (upper level)
4 units, Win (Leivick, J)

ARTSTUDI 272. Individual Work: Photography
Student continues with own work, showing it in weekly seminar critiques. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 273. Individual Work: Digital Media
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 274. Individual Work: Digital Art
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ARTSTUDI 276. The Photographic Book
Grouping and sequencing photographic images to produce a coherent body of work with a thematic structure. (lower level)
4 units, not given this year

GRADUATE COURSES IN ART STUDIO

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ARTSTUDI 310A. Directed Reading: Studio
1-15 units, Aut (Staff)

ARTSTUDI 310B. Directed Reading: Studio
1-15 units, Win (Staff)

ARTSTUDI 310C. Directed Reading: Studio
1-15 units, Spr (Staff)

ARTSTUDI 342. MFA Project: Studio
Two weekly seminars, studio practice, and individual tutorials. Object seminar: student work is critiqued on issues of identity, presentation, and the development of coherent critical language. Concept seminar: modes of conceptualization to broaden the base of cognitive and generative processes. May be repeated for credit.
1-15 units, Aut (Xie, X), Win (Berlier, T), Spr (Wight, G)

ARTSTUDI 360A. Master's Project: Design
Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility.
3 units, Aut (Edmark, J; Franceschini, A)

ARTSTUDI 360B. Master's Project: Design
Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility.
3 units, Win (Franceschini, A)

ARTSTUDI 360C. Master's Project: Design
Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility.
3 units, Spr (Franceschini, A)

ARTSTUDI 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ASIAN AMERICAN STUDIES (ASNAMST) COURSES

UNDERGRADUATE COURSES IN ASIAN AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ASNAMST 74N. Race and Ethnicity in Contemporary American Fiction: Boundaries and Border Crossings
(Stanford Introductory Seminar) (Same as ENGLISH 74N) The question of place and locality in studies of identity and racial formation. Goal is to engage and examine texts with a critical eye both toward the social contexts represented and to the imaginative aesthetic techniques that American writers of color offer to bring their fictional worlds to life. Theme of border hopping and boundary crossing in works by authors including Charles Johnson, Toni Morrison, Alejandro Morales, Julie Otsuka, Stephen Graham Jones, and Lan Samantha Chang. GER:DB-Hum
3 units, Win (Sohn, S)

ASNAMST 100C. EAST House Seminar: Current Issues and Debates in Education
(Same as EDUC 100C) Education and Society Theme (EAST) House seminar. In Autumn Quarter, five current issues broadly related to education and society are discussed and debated among students and faculty. In Winter Quarter, topics pertaining to gender and education, particularly in developing countries, are explored. In the spring, the seminar revolves around race and ethnicity in higher education. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.
1 unit, Spr (Wotipka, C)

ASNAMST 146S. Asian American Culture and Community
(Same as AMSTUD 146, COMPLIT 146, CSRE 146S) An examination of the history of Asians in America via one case history: the International Hotel in San Francisco. Background history of Asians in America, and the specifics of the I Hotel case as involving the convergence of global and local economies, urban redevelopment, and housing issues for minorities. Focus on the convergence of community and cultural production. Service learning component involving community work at the Manilatown Heritage Foundation in San Francisco. Service Learning Course (certified by Haas Center). GER:DB-Hum
5 units, Aut (Palumbo-Liu, D)

ASNAMST 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges
(Same as AFRICAAM 173S, CSRE 173S) Lived experience of people who dwell in the border world of race and nation where they negotiate transcultural and multiethnic identities and politics. Comparative, historical, and global contexts such as family and class. Controversies, such as representations of mixed race people in media and multicultural communities. What the lives of people like Tiger Woods and Barack Obama reveal about how the marginal is becoming mainstream.
5 units, Spr (Murphy-Shigematsu, S)

ASNAMST 179. Asian American Experiences and Documentary Practice
(Same as FILMSTUD 279, CSRE 179) Focus is on documentary cinema as a technology for understanding Asian Americans in the U.S. The social and historical context of the formation of the Asian American filmmaker, an authorial position that emerges in the 60s and 70s as part of the civil rights movement. Works include films by Loni Ding, Bob Nakamura and Curtis Choy; readings about the establishment of Asian American media industries and Asian American film criticism as a multi-genre. Social issue documentaries that represent new ethnographies of social experience including transnational adoption (Daughter From Danang), refugee experience (AKA Don Bonus), and sex tourism (The Women Outside). Readings include analyses of the implications of these works for cinema studies, ethnic studies, and the politics of film in everyday life. Experimental documentaries and their interrogation of the limits of the documentary form

in representing identities and social problems. How does representation matter within and for Asian America in framing the complexities of race and racial identity? Screenings include works by Marlon Fuentes, Rea Tajiri and Trinh T. Minh-ha.

5 units, Spr (Shimizu, C)

ASNAMST 185A. Race and Biomedicine

(Same as ANTHRO 185A) Race, identity, culture, biology, and political power in biomedicine. Biological theories of racial ordering, sexuality and the medicalization of group difference. Sources include ethnography, film, and biomedical literature. Topics include colonial history and medicine, the politics of racial categorization in biomedical research, the protection of human subjects and research ethics, immigration health and citizenship, race-based models in health disparities research and policy, and recent developments in human genetic variation research.

3-5 units, Aut (Lee, S)

ASNAMST 187. Geography, Time, and Trauma in Asian American Literature

(Same as AMSTUD 261A, ENGLISH 261A) The notion that homes can be stable locations for cultural, racial, ethnic, and similarly situated identity categories. Tthe possibility that there really is no place like home for Asian American subjects. How geography, landscape, and time situate traumas within fictional Asian American narratives.

5 units, Aut (Sohn, S)

ASNAMST 188. Gender and Sexuality in Asian American Literature

(Same as AMSTUD 261F, ENGLISH 261F) How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings include literary criticism, and feminist and queer theory.

5 units, Win (Sohn, S)

ASNAMST 200R. Directed Research

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ASNAMST 200W. Directed Reading

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION (ATHLETIC) COURSES

UNDERGRADUATE COURSES IN ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ATHLETIC 2. Abs and Glutes

Lower body workout to strengthen glutes and thighs, and abdominal training. Fee. (AU)

1 unit, Aut (McWherter, B), Win (McWherter, B), Spr (McWherter, B), Sum (Conniff, N)

ATHLETIC 3M. Aikido

1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 4C. Archery Club Team

(AU) (Staff)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 7. Badminton, Beginning/Intermediate

Skills, knowledge, and etiquette including fundamentals such as serving, forehand and backhand shots, drops, and smashes. Score keeping. Strategies for play in singles and doubles. Fee. (AU)

1 unit, Aut (Staff)

ATHLETIC 8C. Badminton Club Team

(AU)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 10. Band, Sports Activity

(AU)

1 unit, Aut (Aquilanti, G), Win (Aquilanti, G), Spr (Aquilanti, G)

ATHLETIC 12V. Baseball, Varsity Men

(AU)

1-2 units, Aut (Marquess, M; Stotz, D), Win (Marquess, M; Stotz, D), Spr (Marquess, M; Stotz, D)

ATHLETIC 14V. Basketball, Varsity Men

(AU)

1-2 units, Aut (Dawkins, J), Win (Dawkins, J)

ATHLETIC 15V. Basketball, Varsity Women

(AU)

1-2 units, Aut (VanDerveer, T), Win (VanDerveer, T)

ATHLETIC 20M. Capoeira Club

1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 22C. Competitive Cheer Club

1 unit, Aut (Mahlow, P), Win (Mahlow, P)

ATHLETIC 23. Core Training

Exercises to build muscular strength and body core endurance, focusing on balance and stability. Equipment includes stability and medicine balls. Fee. (AU)

1 unit, Aut (Conniff, N), Win (Conniff, N), Spr (Conniff, N), Sum (Conniff, N)

ATHLETIC 25V. Crew, Varsity Men

(AU)

1-2 units, Aut (Amerkhanian, C), Win (Amerkhanian, C), Spr (Amerkhanian, C)

ATHLETIC 26V. Crew, Varsity Women

(AU)

1-2 units, Aut (Farooq, Y), Win (Farooq, Y), Spr (Farooq, Y)

ATHLETIC 27. Cross Training Fitness

Cross training fitness class will focus on combining different types of exercises to work the body as a whole to develop cardiovascular fitness, strength and power. All fitness levels are welcome. Class sessions will include exercises such as: indoor cycling, plyometrics, rowing, jump rope, circuit training, and various other exercises.

1 unit, Aut (Ninow, A; Alexander, M)

ATHLETIC 28V. Cross Country, Varsity Men

(AU)

1-2 units, Aut (Dunn, J)

ATHLETIC 29V. Cross Country, Varsity Women

(AU)

1-2 units, Aut (Dunn, J)

ATHLETIC 31C. Cycling Club Team

(AU)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 33. Diving, Springboard

Basic techniques and mechanics of springboard and platform diving. Five basic categories of dives will be introduced: front, back, inward, reverse and twist. Competitive aspects of diving. Fee.

1 unit, Aut (Schavone, R)

ATHLETIC 34V. Diving, Varsity Men

(AU)

1-2 units, Aut (Schavone, R), Win (Schavone, R), Spr (Schavone, R)

ATHLETIC 35V. Diving, Varsity Women

(AU)

1-2 units, Aut (Schavone, R), Win (Schavone, R), Spr (Schavone, R)

ATHLETIC 37C. Equestrian Club Team

(AU)

1 unit, Aut (Bartsch, V), Win (Bartsch, V), Spr (Bartsch, V)

ATHLETIC 38M. Eskrima

1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 39. Fencing: Beginning
The sport of swordmanship develops quick hands, strong legs, and a strategic mind. Footwork, handwork, and bouting. Emphasis is on foil technique. All equipment provided. Fee. (AU)
1 unit, Aut (Milgram, L), Win (Posthumus, E)

ATHLETIC 40. Fencing, Intermediate
Continuation of 39; learn advanced footwork and handwork. Strategy and bouting. Introduction to epee and saber. All equipment provided. Prerequisite: 39. Fee. (AU)
1 unit, Win (Pogossov, G), Spr (Pogossov, G)

ATHLETIC 41V. Fencing, Varsity Men
(AU)
1-2 units, Aut (Posthumus, E), Win (Posthumus, E), Spr (Posthumus, E)

ATHLETIC 42V. Fencing, Varsity Women
(AU) (Milgram)
1-2 units, Aut (Posthumus, E), Win (Posthumus, E), Spr (Posthumus, E)

ATHLETIC 44. Fitness for Life
For improving overall fitness level. Workouts include brief periods of high intensity exercise interspersed with lower intensity exercise or rest. Short duration agility runs, weight lifting, and cardiovascular improvement. Proper stretching techniques, warm-ups, cool-downs, and monitoring heart rate. Fee. (AU)
1 unit, Win (Irvine, L)

ATHLETIC 46. Field Hockey, Intermediate
For those with prior experience. Techniques, skills, and strategy. Scrimmages and game-like scenarios. Fee. (AU)
1 unit, Win (Irvine, L)

ATHLETIC 47V. Field Hockey, Varsity Women
(AU)
1-2 units, Aut (Staff), Spr (Irvine, L)

ATHLETIC 48V. Football, Varsity
(AU)
1-2 units, Aut (Harbaugh, J), Spr (Harbaugh, J)

ATHLETIC 49. Golf for Women: Beginning
Fundamentals of the golf swing: putting, chipping and sand play. Golf etiquette and rules. Fee.
1 unit, Win (O'Connor, C; Mussani, S)

ATHLETIC 51. Golf: Beginning
Fundamentals of the golf swing; putting, chipping, and sand play. Golf etiquette and rules. Fee. (AU)
1 unit, Aut (Miller, J), Win (Miller, J), Spr (Marrone, P), Sum (Miller, J)

ATHLETIC 52. Golf: Advanced Beginning
Further development of the golf swing and short game. How to practice. Rules and etiquette. Prerequisite: 51 or golf experience. Fee. (AU)
1 unit, Aut (Flippo, K), Win (Miller, J), Spr (Miller, J), Sum (Miller, J)

ATHLETIC 53. Golf: Intermediate
Drills and practice on all facets of golf. How to lower scores and manage the game on the course. Prerequisite: 52 or equivalent. Fee. (AU)
1 unit, Aut (Flippo, K), Win (Acosta, E; Tight, M), Spr (Marrone, P), Sum (Miller, J)

ATHLETIC 54. Golf: Advanced
Goal is to refine the golf swing and increase power, distance, and accuracy. Course management, mental preparation, visualization techniques. Prerequisites: 53 or experience playing and practicing, and the ability to hit shots with relative accuracy and distance. Fee. (AU)
1 unit, Aut (Miller, J), Win (Ray, C; Tight, M), Spr (Miller, J)

ATHLETIC 55V. Golf, Varsity Men
(AU)
1-2 units, Aut (Ray, C), Win (Ray, C), Spr (Ray, C)

ATHLETIC 56V. Golf, Varsity Women
AU
1-2 units, Aut (O'Connor, C), Win (O'Connor, C), Spr (O'Connor, C)

ATHLETIC 58. Gymnastics: Beginning
Fundamental gymnastics movement for men and women, including flexibility and strength exercises taught on the Olympic apparatus including floor, balance beam, bars, and rings. Fee. (AU)
1 unit, Aut (Swircek, C), Win (Staff), Spr (Swircek, C)

ATHLETIC 60V. Gymnastics, Varsity Men
(AU)
1-2 units, Aut (Glielmi, T), Win (Glielmi, T), Spr (Glielmi, T)

ATHLETIC 61V. Gymnastics, Varsity Women
(AU)
1-2 units, Aut (Smyth, K), Win (Smyth, K), Spr (Smyth, K)

ATHLETIC 63. Hip Hop
Funky, jazzy, hip hop dance for fun and cardiovascular fitness. Fee. (AU)
1 unit, Aut (Miller Bell, A; Navarro, L), Win (Miller Bell, A; Navarro, L), Spr (Miller Bell, A; Navarro, L), Sum (Miller Bell, A)

ATHLETIC 64. Hockey, Floor
Fast-paced game adapted from ice hockey. Basic passing and shooting, offensive and defensive play, game strategy, team play. All equipment provided, eye guards required. Fee.
1 unit, Aut (Kacir, V), Win (Kacir, V)

ATHLETIC 65. Horsemanship: Beginning Riding
No experience needed. Basic horsemanship and riding at the walk, trot and canter. Fee. (AU)
1 unit, Aut (Bartsch, V), Win (Bartsch, V), Spr (Bartsch, V)

ATHLETIC 66. Horsemanship: Advanced Beginning Riding
Horsemanship and horse care; the canter and basic jumping. Prerequisite: 65 or equivalent. Fee. (AU)
1 unit, Aut (Bartsch, V), Win (Bartsch, V), Spr (Bartsch, V)

ATHLETIC 67. Horsemanship: Intermediate Riding
Basic veterinary skills and barn management. Riding at all gaits and completing horsemanship patterns (Western) or jumping basic courses (English). Fee. Prerequisite: 66 or equivalent. (AU)
1 unit, Aut (Bartsch, V), Win (Bartsch, V), Spr (Bartsch, V)

ATHLETIC 68. Horsemanship: Student Assistant
(Bartsch)
1 unit, Aut (Bartsch, V), Win (Bartsch, V), Spr (Bartsch, V)

ATHLETIC 70C. Horse Polo Club Team
(AU)
1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 72C. Ice Hockey Club Team
Men (AU)
1 unit, Aut (Mahlow, P), Win (Mahlow, P)

ATHLETIC 73M. JKA Shotokan Karate
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 74C. Judo Club Team
(AU)
1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 75M. Jujitsu Self Defense
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 76. Kickboxing
High intensity cardio workout incorporating kicks, punches, and elbow/knee and other combinations inspired by martial arts and boxing. Fee. (AU)
1 unit, Aut (Mandell, M), Win (Mandell, M), Spr (Mandell, M)

ATHLETIC 77C. Lacrosse Club Team (Men)
(AU)
1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 78M. Kenpo Karate
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 78V. Lacrosse, Varsity Women
(AU)
1-2 units, Aut (Bokker, A), Win (Bokker, A), Spr (Bokker, A)

ATHLETIC 80. Lifeguard Training
Priority to those wanting to guard at Stanford during the year. Lifeguard characteristics and responsibilities, recognition of hazards and emergencies, patron and facility surveillance, interaction with the public, rescue skills. Community first aid and CPR for the

professional rescuer. Fee. Prerequisite: pass swim test (swimmer/advanced swimmer level).
2 units, Spr (Erdrich, M; Carpenter, R)

ATHLETIC 81M. Muay Thai
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 82. Manager: Athletic Team
For student managers of intercollegiate teams. Prerequisite: consent of respective varsity team head coach. (AU)
1 unit, Aut (Staff), Win (Dawkins, J), Spr (Staff)

ATHLETIC 86. Racquetball Fundamentals
An introduction to the fundamentals of racquetball.
1 unit, Spr (Stein, E)

ATHLETIC 88. Beginning Rowing for Women
This class is an introduction to the sport of rowing using ergometer machines. The fundamentals of proper form, technique and workouts to develop cardiovascular fitness will be taught. If you are interested in trying out for the Women's Rowing team this is an excellent class to give you the basics.
1 unit, Aut (Farooq, Y), Win (Staff)

ATHLETIC 89. Rowing Ergometer
Introduction to aerobic based training utilizing rowing machines. Rowing, core, flexibility and VO2 expansion. Fee.
1 unit, not given this year

ATHLETIC 90. Pilates Mat
Balanced sequence of exercises emphasizing grace and balance. Breath work and precision separate Pilates from traditional conditioning methods. Fee. (AU)
1 unit, Aut (Conniff, N), Win (Conniff, N), Spr (Conniff, N)

ATHLETIC 91C. Rugby Club Team (Men)
(AU)
1 unit, Aut (Griffin, P), Win (Griffin, P), Spr (Griffin, P)

ATHLETIC 92C. Rugby Club Team (Women)
(AU)
1 unit, Aut (Griffin, P), Win (Griffin, P), Spr (Griffin, P)

ATHLETIC 94C. Running Club
(AU)
1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 95. Running at Stanford
Develop a training plan to meet your running goals. Proper form, warm ups, cool downs. Middle distance and distance workouts to meet your running goals.
1 unit, Aut (Vidal, D)

ATHLETIC 98. Sailing, Beginning
Skills, theory, and techniques to enable beginners to sail with confidence in small centerboard boats. Fee. (AU)
1 unit, Aut (Ustach, F), Spr (Ustach, F)

ATHLETIC 99. Sailing, Advanced Beginning
Continuation of ATHLETIC 98. For those with some sailing experience but not yet ready for intermediate sailing. Fee. May be repeated for credit. Prerequisites: ATHLETIC 98 or consent of instructor.
1 unit, Aut (Ustach, F), Spr (O'Bryan, M)

ATHLETIC 100. Sailing, Intermediate
Refine skills. Introduction to racing. Prerequisite: ATHLETIC 99 or consent of instructor. Fee. (AU)
1 unit, Aut (O'Bryan, M), Spr (O'Bryan, M)

ATHLETIC 104V. Sailing, Varsity Men
(AU)
1-2 units, Aut (Vandemoer, J), Win (Vandemoer, J), Spr (Vandemoer, J)

ATHLETIC 105V. Sailing, Varsity Women
(AU)
1-2 units, Aut (Vandemoer, J), Win (Vandemoer, J), Spr (Vandemoer, J)

ATHLETIC 107C. Ski Club Team
(AU)
1 unit, Win (Mahlow, P)

ATHLETIC 109. Social Dance, Beginning
Introduction to partner dancing. Steps, styling, and rhythms in popular social dances. No experience or partner necessary. Fee. (AU) Fall quarter: Foxtrot, Tango, Cha-Cha, and Salsa will be covered. Winter quarter: Waltz, Viennese Waltz, Rumba, and Hustle will be covered. Spring quarter: Foxtrot, Tango, Samba, and Night Club 2-Step will be covered.
1 unit, Aut (Greer, K), Win (Greer, K), Spr (Greer, K)

ATHLETIC 112. Soccer: Intermediate/Advanced
For the player with club or high school experience. Small group offensive and defensive tactics. Drills and small-sided games. Fee.
1 unit, Spr (Becerra, R; Cooney, J)

ATHLETIC 113. Soccer: Indoor, Beginning/Intermediate
For those with little or no playing experience. Skills, rules, small sided games. Fee. (AU)
1 unit, Win (Cooney, J; Becerra, R)

ATHLETIC 114. Soccer, Indoor: Intermediate/Advanced
Smaller ball and playing area. Emphasis is on individual ball skills through small sided games. Fee. (AU)
1 unit, Win (Cooney, J)

ATHLETIC 115. Soccer: Advanced for Men
Techniques under pressure; small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. Fee. (AU)
1 unit, Win (Simon, B)

ATHLETIC 116. Soccer: Advanced for Women
Techniques under pressure; small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. Fee. (AU)
1 unit, Win (Ratcliffe, P)

ATHLETIC 118V. Soccer, Varsity Men
(AU)
1-2 units, Aut (Simon, B), Spr (Simon, B)

ATHLETIC 119V. Soccer, Varsity Women
(AU)
1-2 units, Aut (Ratcliffe, P), Spr (Ratcliffe, P)

ATHLETIC 121V. Softball, Varsity Women
(AU)
1-2 units, Aut (Rittman, J), Win (Rittman, J), Spr (Rittman, J)

ATHLETIC 122. Spin Bike Cross Training
Aerobic based expansion utilizing spin bikes. Emphasis on volume work rather than anaerobic training. Heart rate monitoring, core, flexibility and nutrition information for more efficient fueling. Fee.
1 unit, Win (Amerkhanian, C)

ATHLETIC 123. Squash, Beginning/Intermediate
Techniques, rules and practice matches. Racquets, balls, and eye guards provided. Limited enrollment. Fee.
1 unit, Aut (Talbott, M), Win (Talbott, M), Spr (Talbott, M)

ATHLETIC 125C. Squash Club Team (Men)
(AU)
1 unit, Aut (Talbott, M), Win (Talbott, M), Spr (Talbott, M)

ATHLETIC 126V. Squash, Varsity Women
(AU)
1-2 units, Aut (Talbott, M), Win (Talbott, M), Spr (Talbott, M)

ATHLETIC 128. Swimming: Overcome Fear of Water
Overcome fear and discomfort in water. Learn to be comfortable and in control in both shallow and deep water. Feel balanced in water. Learn how water works and how your body works in water. If time permits, introduction to front crawl.
1 unit, Spr (Lonaker, S)

ATHLETIC 129. Swimming: Beginning
For non-swimmers or those who can swim about 10 yards but are not comfortable in deep water. Safety skills, front crawl, and back stroke. Additional strokes introduced as ability warrants. Fee. (AU)
1 unit, Aut (Neuhold-Huber, Z), Spr (Vargas, J), Sum (Neuhold-Huber, Z)

ATHLETIC 130. Swimming: Advanced Beginning
For those with limited swimming and safety skills. Safety skills, crawl, and elementary backstroke or back crawl. Introduction to sidestroke and breaststroke. Increase time and distance of swim. Prerequisite: ability to swim 25-50 yards on front and back. Fee. (AU)
1 unit, Aut (Neuhold-Huber, Z), Win (Neuhold-Huber, Z), Spr (Neuhold-Huber, Z), Sum (Neuhold-Huber, Z)

ATHLETIC 131. Swimming: Intermediate
Crawl, elementary backstroke, backstroke, and sidestroke. Safety skill work as needed. Introduction to or review of breaststroke. Open turns. Introduction to butterfly, flip turn, and conditioning.

Prerequisites: crawl, elementary backstroke, backstroke; some sidestroke and breaststroke; ability to swim approximately 100-200 yards continuously by mixing strokes. Fee. (AU)

1 unit, Aut (Neuhold-Huber, Z), Win (Neuhold-Huber, Z), Spr (Whildin, S), Sum (Neuhold-Huber, Z)

ATHLETIC 132. Swimming: Advanced

Review and refine all basic strokes and safety skills. Introduction to or review of butterfly and flip turn. Stroke drills and information on conditioning and designing individual workouts. Prerequisite: average to good strokes; ability to swim approximately 400-500 yards continuously. Fee. (AU)

1 unit, Aut (Tanner, J), Spr (Maurer, L)

ATHLETIC 133. Swim Conditioning

Improve cardio-respiratory endurance through directed swimming workouts. Technique corrections as needed. Prerequisite: advanced swimmer. Fee. (AU)

1 unit, Aut (Kenney, A), Win (Bokker, A), Spr (Knapp, T)

ATHLETIC 135V. Swimming, Synchronized: Varsity

(AU)

1-2 units, Aut (Olson, H), Win (Olson, H), Spr (Olson, H; Lowe, S)

ATHLETIC 136V. Swimming, Varsity Men

(AU)

1-2 units, Aut (Kenney, A), Win (Kenney, A), Spr (Kenney, A)

ATHLETIC 137V. Swimming, Varsity Women

(AU)

1-2 units, Aut (Maurer, L), Win (Maurer, L), Spr (Maurer, L)

ATHLETIC 139. Table Tennis

Basic counters, topspins, and chops with both the forehand and backhand. Serve and return, emphasizing game situations and match play. All equipment provided. Fee.

1 unit, Aut (Shodhan, S), Win (Shodhan, S), Spr (Shodhan, S)

ATHLETIC 140. Taiji Quan (Tai Chi)

(Same as ATHLETIC 44444) Taiji Quan (Tai Chi) is a Chinese martial arts system of slow meditative physical exercise designed for relaxation, balance and health. All levels are welcome.

1 unit, Aut (Ghormley, T)

ATHLETIC 141C. Tae Kwon Do Club

(AU)

1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 144. Tennis: Beginning

Forehand, backhand, serve, and net play; rules and scoring. (AU)

1 unit, Aut (Coupe, B), Win (Gould, A), Spr (Fenton, M), Sum (Gould, A)

ATHLETIC 145. Tennis: Low Intermediate

Fundamental strokes and their use in a game situation. Prerequisites: 144, or knowledge of rules and scoring and average ability in fundamental strokes but limited playing experience. Fee. (AU)

1 unit, Aut (Gould, A), Win (Gould, A), Spr (Sarsfield, T), Sum (Gould, A)

ATHLETIC 146. Tennis: Intermediate

Fundamental stroke review. Singles and doubles tactics. Prerequisites:145 or average ability in fundamental strokes, and regular playing experience; NTRP rating of 3.0 or equivalent. (AU)

1 unit, Aut (Glielmi, T), Win (Gould, A), Spr (Sarsfield, T), Sum (Gould, A)

ATHLETIC 147. Tennis: Advanced

Drills emphasize footwork, serve and return, approach shots, volleys, lobs, and overheads. Strategy for competition in singles and doubles. Prerequisites: above average stroking and game playing ability; NTRP rating above 4.0 or equivalent. (AU)

1 unit, Aut (Brennan, F), Win (Gould, A), Spr (Sarsfield, T), Sum (Gould, A)

ATHLETIC 148V. Tennis, Varsity Men

(AU)

1-2 units, Aut (Whitlinger, J), Win (Whitlinger, J), Spr (Whitlinger, J)

ATHLETIC 149V. Tennis, Varsity Women

(AU)

1-2 units, Aut (Forood, L), Win (Forood, L), Spr (Forood, L)

ATHLETIC 151. Total Body Workout

For all fitness levels; tone and strengthen the entire body. Different equipment used to target all major muscle groups. (AU)

1 unit, Aut (McWherter, B), Win (McWherter, B), Spr (McWherter, B), Sum (McWherter, B)

ATHLETIC 153V. Track and Field, Varsity Men

(AU)

1-2 units, Aut (Floreal, E), Win (Floreal, E), Spr (Floreal, E)

ATHLETIC 154V. Track and Field, Varsity Women

(AU)

1-2 units, Aut (Floreal, E), Win (Floreal, E), Spr (Floreal, E)

ATHLETIC 156C. Triathlon Club Team

(AU)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 158C. Ultimate Frisbee Club Team (Men)

(AU)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 159C. Ultimate Frisbee Club Team (Women)

(AU) (Staff)

1 unit, Aut (Mahlow, P), Win (Mahlow, P), Spr (Mahlow, P)

ATHLETIC 162. Volleyball

Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy. Fee. (AU)

1 unit, Aut (Price, A)

ATHLETIC 164. Volleyball: Intermediate Sand

Further development of skills and rules. Strategy in two- and four-person sand volleyball. Fee. (AU)

1 unit, Aut (Shibuya, K), Spr (Shaw, D)

ATHLETIC 165. Volleyball: Advanced Sand

Refine and improve skills and game playing strategy in two- and four-person sand volleyball. Must have strong skills and general knowledge of team concepts. Prerequisiste: 164 or consent of the instructor. Fee. (AU)

1 unit, Aut (Shibuya, K), Spr (Shaw, D)

ATHLETIC 166V. Volleyball, Varsity Men

(AU)

1-2 units, Aut (Kosty, J), Win (Kosty, J), Spr (Kosty, J)

ATHLETIC 167V. Volleyball, Varsity Women

(AU)

1-2 units, Aut (Dunning, J), Win (Dunning, J), Spr (Dunning, J)

ATHLETIC 169. Water Polo: Beginning

Introduction to basic skills and game play. For those who have never played or have had limited experience. Fee. (AU)

1 unit, Spr (Barnea, J)

ATHLETIC 170. Water Polo: Intermediate/Advanced

Further work on skills. Game strategies. Fee. (AU)

1 unit, Aut (Ortwein, S), Spr (Barnea, J)

ATHLETIC 171V. Water Polo, Varsity Men

(AU)

1-2 units, Aut (Vargas, J), Win (Vargas, J), Spr (Vargas, J)

ATHLETIC 172V. Water Polo, Varsity Women

(AU)

1-2 units, Aut (Tanner, J), Win (Tanner, J; Ortwein, S), Spr (Tanner, J; Ortwein, S)

ATHLETIC 174. Weight Training: Beginning

Improve fitness level through progressive resistance exercises using machines and free weights. Individualized weight training programs once basic exercises are learned. Stretching program. Basics of exercise physiology. Fee. (AU)

1 unit, Aut (Severson, L), Spr (Blake, R)

ATHLETIC 176. Weight Training for Women

All levels welcome, but designed for the beginner. Techniques and equipment for weight training. Emphasis is on stretching, proper form and progressions, and injury prevention. The basics of the physiology of strength training and planning individual programs. Fee. (AU)

1 unit, Aut (Severson, L)

ATHLETIC 177. Circuit Aerobic Weight Training

A full-body conditioning workout with weight lifting and aerobic components. Weight training equipment organized into a circuit to maximize workout intensity in a short amount of time. Fee. (AU)

1 unit, Aut (Nelson, D), Win (Nelson, D), Spr (Nelson, D)

ATHLETIC 178M. Wing Chun Kung Fu
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 179. Wrestling and Introduction to Mixed Martial Arts (MMA)
While primarily focusing on the basic techniques of collegiate wrestling, some non-striking forms of MMA, such as Brazilian jiu-jitsu and submission grappling, will be covered throughout the quarter.
1 unit, Spr (Gentry, M)

ATHLETIC 180V. Wrestling, Varsity
(AU)
1-2 units, Aut (Borrelli, J), Win (Borrelli, J), Spr (Borrelli, J)

ATHLETIC 181M. Wushu
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 182. Yoga
Mind, body, and spirit meet in yoga. Increase flexibility and restore health to the body. Fee. (AU)
1 unit, Aut (Carlow, A), Win (Carlow, A), Spr (Carlow, A), Sum (Conniff, N)

ATHLETIC 184. Yoga/Pilates Fusion
Combination of power and restorative yoga with strength building Pilates exercises. Fee.
1 unit, Aut (Conniff, N), Win (Conniff, N), Spr (Conniff, N), Sum (Conniff, N)

ATHLETIC 186. Zumba
Zumba combines Latin rhythms with cardiovascular exercise to create an aerobic routine. Interval and resistance training to maximize caloric output, fat burning, and total body toning. (AU)
1 unit, Aut (Picollo, A), Win (Picollo, A), Spr (Picollo, A)

ATHLETIC 187. Analysis of Human Movement
Overview of skeletal and muscular anatomy. The mechanical principles of movement as related to efficient performance in aquatics, dance, and sports.
2-4 units, Win (Wilson, C)

ATHLETIC 189. Business Practices in Sport
Planning and management of intercollegiate sports and recreation. Elements of business contracts, finance, facility development, legal issues, risk management, human resources, security, and operations and event management. How an athletic and recreation department is organized. Career opportunities in sports and recreation administration.
2 units, Spr (Purpur, R)

ATHLETIC 190. Introduction to Nutrition
How to optimize nutrition for health and performance. Topics include macronutrients, fad diets, sugar addiction, low-calorie sweeteners, caloric restriction, disease prevention, and nutrition.
1-2 units, Aut (Wilson, C), Spr (Wilson, C), Sum (Wilson, C)

ATHLETIC 193. Lifestyle Fitness Challenge
Exploration and improvement of overall health. Wellness, physical fitness, nutrition, cardio endurance, muscular strength and endurance, flexibility, and stress management. Introductions to weight and cardio equipment, outdoor workouts, spinning, strength and tone workouts, and yoga.
2 units, Aut (Spanier, J), Win (Spanier, J), Spr (Spanier, J)

ATHLETIC 195. Mind, Body, Spirit
Spiritual features of everyday life primarily from a psychological perspective with a focus on health. Topics include cultivating gratitude, forgiveness, life purpose, and kindness; mind/body/spirit solutions to everday problems. Meditation and other stress management practices.
2 units, Spr (Luskin, F)

ATHLETIC 196. HAPPINESS
Guided practice in research proven methods of creating more happiness in your life. Simple strategies for finding the good, becoming more peaceful, improving relationships and appreciating yourself.
1 unit, Aut (Luskin, F; Pertofsky, C), Spr (Luskin, F; Pertofsky, C)

ATHLETIC 197. Sport Psychology
Basic theories in psychology which have the greatest influence on sport performance. Motivation, anxiety reduction, personality and self esteem, motor learning theories and sociological aspects and their influence on performance and learning.
2 units, Spr (Schavone, R)

ATHLETIC 199. Sports Nutrition with Clinical Applications
Nutrition topics. Mechanisms by which nutrition positively impacts sports performance and relates to the mechanisms of health and disease. Student presentations. Prerequisites: ATHLETIC 190 and HUMBIO 130 or 135, or consent of instructor.
1-2 units, Spr (Wilson, C)

ATHLETIC 340. Rock Climbing: Strength and Conditioning
For experienced climbers to improve climbing skills and overall fitness through rock climbing exercises that center on focus, endurance, power-endurance, and power. Prerequisite: intermediate climbing class or equivalent or consent of instructor. Fee. (AU)
1 unit, Aut (Sandlin, P), Win (Sandlin, P), Spr (Sandlin, P)

ATHLETIC 342. Rock Climbing Route Setting
This class will introduce the route setting for rock climbing
1-11 units, Aut (Sandlin, P), Win (Staff), Spr (Staff)

ATHLETIC 405. Outdoor Leadership
Skills needed to lead basic multi-day backpacking trips. Classroom sessions and wilderness trips. Topics include group dynamics and leadership, technical skills, and wilderness first aid. Class may require work over several quarters. See http://www.stanford.edu/group/spot/training/. (FORMERLY ATH 84)
1 unit, Aut (Wright, P), Win (Nash-Webber, C), Spr (Nash-Webber, C)

ATHLETIC 406. Outdoor Leadership Practicum
Wilderness field portion of ATH 405 Outdoor Leadership. Skills needed to lead basic multi-day backpacking trips. See http://www.stanford.edu/group/spot/training/. You may contact SPOT with specific questions. PREREQ ATH 405 (Formerly ATH 84)
1 unit, Aut (Wright, P), Win (Staff), Spr (Staff)

ATHLETIC 495. Outdoor Education: Assistant Instructor
Formerly ATH 83
1-2 units, Aut (Fields, A), Win (Staff), Spr (Fields, A)

ATHLETIC 530. Climbing Wall Instructor
The Professional Climbing Instructor's Association (PCIA) Climbing Wall Instructor (CWI) Course provides instructors with an in depth and standardized understanding of the skills essential to teaching climbing in an indoor setting. Emphasis on the importance of teaching technically accurate information & sound fundamental skills. (Formerly ATH 21)
1 unit, Aut (Fields, A), Win (Fields, A), Spr (Fields, A)

ATHLETIC 535. PCIA Base-site Manager Instructor Course
This course will cover an understanding of the needed skills for teaching climbing in an outdoor setting. It will address fundamental climbing skills and an approach of how to teach this to others. Upon successful completion of all course components participants are considered PCIA Assistant Instructors.
1 unit, Aut (Fields, A), Win (Staff), Spr (Staff)

BIOCHEMISTRY (BIOC) COURSES

UNDERGRADUATE COURSES IN BIOCHEMISTRY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

BIOC 118Q. Genomics and Medicine
(Stanford Introductory Seminar) Preference to sophomores. Knowledge gained from sequencing human, bacterial, and viral genomes and implications for medicine and biomedical research. Novel diagnoses (chips, SNPs and gene expression) and treatment of diseases including gene therapy, stem cell therapy, and rational drug design. Ethical implications of stem cell therapy and uses of genetic information. Use of genome and disease databases to determine gene function in disease, diagnosis, and potential treatments. See http://biochem118.stanford.edu/. GER:DB-EngrAppSci
3 units, Aut (Brutlag, D)

BIOC 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN BIOCHEMISTRY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIOC 200. Applied Biochemistry
Enrollment limited to MD candidates. Fundamental concepts of biochemistry as applied to clinical medicine. Topics include thermodynamics, enzyme kinetics, vitamins and cofactors, metabolism of carbohydrates, lipids, amino acids and nucleotides, and the integration of metabolic pathways. Clinical case studies discussed in small-group, problem-based learning sessions.
1 unit, Aut (Harbury, P; Theriot, J; Cowan, T)

BIOC 201. Advanced Molecular Biology
Literature-based lectures and discussion on rapidly developing frontiers in chromosome structure and function and modern insights into the control of gene expression. Emphasis is on experimental approaches and insights. Topics include chromosome organization, novel modes of transcriptional control, RNA-based mechanisms for controlling gene expression and emerging translational regulatory mechanisms. Prerequisite: undergraduate molecular biology.
5 units, Spr (Krasnow, M; Straight, A)

BIOC 205. Molecular Foundations of Medicine
For medical students. Topics include DNA structure, replication, repair, and recombination; gene expression, including mechanisms for regulating transcription and translation; chromosome structure and function; and methods for manipulating DNA, RNA, and proteins. Patient presentations and journal clubs illustrate how molecular biology affects the practice of medicine.
3 units, Aut (Chu, G; Krasnow, M)

BIOC 210. Advanced Topics in Membrane Trafficking
The structure, function, and biosynthesis of cellular membranes and organelles. Current literature. Prerequisite: consent of instructor.
3 units, not given this year

BIOC 215. Frontiers in Biological Research
(Same as DBIO 215, GENE 215) Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker¿s primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research.
1 unit, Aut (Harbury, P; Calos, M; Villeneuve, A), Win (Harbury, P; Villeneuve, A; Calos, M)

BIOC 218. Computational Molecular Biology
(Same as BIOMEDIN 231) For molecular biologists and computer scientists. Representation and analysis of genomes, sequences, and proteins. Strengths and limitations of existing methods. Course work performed on web or using downloadable applications. See http://biochem218.stanford.edu/. Prerequisites: introductory molecular biology course at level of BIOSCI 41 or consent of instructor. All offerings are via internet only.
3 units, Aut (Brutlag, D), Win (Brutlag, D), Spr (Brutlag, D)

BIOC 220. Chemistry of Biological Processes
(Same as CSB 220) The principles of organic and physical chemistry as applied to biomolecules. Goal is a working knowledge of chemical principles that underlie biological processes, and chemical tools used to study and manipulate biological systems. Prerequisites: organic chemistry and biochemistry, or consent of instructor.
4 units, Spr (Wandless, T), alternate years, not given next year

BIOC 221. The Teaching of Biochemistry
Required for teaching assistants in Biochemistry. Practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text materials; evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.
3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOC 224. Advanced Cell Biology
(Same as BIO 214, MCP 221) For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor.
2-5 units, Win (Kopito, R; Theriot, J; Pfeffer, S; Straight, A; Nachury, M)

BIOC 226. Interdisciplinary Approaches to Biochemistry: Single Molecule Biophysics to Clinical Outcomes
Interdisciplinary analyses from basic biochemistry and biophysics to clinical outcomes of disease states and potential therapeutic interventions (translational research). Focus on cardiac system. Cardiomyopathies arise from missense mutations in cardiac muscle proteins, including the cardiac myosin motor. Single molecule biophysics and classical enzyme kinetics and use of induced pluripotent stem cells (iPS cells) and single cell studies lay foundation for discussions of effects of cardiomyopathy mutations on heart function. Potential therapeutic approaches discussed, including genetic analysis, DNA cloning, reconstitution of functional assemblies, x-ray diffraction and 3D reconstruction of electron microscope images, spectroscopic methods, computational approaches, single molecule biophysics, use of induced pluripotent stem cells in research, and other interdisciplinary approaches. Current papers examined. Prerequisites: basic biochemistry.
3 units, Spr (Spudich, J)

BIOC 230. Molecular Interventions in Human Disease
For M.D. students who intend to declare a concentration in molecular basis of medicine, MSTP students, and Ph.D. students. Advanced medical biochemistry focusing on cases where molecular-level research has led to new medical treatments or changes in the understanding of important diseases. Different topics each week explore the underlying molecular basis of a variety of diseases and the reasons for success and failure in molecular approaches to treatment. Student-led discussions dissect papers from the primary medical and scientific research literature.
2-3 units, not given this year

BIOC 236. Biology by the Numbers
(Same as APPPHYS 136) Skillbuilding in biological quantitative reasoning. Topics include: biological size scales from proteins to ecosystems; biological time scales from enzymatic catalysis and DNA replication to evolution; biological energy, motion, and force from molecular to organismic scales; mechanisms of environmental sensing from bacterial chemotaxis to vision. Prerequisite: Physics 21, 41, or consent of instructor.
3 units, not given this year

BIOC 241. Biological Macromolecules
(Same as BIOPHYS 241, SBIO 241) The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 40. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only.
3-5 units, Aut (Herschlag, D; Ferrell, J; Block, S; Weis, W; Garcia, K; Puglisi, J)

BIOC 257. Currents in Biochemistry
Seminars by Biochemistry faculty on their ongoing research. Background, current advances and retreats, general significance, and tactical and strategic research directions.
1 unit, Aut (Spudich, J)

BIOC 298. Biochemistry Consulting Service
Students are presented with requests for advice from faculty and students in the biological sciences and Medical School encountering experimental and analytical problems in their research. Students work with the instructor and other biochemistry faculty to propose solutions. May be repeated for credit.
3 units, not given this year

BIOC 299. Directed Reading in Biochemistry
Prerequisite: consent of instructor. (Staff)
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOC 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOC 399. Graduate Research and Special Advanced Work
Allows for qualified students to undertake investigations sponsored by individual faculty members.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOC 459. Frontiers in Interdisciplinary Biosciences
(Same as BIO 459, BIOE 459, CHEMENG 459, CHEM 459, PSYCH 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.
1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson)

BIOC 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOC 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOENGINEERING (BIOE) COURSES

UNDERGRADUATE COURSES IN BIOENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

BIOE 41. Physical Biology of Macromolecules
Principles of statistical physics and thermodynamics, with applications to molecular biology. Topics include entropy, temperature, free energy, chemical forces, self assembly, cooperative transitions in macromolecules, enzyme kinetics, molecular machines, and an introduction to genomic and proteomic technologies. Corequisite: BIO 41.
4 units, Aut (Fisher, D)

BIOE 42. Physical Biology of Cells
Principles of transport, continuum mechanics, and fluids, with applications to cell biology. Topics include random walks, diffusion, Langevin dynamics, transport theory, low Reynolds number flow, and beam theory, with applications including quantitative models of protein trafficking in the cell, mechanics of the cell cytoskeleton, the effects of molecular noise in development, the electromagnetics of nerve impulses, and an introduction to cardiovascular fluid flow. Concurrent enrollment in BIO 42 is required.
4 units, Win (Huang, K)

BIOE 44. Fundamentals for Engineering Biology Lab
Introduction to next-generation techniques in genetic, molecular, biochemical, and cellular engineering. Lab modules build upon current research including: gene and genome engineering via decoupled design and construction of genetic material; component engineering focusing on molecular design and quantitative analysis of experiments; device and system engineering using abstracted genetically encoded objects; and product development based on useful applications of biological technologies. Limited enrollment. Priority given to majors.
4 units, Spr (Endy, A)

BIOE 51. Anatomy for Bioengineers
Design principles of human anatomy, spanning major systems and tissues including nerve, muscle, bone, cardiovascular, respiratory, endocrine, and sensory systems. Explore feedback, homeostasis, information handling, and mass transfer across systems. Major disorders of anatomically-defined systems, defining challenges and opportunities for bioengineers. Evolving clinical interventions ranging from devices to tissue modeling and tissue engineering. Participate in medical school dissection procedures to gain understanding of the bioengineering human application domain.
4 units, Spr (Srivastava, S)

BIOE 70Q. Medical Device Innovation
(Stanford Introductory Seminar) Preference to sophomores. Survey of innovative technologies and medical devices used in multiple medical specialties. Guest lecturers include Stanford Medical School physicians, entrepreneurs, and venture capitalists. Focus on how to identify clinical needs and design device solutions to address those needs. Fundamentals of starting a company. Field trips to local medical device companies and design house. No previous engineering training required.
3 units, Spr (Mandato, J)

BIOE 80. Introduction to Bioengineering
(Same as ENGR 80) Overview of biological engineering focused on engineering analysis and design of biological processes. Topics include overall material and energy balances, rates of biochemical reactions and processes, genetic programming of biological systems, links between information and function, and technologies to probe and manipulate biological systems. Applications of these concepts to areas of current technological importance, including biotechnology, biosynthesis, molecular/cellular therapeutics, and personalized medicine and gene therapy. GER:DB-EngrAppSci
4 units, Spr (Smolke, C)

BIOE 101. SYSTEMS BIOLOGY
(Same as BIOE 210) Complex biological behaviors through the integration of computational modeling and molecular biology. Topics: reconstructing biological networks from high-throughput data and knowledge bases. Network properties. Computational modeling of network behaviors at the small and large scale. Using model predictions to guide an experimental program. Robustness, noise, and cellular variation. Prerequisites: background in biology and mathematical analysis.
4 units, Aut (Covert, M)

BIOE 102. Systems Physiology and Design I
Structure-function relationships of transport processes and systems. Conservation equations and momentum balance equations developed and applied to fluid and mass transport from cellular to organism scales. Topics: equations of mass conservation and momentum balance, fluid flow in the circulation and tissues, mass transport in biological systems, fluid and solute transport in porous media, transvascular transport, gas exchange in the cardiopulmonary systems, transport in the kidneys, applications to drug transport, circulatory devices, and mechanical and tissue-engineered artificial organs.
4 units, Win (Taylor, C)

BIOE 103. Systems Physiology and Design II
Biological and electrical design principles. Engineering tools used to electrically probe and model physiological systems. Basic and clinical excitable cell physiology. Topics: single-cell physiology (treatment of cells as bioelectrical devices, cable properties, ion channels and gradients, nonlinear dynamics of action potentials), network physiology and system design (neural networks, orderly recruitment of axons, Hebbian and spike timing-dependent plasticity), and excitable cell disease and interventions (major neurological and neuromuscular disease syndromes, neuromuscular simulation and surgical planning, electromagnetic stimulation instrumentation, optogenetics, tissue engineering).
4 units, Spr (Delp, S; Deisseroth, K)

BIOE 121. Bioinstrumentation and Imaging Lab
Introduction to bioinstrumentation and imaging through the use of ultrasound imaging. Basic ultrasound physics, pulser/receiver instrumentation, signal processing, and image reconstruction. Projects include building a 2D ultrasound system in a water tank and testing imaging performance.
4 units, Spr (Pelc, N)

BIOE 122. Tissue Engineering Lab
Introduction to the suite of cell culture tools needed to create tissue-mimetic, in vitro mammalian cellular communities, both on and within biocompatible and bioinspired materials known to direct cellular fate. Observation of the impacts of substrate properties on cell fate; mechanisms of cell-biomaterial interactions. Chemical/biochemical formulation and physical, rheological characterization of cell culture biomaterial substrates, from simple/conventional to experimental and biomimetic. Experience culturing epithelial, connective, muscle and neural cell lines. Tissue regeneration and engineering.
4 units, Win (Barron, A)

BIOE 123. Optics Lab
Introduction to optical microscopy, lasers, and optical forces. Lens theory, diffraction, compound optics, aberration, gaussian optics, fluorescence spectroscopy, and optical trapping. Projects include building and testing optical microscope and optical tweezers.
4 units, Win (Quake, S)

BIOE 161. Vertebrate Biology
(Same as HUMBIO 185) Study of structure, function, evolution and behavior of vertebrate animals. Consideration of vertebrate origins and examination of classes of vertebrates. Physiology, morphology, behaviors and evolutionary relationships are treated in each vertebrate group, as these relate to overall evolutionary trends within vertebrates. Topics: swimming behaviors in sharks and bony fishes, olfaction and vision in fishes, sex determination in amphibians, reptiles, birds and mammals, navigation in sea turtles and birds, evolution and biomechanics of flight in pterosaurs birds and bats, vocalization in whales and birds, temperature adaptation in reptiles, birds and mammals.
3 units, Win (Porzig, E)

BIOE 191. Bioengineering Problems and Experimental Investigation
Directed study and research for undergraduates on a subject of mutual interest to student and instructor. Prerequisites: consent of instructor and adviser. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOE 260. Tissue Engineering
Principles of tissue engineering and design strategies for practical applications for tissue repair. Topics include tissue components and dynamics, morphogenesis, stem cells, cellular fate processes, cell and tissue characterization, controlled drug and gene delivery, bioreactors, cell-materials interactions, and host integration. Present research proposal to solve a real life tissue engineering problem.
3 units, Aut (Yang, F)

GRADUATE COURSES IN BIOENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIOE 210. SYSTEMS BIOLOGY
(Same as BIOE 101) Complex biological behaviors through the integration of computational modeling and molecular biology. Topics: reconstructing biological networks from high-throughput data and knowledge bases. Network properties. Computational modeling of network behaviors at the small and large scale. Using model predictions to guide an experimental program. Robustness, noise, and cellular variation. Prerequisites: background in biology and mathematical analysis.
4 units, Aut (Covert, M)

BIOE 212. Introduction to Biomedical Informatics Research Methodology
(Same as BIOMEDIN 212, CS 272, GENE 212) Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor.
3 units, Spr (Altman, R)

BIOE 214. Representations and Algorithms for Computational Molecular Biology
(Same as BIOMEDIN 214, CS 274, GENE 214) Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.
3-4 units, Aut (Altman, R)

BIOE 220. Introduction to Imaging and Image-based Human Anatomy
(Same as RAD 220) The physics of medical imaging and human anatomy through medical images. Emphasis is on normal anatomy, contrast mechanisms, and the relative strengths of each imaging modality. Labs reinforce imaging techniques and anatomy. Prerequisites: basic biology, physics.
3 units, Win (Gold, G; Pauly, K)

BIOE 222A. Multimodality Molecular Imaging in Living Subjects I
(Same as RAD 222A) Provides an overview of the biology, instruments and chemistries for imaging of cellular and molecular processes in living animals and humans. Covers molecular biology, instrumentation physics, and chemistry of molecular imaging probes as an introduction to preclinical and clinical molecular imaging.
4 units, Aut (Contag, C; Xing, L; Rao, J)

BIOE 222B. Multimodality Molecular Imaging in Living Subjects II
(Same as RAD 222B) Focuses on molecular probes that target specific disease mechanisms. Covers molecular probe design for dynamic measures of biological function and how to deliver these to the target tissues for informative assays that reveal cellular and molecular changes.
4 units, Win (Contag, C; Xing, L; Rao, J)

BIOE 222C. Multimodality Molecular Imaging in Living Subjects III
(Same as RAD 222C) Topics course comprised of discussion and review of primary literature. Focuses on emerging chemistries and instruments that address unmet needs for improved diagnosis and disease management in cancer, neurological disease, cardiovascular medicine and musculoskeletal disorders. Identifies problems or controversies in the field, and resolves them through understanding the relevant primary literature.
4 units, Spr (Contag, C; Xing, L; Rao, J)

BIOE 232. Statistics Concepts in Bioengineering
Key statistics concepts for bioengineering research. Topics include how to select appropriate statistical tests, how to design efficient experiments to minimize sample size and maximize power, statistical design of experiments (DOE), principles of hypothesis testing, and reading and reporting statistical results in journal articles. Prerequisite: Knowledge of descriptive statistics, t-tests, analysis of variance, and linear regression.
1 unit, Win (Walker, M)

BIOE 261. Principles and Practice of Stem Cell Engineering
(Same as NSUR 261) Quantitative models used to characterize incorporation of new cells into existing tissues emphasizing pluripotent cells such as embryonic and neural stem cells. Molecular methods to control stem cell decisions to self-renew, differentiate, die, or become quiescent. Practical, industrial, and ethical aspects of stem cell technology application. Final projects: team-reviewed grants and business proposals.
3 units, not given this year

BIOE 280. Skeletal Development and Evolution
(Same as ME 280) The mechanobiology of skeletal growth, adaptation, regeneration, and aging is considered from developmental and evolutionary perspectives. Emphasis is on the interactions between mechanical and chemical factors in the regulation of connective tissue biology. Prerequisites: BIO 42, and ME 80 or BIOE 42.

3 units, not given this year

BIOE 280. Skeletal Development and Evolution
(Same as ME 280) The mechanobiology of skeletal growth, adaptation, regeneration, and aging is considered from developmental and evolutionary perspectives. Emphasis is on the interactions between mechanical and chemical factors in the regulation of connective tissue biology. Prerequisites: BIO 42, and ME 80 or BIOE 42.

3 units, not given this year

BIOE 281. Biomechanics of Movement
(Same as ME 281) Experimental techniques to study human and animal movement including motion capture systems, EMG, force plates, medical imaging, and animation. The mechanical properties of muscle and tendon, and quantitative analysis of musculoskeletal geometry. Projects and demonstrations emphasize applications of mechanics in sports, orthopedics, and rehabilitation.

3 units, not given this year

BIOE 282. Performance, Development, and Adaptation of Skeletal Muscle
Fundamentals of skeletal muscle by study of classical and recent research articles. Emphasis on the interactions between mechanics, biology, and electrophysiology in skeletal muscle performance, development, adaptation, control, and disease. Lab activities explore research methods discussed in class. Limited Enrollment. Prerequisites: engineering or biology core coursework.

3 units, Spr (Delp, S)

BIOE 284A. Cardiovascular Bioengineering
(Same as ME 284A) Bioengineering principles applied to the cardiovascular system. Anatomy of human cardiovascular system, comparative anatomy, and allometric scaling principles. Cardiovascular molecular and cell biology. Overview of continuum mechanics. Form and function of blood, blood vessels, and the heart from an engineering perspective. Normal, diseased, and engineered replacement tissues.

3 units, Aut (Taylor, C)

BIOE 284B. Cardiovascular Bioengineering
(Same as ME 284B) Continuation of ME/BIOE 284A. Integrative cardiovascular physiology, blood fluid mechanics, and transport in the microcirculation. Sensing, feedback, and control of the circulation. Overview of congenital and adult cardiovascular disease, diagnostic methods, and treatment strategies. Engineering principles to evaluate the performance of cardiovascular devices and the efficacy of treatment strategies.

3 units, Win (Taylor, C)

BIOE 291. Principles and Practice of Optogenetics for Optical Control of Biological Tissues
Principles and practice of optical control of biological processes (optogenetics), emphasizing bioengineering approaches. Theoretical, historical, and current practice of the field. Requisite molecular-genetic, optoelectronic, behavioral, clinical, and ethical concepts, and mentored analysis and presentation of relevant papers. Final projects of research proposals and a laboratory component in BioX to provide hands-on training. Contact instructor before registering.

3 units, Aut (Deisseroth, K)

BIOE 300A. Molecular and Cellular Bioengineering
The molecular and cellular bases of life from an engineering perspective. Analysis and engineering of biomolecular structure and dynamics, enzyme function, molecular interactions, metabolic pathways, signal transduction, and cellular mechanics. Quantitative primary literature. Prerequisites: CHEM 171 and BIO 41 or equivalents; MATLAB or an equivalent programming language.

3 units, Aut (Bryant, Z)

BIOE 300B. Physiology and Tissue Engineering
The interaction, communication, and disorders of major organ systems and relevant developmental biology and tissue engineering from cells to complex organs.

3 units, Win (Deisseroth, K; Covert, M)

BIOE 301A. Molecular and Cellular Engineering Lab
Preference to Bioengineering graduate students. Practical applications of biotechnology and molecular bioengineering including recombinant DNA techniques, molecular cloning, microbial cell growth and manipulation, library screening, and microarrays. Emphasis is on experimental design and data analysis. Limited enrollment. Corequisite: 300A.

2 units, Spr (Cochran, J)

BIOE 301B. Clinical Needs and Technology
Diagnostic and therapeutic methods in medicine. Labs include a pathology/histology session, pulmonary function testing, and the Goodman Simulation Center. Each student paired with a physician for observation of an operation or procedure. Final presentation. Limited enrollment. Corequisite: 300B.

1 unit, Spr (Feinstein, J)

BIOE 301C. Diagnostic Devices Lab
Biomedical instruments and diagnostic devices. Emphasis is on comparing measurements with theoretical predictions. Labs include ECG, MRI, microfluidics, CT, and EEG. Prerequisites: 300B and 301B.

3 units, Spr (Boahen, K)

BIOE 310. Systems Biology
(Same as CS 278, CSB 278) Experimental and computational approaches to the dissection of complex biologcal systems. Topics include network structure, non-linear dynamics, numerical modeling approaches, noise, and robustness. Topics are introduced in the context of recent papers from the primary literature.

4 units, Win (Ferrell, J)

BIOE 331. Protein Engineering
The design and engineering of biomolecules emphasizing proteins, antibodies, and enzymes. Combinatorial methodologies, rational design, protein structure and function, and biophysical analyses of modified biomolecules. Clinically relevant examples from the literature and biotech industry. Prerequisite: basic biochemistry.

3 units, Win (Cochran, J)

BIOE 332. Large-Scale Neural Modeling
Emphasis is on modeling neural systems at the circuit level, ranging from feature maps in neocortex to episodic memory in hippocampus. Simulation exercises to explore the roles of cellular properties, synaptic plasticity, spike synchrony, rhythmic activity, recurrent connectivity, and noise and heterogeneity. Theory of dynamical systems is introduced to analyze and predict network behavior. Work in teams of two; run simulations in real-time on neuromorphic hardware developed for this purpose.

3 units, Spr (Boahen, K)

BIOE 333. Interfacial Phenomena and Bionanotechnology
Fundamental and applied study of interfacial phenomena and effects of surface-active molecules on behavior of important biological, biochemical, environmental, and bioengineering systems. Discussion of central mathematical equations in surface science attributed to Laplace, Gibbs, Kelvin, and Young. Self-assembly of surfactants and biomolecules. Relevance of interfacial phenomena to protein folding/unfolding and microfluidics. Applications to recent research advances in bionano- and biomicrotechnology, using scientific literature.

3 units, Spr (Barron, A)

BIOE 334. Engineering Principles in Molecular Biology
The achievements and difficulties that exemplify the interface of theory and quantitative experiment. Topics include: bistability, cooperativity, robust adaptation, kinetic proofreading, analysis of fluctuations, sequence analysis, clustering, phylogenetics, maximum likelihood methods, and information theory. Sources include classic papers.

3 units, Win (Huang, K)

BIOE 335. Molecular Motors I
Physical mechanisms of mechanochemical coupling in biological molecular motors, using F1 ATPase as the major model system. Applications of biochemistry, structure determination, single molecule tracking and manipulation, protein engineering, and computational techniques to the study of molecular motors.

3 units, Spr (Bryant, Z)

BIOE 341. Computational Neural Networks
Distributed neural network implementations of algorithms for signal processing, function approximation, and control. Representation of information in networks of spiking neurons. Supervised and

unsupervised learning algorithms. Radial basis functions, principal and independent components analysis, reinforcement learning, support-vector machines, self-organizing maps, auto-associative learning, hidden Markov models. Related methods from information theory, signal processing, bayesian estimation, and stochastic systems. Final project in software or programmable hardware. Prerequisites: linear algebra, dynamic systems, and probability theory as in MATH 103, EE 102A, and EE 178 or equivalent, and programming experience in C++ or Matlab.

3 units, not given this year

BIOE 355. Advanced Biochemical Engineering

(Same as CHEMENG 355) Combines biological knowledge and methods with quantitative engineering principles. Quantitative review of biochemistry and metabolism; recombinant DNA technology and synthetic biology (metabolic engineering). The production of protein pharaceuticals as a paradigm for the application of chemical engineering principles to advanced process development within the framework of current business and regulatory requirements. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41, or equivalent.

3 units, Win (Swartz, J)

BIOE 361. Biomaterials in Regenerative Medicine

(Same as MATSCI 381) Materials design and engineering for regenerative medicine. How materials interact with cells through their micro- and nanostructure, mechanical properties, degradation characteristics, surface chemistry, and biochemistry. Examples include novel materials for drug and gene delivery, materials for stem cell proliferation and differentiation, and tissue engineering scaffolds. Prerequisites: undergraduate chemistry, and cell/molecular biology or biochemistry.

3 units, alternate years, not given this year

BIOE 370. Microfluidic Device Laboratory

Fabrication of microfluidic devices for biological applications. Photolithography, soft lithography, and micromechanical valves and pumps. Emphasis is on device design, fabrication, and testing.

2 units, Win (Quake, S; Melin, J)

BIOE 371. Global Biodesign: Medical Technology in an International Context

(Same as MED 271) Seminar examines the development and commercialization of medical technologies in the global setting focusing primarily on Europe, India and China. Faculty and guest speakers from industry and government discuss the status of the industry, as well as opportunities in and challenges to medical technology innovation unique to each geography. Topics related to development of technologies for bottom of the pyramid markets are also addressed. Students enrolling for 2 units are required to write/deliver a final paper.

1-2 units, Spr (Doshi, R; Yock, P; Shen, C)

BIOE 374A. Biodesign Innovation: Needs Finding and Concept Creation

(Same as ME 368A, MED 272A) (Same as OIT 384.) First of a two quarter series. How to develop comprehensive solutions (most commonly medical devices) to significant medical problems. Needs-finding methods, brainstorming, and concept creation. Strategies for understanding and interpreting clinical needs, researching literature, and searching patents. Clinical and scientific literature review, techniques of intellectual property analysis and feasibility, basic prototyping and market assessment. Students work in small entrepreneurial multidisciplinary teams to create, analyze, and screen medical technology ideas, and select projects for future development. Final presentations to a panel of prominent inventors and investors in medical Expert guest lecturers, faculty-led practical demonstrations and coaching sessions, and interactive team meetings under the mentorship of Biodesign. Projects from previous years include: prevention of hip fractures in the elderly; methods to accelerate healing after surgery; less invasive techniques for bariatric surgery; point of care diagnostics to improve emergency room efficiency; novel devices to bring specialty-type of care to primary care community doctors. More than 40,00 patients have been treated to date with technologies developed as part of this program and more than ten venture-backed companies were started by alums of the program. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: application; see http://www.stanford.edu/group/biodesign/courseapplication.html; deadline is November 20, 2010.

2-4 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)

BIOE 374B. Biodesign Innovation: Concept Development and Implementation

(Same as ME 368B, MED 272B) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: MED 272A, ME368A, or BIOE 374A.

2-4 units, Spr (Brinton, T; Milroy, J; Yock, P; Zenios, S)

BIOE 381. Orthopaedic Bioengineering

(Same as ME 381) Engineering approaches applied to the musculoskeletal system in the context of surgical and medical care. Fundamental anatomy and physiology. Material and structural characteristics of hard and soft connective tissues and organ systems, and the role of mechanics in normal development and pathogenesis. Engineering methods used in the evaluation and planning of orthopaedic procedures, surgery, and devices.

3 units, Spr (Levenston, M)

BIOE 386. Neuromuscular Biomechanics

(Same as ME 386) The interplay between mechanics and neural control of movement. State of the art assessment through a review of classic and recent journal articles. Emphasis is on the application of dynamics and control to the design of assistive technology for persons with movement disorders.

3 units, not given this year

BIOE 390. Introduction to Bioengineering Research

(Same as MED 289) Preference to medical and bioengineering graduate students. Bioengineering is an interdisciplinary field that leverages the disciplines of biology, medicine, and engineering to understand living systems, and engineer biological systems and improve engineering designs and human and environmental health. Topics include: imaging; molecular, cell, and tissue engineering; biomechanics; biomedical computation; biochemical engineering; biosensors; and medical devices. Limited enrollment.

1 unit, Aut (Wang, P; Gold, G)

BIOE 391. Directed Study

May be used to prepare for research during a later quarter in 392. Faculty sponsor required. May be repeated for credit.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOE 392. Directed Investigation
For Bioengineering graduate students. Previous work in 391 may be required for background; faculty sponsor required. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOE 393. Bioengineering Departmental Research Colloquium
Bioengineering department labs at Stanford present recent research projects and results. Guest lecturers. Topics include applications of engineering to biology, medicine, biotechnology, and medical technology, including biodesign and devices, molecular and cellular engineering, regenerative medicine and tissue engineering, biomedical imaging, and biomedical computation.

1 unit, Aut (Lin, M; Yang, F), Win (Lin, M; Huang, K), Spr (Lin, M; Riedel-Kruse, H)

BIOE 454. Synthetic Biology and Metabolic Engineering
(Same as CHEMENG 454) Principles for the design and optimization of new biological systems. Development of new enzymes, metabolic pathways, other metabolic systems, and communication systems among organisms. Example applications include the production of central metabolites, amino acids, pharmaceutical proteins, and isoprenoids. Economic challenges and quantitative assessment of metabolic performance. Pre- or corequisite: CHEMENG 355 or equivalent.

3 units, alternate years, not given this year

BIOE 459. Frontiers in Interdisciplinary Biosciences
(Same as BIO 459, BIOC 459, CHEMENG 459, CHEM 459, PSYCH 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.

1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson)

BIOE 484. Computational Methods in Cardiovascular Bioengineering
(Same as ME 484) Lumped parameter, one-dimensional nonlinear and linear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system and evaluate the performance of cardiovascular devices. Construction of anatomic models and extraction of physiologic quantities from medical imaging data. Problems in blood flow within the context of disease research, device design, and surgical planning.

3 units, not given this year

BIOE 485. Modeling and Simulation of Human Movement
(Same as ME 485) Direct experience with the computational tools used to create simulations of human movement. Lecture/labs on animation of movement; kinematic models of joints; forward dynamic simulation; computational models of muscles, tendons, and ligaments; creation of models from medical images; control of dynamic simulations; collision detection and contact models. Prerequisite: 281, 331A,B, or equivalent.

3 units, not given this year

BIOE 500. Thesis (Ph.D.)
(Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOE 802. TGR Dissertation
(Staff)

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOLOGY (BIO) COURSES

UNDERGRADUATE COURSES IN BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

BIO 1. Human Evolution and Environment
Human genetic and cultural evolution and how people interact with their environments, from the ancestors of Australopithecus to current events. Issues include race, gender, and intelligence; pesticide and antibiotic resistance; abortion and contraception; ecosystem services; environmental economics and ethics; the evolution of religion; climate change; population growth and overconsumption; origins and spread of ideas and technologies; and the distribution of political and economic power. GER:DB-NatSci

3 units, not given this year

BIO 2N. Photons, Biological Photosynthesis, and Quantum Mechanics
(Stanford Introductory Seminar) Light driven reactions are fundamental to life on earth. Examination of basic properties of light, the role of light in photosynthesis, pertinent aspects of quantum mechanics, and the harnessing of light in bio- and nanotechnology. Discussion will emphasize intuitive understanding. High school biology and physics required. GER:DB-NatSci

3 units, Aut (Schnitzer, M)

BIO 3. Frontiers in Marine Biology
An introduction to contemporary research in marine biology, including ecology, conservation biology, environmental toxicology, behavior, biomechanics, evolution, neurobiology, and molecular biology. Emphasis is on new discoveries and the technologies used to make them. Weekly lectures by faculty from the Hopkins Marine Station.

1 unit, Aut (Somero, G)

BIO 3N. Views of a Changing Sea: Literature & Science
(Stanford Introductory Seminar) The state of a changing world ocean, particularly in the eastern Pacific, will be examined through historical and contemporary fiction, non-fiction and scientific publications. Issues will include harvest and mariculture fisheries, land-sea interactions and oceanic climate change in both surface and deep waters. GER:DB-NatSci

3 units, Spr (Gilly, W)

BIO 4N. Personalized Genomic Medicine
(Stanford Introductory Seminar) Exploration of the exciting new field of personalized genomic medicine. Personalized medicine is based on the idea that each person's unique genome sequence can be used to predict risk of acquiring specific diseases, and to make more informed medical choices. Learn about the fascinating science behind these approaches; where they are heading in the future; and the ethical implications such technology presents. Lectures will be augmented with hands-on experience in exploring and analyzing a real person's genome.

3 units, Aut (Fraser, H)

BIO 7S. Introduction to Biology
The major fields of biology: biochemistry, the cell, evolution, and diversity. Foundation for higher-level biology courses. GER:DB-NatSci

3 units, Sum (Khalfan, W)

BIO 7SL. Introduction to Biology Lab
Optional lab to be taken concurrently with BIO 7S.

2 units, Sum (Khalfan, W)

BIO 8N. Human Evolution
(Stanford Introductory Seminar) A survey of the anatomical and behavioral evidence for human evolution and of the increasingly important information from molecular genetics. Emphasis on the split between the human and chimpanzee lines 6-7 million years ago, the appearance of the australopiths by 4.1 million years ago, the emergence of the genus Homo about 2.5 million years ago, the spread of Homo from Africa 1.7-1.6 million years ago, the subsequent divergence of Homo into different species on different continents, and the expansion of fully modern humans (Homo sapiens) from Africa about 50,000 years ago to replace the Neanderthals and other non-modern Eurasians.
5 units, Win (Klein, R)

BIO 8S. Introduction to Human Physiology
The function and regulation of human organ systems. Various diseases are examined as failures of these regulatory processes. Systems include cardiovascular, respiratory, renal, endocrine, and gastrointestinal. GER:DB-NatSci
3 units, Sum (Garza, D)

BIO 9S. Introduction to Biological Research Methods
Theory and practice of experimental biology using representative fields in biology and model systems. How to plan an experiment and analyze data. Introduction to scientific writing and reading scientific journal articles. Prerequisite: high school biology. GER:DB-NatSci
3 units, Sum (Malladi, S)

BIO 14N. Plants and Civilization
(Stanford Introductory Seminar) Preference to freshmen. The role of plants in the development of civilization. Topics: the use of forests, woodlands, and grazing lands; centers of origins and spread of crops; viticulture, and wine and beer making; the spice route and the age of exploration; the use of plants as medicine; the global spread of weeds; engineering plants for the future; the importance of tea, coffee, chocolate, sugar, potatoes, natural dyes, and rubber in societal affairs and change. GER:DB-NatSci
3 units, Win (Mooney, H)

BIO 20. Introduction to Brain and Behavior
(Same as HUMBIO 21) Evolutionary principles to understand how the brain regulates behavior physiologically, and is also influenced by behavioral interactions. Topics include neuron structure and function, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states, the biological basis of learning and memory, and behavioral abnormalities. GER:DB-NatSci
3 units, Aut (Fernald, R), alternate years, not given next year

BIO 23N. FACEBUG: The Social Life of Microbes
(Stanford Introductory Seminar) Exploration of three crucial aspects of microbial life. First, examine how the unseen microbial majority is responsible for critical but under-appreciated aspects of the biology of the planet. Second, investigate the array of current genomic and imaging tools available to probe microscopic organisms in the environment. Last, we will research the importance of microbial communities and social dynamics in ecological and human health settings. GER:DB-NatSci
3 units, Aut (Bhaya, D)

BIO 26N. Maintenance of the Genome
(Stanford Introductory Seminar) Preference to freshmen. Focus is on DNA repair systems that monitor the genome to ensure genomic stability in the face of natural endogenous threats to DNA and those due to radiation and genotoxic environmental chemicals. Redundancy of the genetic message ensured by complementary DNA strands facilitates recovery of information by excision repair when one of the strands is damaged. Predisposition to cancer is often a consequence of defective DNA repair. Relevance for oncology, aging, developmental biology, environmental health, and neurobiology. GER:DB-NatSci
3 units, Spr (Hanawalt, P)

BIO 31Q. Ants: Behavior, Ecology, and Evolution
(Stanford Introductory Seminar) Preference to sophomores. Behavior: the organization of colonies, how they operate without central control, how they resemble other complex systems like brains. Ecology: how populations of colonies change, comparing the ecology of a species in SW American desert and invasive Argentine ants. Evolution: why are there so many species of ants; how are they alike, how do they differ, and why? Ants as the theme for exploring how to do research in animal behavior, ecology, and evolution. Research project will be on the invasive Argentine ant: its distribution on campus, foraging trails, and nest structure.
3 units, Spr (Gordon, D)

BIO 33N. Conservation Science and Practice
(Stanford Introductory Seminar) Preference to freshmen. Interdisciplinary. The science and art of conservation today. The forces that are driving change in Earth's atmosphere, lands, waters, and variety of life forms. Which broad dimensions of the biosphere, and which elements of ecosystems, most merit protection? The prospects for, and challenges in, making conservation economically attractive and commonplace. Field trip; project. GER:DB-NatSci
3 units, Spr (Daily, G)

BIO 41. Genetics, Biochemistry, and Molecular Biology
Emphasis is on macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and higher order assembly; molecular biology, genome structure and dynamics, gene expression from transcription to translation. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35. GER:DB-NatSci
5 units, Aut (Bergmann, D; Simoni, R)

BIO 41S. Biochemistry, Genetics, and Molecular Biology
Emphasis is on macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and higher order assembly; molecular biology, genome structure and dynamics, gene expression from transcription to translation. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35. GER:DB-NatSci
5 units, Sum (Staff)

BIO 42. Cell Biology and Animal Physiology
Cell structure and function; principles of animal physiology (immunology, renal, cardiovascular, sensory, motor physiology, and endocrinology); neurobiology from cellular basis to neural regulation of physiology. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35. GER:DB-NatSci
5 units, Win (Cyert, M; Jones, P; Sapolsky, R)

BIO 43. Plant Biology, Evolution, and Ecology
Principles of evolution: macro- and microevolution and population genetics. Ecology: the principles underlying the exchanges of mass and energy between organisms and their environments; population, community, and ecosystem ecology; populations, evolution, and global change. Equivalent to BIOHOPK 43. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35. GER:DB-NatSci
5 units, Spr (Petrov, D; Mudgett, M; Gordon, D)

BIO 44X. Core Experimental Laboratory
Concepts, organisms, and techniques of modern biological research. Four different labs cover various molecular biological procedures, purification and characterization of beta-galactosidase and its kinetics, fertilization and early development of the purple sea urchin and an introduction to the fundamental concepts of classical and molecular genetics. Emphasis on experimental design, analysis of data, written and oral presentation of the experiments. Lab fee. Prerequisites: CHEM 31X, or 31A,B, and 33. Recommended: statistics, and concurrent enrollment in Biology or Human Biology core; 44X,Y should be taken sequentially in same year.
5 units, Win (Malladi, S)

BIO 44Y. Core Experimental Laboratory
Concepts, organisms, and techniques of modern biological research. Four different labs cover immunological concepts, animal behavioral studies using ants and cichlid fish, vesicle transport studies in the Caenorhabditis elegans nervous system and field studies on woody encroachment of grasslands. Create, design, execute and report on individual experimental project. Emphasis on experimental design, analysis of data, written and oral presentation of the experiments. Lab fee. Prerequisites: CHEM 31X, or 31A,B, and 33. Recommended: statistics, and concurrent enrollment in Biology or Human Biology core; 44X,Y should be taken sequentially in same year. Equivalent to BIOHOPK 44Y.
5 units, Spr (Malladi, S; Fukami, T; Seawell, P)

BIO 101. Ecology
The principles of ecology. Topics: interactions of organisms with their environment, dynamics of populations, species interactions,

structure and dynamics of ecological communities, biodiversity. Satisfies Central Menu Area 4. Prerequisite: 43, or consent of instructor. Recommended: statistics. GER:DB-NatSci

3 units, Aut (Dirzo, R; Vitousek, P)

BIO 102. Demography: Health, Development, Environment

(Same as HUMBIO 119) Demographic methods and their application to understanding and projecting changes in human infant, child, and adult mortality and health, fertility, population, sex ratios, and demographic transitions. Progress in human development, capabilities, and freedoms. Relationships between population and environment. Prerequisites: numeracy and basic statistics; Biology or Human Biology core; or consent of instructor. GER:DB-SocSci

3 units, not given this year

BIO 104. Advanced Molecular Biology

(Same as BIO 200) Molecular mechanisms that govern the replication, recombination, and expression of eukaryotic genomes. Topics: DNA replication, DNA recombination, gene transcription, RNA splicing, regulation of gene expression, protein synthesis, and protein folding. Satisfies Central Menu Area 1. Prerequisite: Biology core. GER:DB-NatSci

5 units, Win (Frydman, J; Gozani, O)

BIO 105A. Jasper Ridge Docent Training

Formerly 96A. First of two-quarter sequence training program to join the Jasper Ridge education program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes, and attend continuing education classes available to members of the JRBP community after the course.

4 units, Win (Dirzo, R; Wilber, C)

BIO 105B. Jasper Ridge Docent Training

Formerly 96B. Second of two-quarter sequence training program to join the Jasper Ridge education program. Multidisciplinary environmental education; hands-on field research. Field ecology and the natural history of plants and animals, archaeology, geology, hydrology, land management, and research projects of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes, and attend continuing education classes available to members of the JRBP community after the course. Prerequisite: 96A.

4 units, Spr (Dirzo, R; Wilber, C)

BIO 109A. The Human Genome and Disease

(Same as BIO 209A, HUMBIO 158) The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. GER:DB-NatSci

3 units, Win (Heller, R)

BIO 109B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine

(Same as BIO 209B) Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core. GER:DB-NatSci

3 units, Spr (Heller, R)

BIO 112. Human Physiology

(Same as BIO 212, HUMBIO 133) The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core. GER:DB-NatSci

4 units, Win (Garza, D)

BIO 113. Fundamentals of Molecular Evolution

(Same as BIO 244) The inference of key molecular evolutionary processes from DNA and protein sequences. Topics include random genetic drift, coalescent models, effects and tests of natural selection, combined effects of linkage and natural selection, codon bias and genome evolution. Satisfies Central Menu Areas 1 or 4. Prerequisites: Biology core or graduate standing in any department, and consent of instructor. GER:DB-NatSci

4 units, Spr (Petrov, D)

BIO 114. Field Course on Tropical Biogeochemistry: Amazon as Case Study

(Same as EARTHSYS 114) Post-field seminar for students who went on the two-week field trip to the Amazon in September with Brazilian students under Professor Martinelli of the University of São Paulo and Stanford Latin American Studies. Land use changes over the last 30 years including the conversion of natural forest for cattle ranching and soy beans in the Amazon, the largest continuous area of tropical forests on Earth with the greatest number of plant and animal species. In English.

3 units, not given this year

BIO 116. Ecology of the Hawaiian Islands

(Same as EARTHSYS 116) Terrestrial and marine ecology and conservation biology of the Hawaiian Archipelago. Taught in the field in Hawaii as part of quarter-long sequence of courses including Earth Sciences and Anthropology. Topics include ecological succession, plant-soil interactions, conservation biology, biological invasions and ecosystem consequences, and coral reef ecology. Restricted to students accepted into the Earth Systems of Hawaii Program. GER:DB-NatSci

4 units, Aut (Vitousek, P; Palumbi, S), alternate years, not given next year

BIO 117. Biology and Global Change

(Same as EARTHSYS 111, EESS 111) The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing. GER:DB-NatSci

4 units, Win (Vitousek, P; Arrigo, K)

BIO 118. Genetic Analysis of Biological Processes

(Same as BIO 218) Genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core. GER:DB-NatSci

5 units, Spr (Staff)

BIO 121. Biogeography

Global distributions of organisms through the Phanerozoic, with emphasis on historical causes. Topics: plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity. Satisfies Central Menu Area 4. GER:DB-NatSci

3 units, not given this year

BIO 122. Along the Track of the Yellowstone Hotspot: Fusion of Art and Science

(Same as ARTSTUDI 184A) The 20-million-year-old track of the Yellowstone hotspot through western North America, using the field setting to investigate ecology, evolution, and geology through an aesthetic and documentary media lens. Students create: experiential ways to learn about the natural world; a scientific yet personal intimacy about how ecosystems work and how they change; and ways to convey their observations to the public. Required trip to Yellowstone National Park.

4 units, not given this year

BIO 125. Ecosystems of California

The diversity and functioning of California ecosystems through time and how human beings have impacted and managed them. Prerequisite: 43, HUMBIO 2A, or EARTHSYS 10. GER:DB-NatSci

3 units, Spr (Mooney, H)

BIO 129A. Cellular Dynamics I: Cell Motility and Adhesion

Cell motility emphasizing role of actin assembly and dynamics coupling actin organization to cell movement. Interaction of cells with extracellular matrix, and remodelling of extracellular matrix in development and disease. Directed cell migration by chemotaxis

(neuronal path-finding, immune cells). Cell-cell adhesion, formation of intercellular junctions and mechanisms regulating cell-cell interactions in development and diseases. Emphasis is on experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Satisfies Central Menu Area 2. Prerequisite: Biology core. GER:DB-NatSci

4 units, Win (Nelson, W)

BIO 129B. Cellular Dynamics II: Building a Cell

Principles of cell organization; how common biochemical pathways are modified to generate diversity in cell structure and function. Roles of actin and microtubule cytoskeletons in cellular architecture. Mechanisms of protein sorting and trafficking, and protein modules and switches in regulating cell polarity. Yeast to polarized epithelial cells and neurons. Emphasis is on experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Satisfies Central Menu Area 2. Prerequisite: Biology core. Recommended: 129A. GER:DB-NatSci

4 units, Spr (Nelson, W)

BIO 132. Advanced Imaging Lab in Biophysics

(Same as APPPHYS 232, BIO 232, BIOPHYS 232, MCP 232) Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor. GER:DB-NatSci

4 units, Spr (Block, S; Smith, S; Stearns, T)

BIO 136. Evolutionary Paleobiology

A paleontological approach to evolutionary theory. Topics: history of life, speciation, heterochrony, evolutionary constraint, coevolution, macroevolution, the Cambrian Explosion, mass extinctions, taphonomy, life on land, life in the sea, life in the air. Satisfies Central Menu Area 4. GER:DB-NatSci

4 units, Win (Hadly, E)

BIO 137. Plant Genetics

(Same as BIO 237) Gene analysis, mutagenesis, transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; scientific and societal lessons from transgenic plants. Satisfies Central Menu Area 2. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

3-4 units, Spr (Walbot, V)

BIO 139. Biology of Birds

How birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Local bird communities. Emphasis is on field research. Enrollment limited to 20. Prerequisites: 43 or equivalent, and consent of instructor. Recommended: birding experience. GER:DB-NatSci

3 units, Spr (Root, T), alternate years, not given next year

BIO 140. Population Biology of Butterflies

Field work on Euphydryas populations under study on campus and elsewhere in California. Course offered as participation in research when conditions permit; decisions not made until Winter Quarter. Prerequisites: 43 and consent of instructor.

2-5 units, not given this year

BIO 141. Biostatistics

(Same as STATS 141) Introductory statistical methods for biological data: describing data (numerical and graphical summaries); introduction to probability; and statistical inference (hypothesis tests and confidence intervals). Intermediate statistical methods: comparing groups (analysis of variance); analyzing associations (linear and logistic regression); and methods for categorical data (contingency tables and odds ratio). Course content integrated with statistical computing in R. GER:DB-Math

4-5 units, Aut (De la Cruz Cabrera, O), Win (Feldman, M)

BIO 143. Evolution

(Same as BIO 243) The basic facts and principles of the evolution of all life. The logic of and evidence for the correctness of Darwin's argument for evolution by natural selection. How Mendelian genetics was integrated into evolutionary thinking. The integration of physiological and ecological perspectives into the study of evolutionary adaptation within species. Species formation and evolutionary divergence among species. Patterns of evolution over long time scales. Satisfies Central Menu Area 4. GER:DB-NatSci

3 units, Aut (Watt, W)

BIO 144. Conservation Biology

(Same as HUMBIO 112) Principles and application of the science of preserving biological diversity. Topics: sources of endangerment of diversity; the Endangered Species Act; conservation concepts and techniques at the population, community, and landscape levels; reserve design and management; conflict mediation. 4 units if taken with a service learning component. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101, or BIO 43 or HUMBIO 2A with consent of instructor. GER:DB-NatSci

3-4 units, Win (Boggs, C; Launer, A)

BIO 145. Behavioral Ecology

(Same as BIO 245) Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Satisfies Central Menu Area 4. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics. GER:DB-NatSci, WIM

4 units, Spr (Gordon, D)

BIO 146. Population Studies

Series of talks by distinguished speakers introducing approaches to population and resource studies.

1 unit, Win (Feldman, M)

BIO 149. The Neurobiology of Sleep

(Same as BIO 249, HUMBIO 161) (Graduate students register for 249.) Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16. GER:DB-NatSci

4 units, not given this year

BIO 150. Human Behavioral Biology

(Same as BIO 250, HUMBIO 160) Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness. GER:DB-NatSci

5 units, alternate years, not given this year

BIO 151. Mechanisms of Neuron Death

For Biology majors with background in neuroscience. Cell and molecular biology of neuron death during neurological disease. Topics: the amyloid diseases (Alzheimer's), prion diseases (kuru and Creutzfeldt-Jakob), oxygen radical diseases (Parkinson's and ALS), triplet repeat diseases (Huntington's), and AIDS-related dementia. Student presentations. Enrollment limited to 15; application required. GER:DB-NatSci

3 units, Aut (Sapolsky, R)

BIO 152. Imaging: Biological Light Microscopy

(Same as MCP 222) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Lab. Prerequisites: some college physics, Biology core. GER:DB-NatSci

3 units, Spr (Staff)

BIO 153. Cellular Neuroscience: Cell Signaling and Behavior

(Same as PSYCH 120) Neural interactions underlying behavior. Prerequisites: PSYCH 1 or basic biology. GER:DB-NatSci

4 units, not given this year

BIO 154. Molecular and Cellular Neurobiology

(Same as BIO 254, NBIO 254) For advanced undergraduates and graduate students. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular

basis of behavior including learning and memory, molecular pathogenesis of neurological diseases. Satisfies Central Menu Areas 2 or 3. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors. GER:DB-NatSci

4-5 units, Aut (Clandinin, T; Luo, L; Shen, K), alternate years, not given next year

BIO 156. Epigenetics

(Same as BIO 256, GENE 206, PATH 206) For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in Drosophila in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42 , or GENE 203, or consent of instructor.

2 units, Spr (Lipsick, J; Gozani, O), alternate years, not given next year

BIO 157. Biochemistry and Molecular Biology of Plants

(Same as BIO 257) Biochemical and molecular basis of plant growth and adaptation. Topics include: hormone signal transduction; photoreceptor chemistry and signaling; metabolite sensing and transport; dynamics of photosynthesis; plant innate immunity and symbiosis. Lectures and readings will emphasize research methods. Prerequisite: Biology core or equivalent, or consent of instructor. GER:DB-NatSci

3-4 units, Spr (Mudgett, M)

BIO 158. Developmental Neurobiology

For advanced undergraduates and coterminal students. The principles of nervous system development from the molecular control of patterning, cell-cell interactions, and trophic factors to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Satisfies Central Menu Areas 2 or 3. Prerequisite: BIO 42 or equivalent. GER:DB-NatSci

4 units, Spr (McConnell, S; Shen, K; Garner, C; Shatz, C), alternate years, not given next year

BIO 160A. Developmental Biology I

Focus is on the molecular mechanisms underlying the generation of diverse cell types and tissues during embryonic and post-embryonic animal development. The role of cell-cell communication in controlling key developmental decisions. Topics covered in this quarter include embryonic axis formation, morphogen signaling, cell type specification and stem cells. Experimental logic and methods of research in developmental biology. Discussions of research papers. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

4 units, Aut (Simon, M)

BIO 160B. Developmental Biology II

Continuation of BIO 160A. Focus is on the molecular mechanisms underlying the generation of diverse cell types and tissues during embryonic and post-embryonic animal development. The role of cell-cell communication in controlling key developmental decisions. The topics include sexual control of development, tissue polarity and growth, cell migration, regeneration, and the evolution of developmental mechanisms. Experimental logic and methods of research in developmental biology. Discussions of research papers. Satisfies Central Menu Areas 1 or 2. Prerequisites: Biology Core and 160A, or consent of instructor. GER:DB-NatSci

4 units, Win (Simon, M)

BIO 161. Molecular Basis of Biological Communication

Across molecular, cellular, organismal and communal biological scales, communication among elements of a system is required for its function. The molecules and logic at the heart of communication at levels from the interactions between cells in a developing body to how organisms perceive and respond to their physical environment and the organisms around them; how these systems normally work and how failures in communication result in and from disease. Current research literature. Prerequisites: BIO 41, 42. Recommended: BIO 160A, 129A.

4 units, Spr (Bergmann, D), alternate years, not given next year

BIO 163. Neural Systems and Behavior

(Same as BIO 263, HUMBIO 163) The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A. GER:DB-NatSci

4 units, alternate years, not given this year

BIO 164. Biosphere-Atmosphere Interactions

(Same as BIO 264) Physiological, ecological, and physical aspects of ecosystem function, emphasizing how ecosystems influence and are influenced by the atmosphere. Prerequisites: 42, 43; or consent of instructor. GER:DB-NatSci

4 units, Win (Field, C; Berry, J), alternate years, not given next year

BIO 165. When Neurons Misfire: The Molecular Basis of Neurological Disorders

Current topics in research and investigative therapies of neurological conditions including stroke, epilepsy,depression, personality disorders, schizophrenia, Parkinsons, and aging. Sources include primary literature and focus on molecular mechanisms and therapeutic strategies. Emphasis placed on what the study of dysfunction in the nervous system tells us about the delicacy of proper function. Guest lecturers.

1 unit, Win (House, P)

BIO 166. Faunal Analysis: Animal Remains for the Archaeologist

(Same as ANTHRO 113, ANTHRO 213, BIO 266) The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodoloigcal issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

5 units, Spr (Klein, R)

BIO 171. Principles of Cell Cycle Control

(Same as BIO 271, CSB 271) Genetic analysis of the key regulatory circuits governing the control of cell division. Illustration of key principles that can be generalized to other synthetic and natural biological circuits. Focus on tractable model organisms; growth control; irreversible biochemical switches; chromosome duplication; mitosis; DNA damage checkpoints; MAPK pathway-cell cycle interface; oncogenesis. Analysis of classic and current primary literature. Satisfies Central Menu Area 2.

3 units, Aut (Skotheim, J; Ferrell, J)

BIO 172. Molecular Basis of Body Plan Evolution

(Same as BIO 272) Developmental biology research, from arthropods and chordates, over the past 25 years has revealed astonishing levels of shared developmental similarities, despite large morphological differences between the two groups, and has led to speculation about the morphology of the earliest animals. This has led to a synthesis between developmental biology, zoology, and paleontology and sparked molecular developmental studies in diverse metazoan phyla. Focus is on the latest findings from comparative development and what they reveal about the early evolution of the animal phyla.

4 units, Spr (Lowe, C)

BIO 175. Tropical Ecology and Conservation

Field trip to a field station at Los Tuxtlas, Mexico; lectures at Stanford. How to address scientific questions concerning ecology and conservation. Field trip includes natural history observations and group research projects. Symposium based on project results. Recommended: 43, 101, and 141 or STATS 60. GER:DB-NatSci

5 units, Spr (Dirzo, R)

BIO 177. Plant Microbe Interaction
(Same as BIO 277) Molecular basis of plant symbiosis and pathogenesis. Topics include mechanisms of recognition and signaling between microbes and plant hosts, with examples such as the role of small molecules, secreted peptides, and signal transduction pathways in symbiotic or pathogenic interactions. Readings include landmark papers together with readings in the contemporary literature. Prerequisites: Biology core and two or more upper division courses in genetics, molecular biology, or biochemistry. Recommended: plant genetics or plant biochemistry.
3 units, alternate years, not given this year

BIO 178. Microbiology Literature
(Same as BIO 278) For advanced undergraduates and first-year graduate students. Critical reading of the research literature in prokaryotic genetics and molecular biology, with particular applications to the study of major human pathogens. Classic and foundational papers in pathogenesis, genetics, and molecular biology; recent literature on bacterial pathogens such as Salmonella, Vibrio, and/or Yersinia. Diverse experimental approaches: biochemistry, genomics, pathogenesis, and cell biology. Prerequisites: Biology Core and two upper-division courses in genetics, molecular biology, or biochemistry.
3 units, Win (Long, S)

BIO 183. Theoretical Population Genetics
(Same as BIO 283) Models in population genetics and evolution. Selection, random drift, gene linkage, migration, and inbreeding, and their influence on the evolution of gene frequencies and chromosome structure. Models are related to DNA sequence evolution. Prerequisites: calculus and linear algebra, or consent of instructor.
3 units, alternate years, not given this year

BIO 186. Natural History of the Vertebrates
(Same as BIO 286) Broad survey of the diversity of vertebrate life. Discussion of the major branches of the vertebrate evolutionary tree, with emphasis on evolutionary relationships and key adaptations as revealed by the fossil record and modern phylogenetics. Modern orders introduced through an emphasis on natural history, physiology, behavioral ecology, community ecology, and conservation. Lab sessions focused on comparative skeletal morphology through hands-on work with skeletal specimens. Discussion of field methods and experience with our local vertebrate communities through field trips to several of California¿s distinct biomes. Prerequisite: Biology core.
4 units, alternate years, not given this year

BIO 188. Biochemistry I
(Same as BIO 288, CHEMENG 181, CHEMENG 281, CHEM 181) (CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 135 or 171. GER:DB-NatSci
3 units, Win (Zare, R; Cegelski, L)

BIO 189. Biochemistry II
(Same as BIO 289, CHEMENG 183, CHEMENG 283, CHEM 183) Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). GER:DB-NatSci
3 units, Spr (Dunn, A)

BIO 196A. Biology Senior Reflection
Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.
3 units, Aut (McConnell, S)

BIO 196B. Biology Senior Reflection
Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.
3 units, Win (McConnell, S)

BIO 196C. Biology Senior Reflection
Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.
3 units, Spr (McConnell, S)

BIO 198. Directed Reading in Biology
Individually arranged under the supervision of members of the faculty.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 198X. Out-of-Department Directed Reading
Individually arranged under the supervision of members of the faculty. Credit for work arranged with out-of-department faculty is restricted to Biology majors and requires department approval. See http://biohonors.stanford.edu for information and petitions. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 199. Advanced Research Laboratory in Experimental Biology
Individual research taken by arrangement with in-department instructors. See http://biohonors.stanford.edu for information on research sponsors, units, and credit for summer research. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 199X. Out-of-Department Advanced Research Laboratory in Experimental Biology
Individual research by arrangement with out-of-department instructors. Credit for 199X is restricted to declared Biology majors and requires department approval. See http://biohonors.stanford.edu for information on research sponsors, units, petitions, deadlines, credit for summer research, and out-of-Stanford research. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 271. Principles of Cell Cycle Control
(Same as BIO 171, CSB 271) Genetic analysis of the key regulatory circuits governing the control of cell division. Illustration of key principles that can be generalized to other synthetic and natural biological circuits. Focus on tractable model organisms; growth control; irreversible biochemical switches; chromosome duplication; mitosis; DNA damage checkpoints; MAPK pathway-cell cycle interface; oncogenesis. Analysis of classic and current primary literature. Satisfies Central Menu Area 2.
3 units, Aut (Skotheim, J; Ferrell, J)

GRADUATE COURSES IN BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIO 274S. Hopkins Microbiology Course
(Same as BIOHOPK 274, CEE 274S, EESS 253S) (Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and conse-

quences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

9-12 units, Sum (Spormann, A; Francis, C)

BIO 200. Advanced Molecular Biology

(Same as BIO 104) Molecular mechanisms that govern the replication, recombination, and expression of eukaryotic genomes. Topics: DNA replication, DNA recombination, gene transcription, RNA splicing, regulation of gene expression, protein synthesis, and protein folding. Satisfies Central Menu Area 1. Prerequisite: Biology core.

5 units, Win (Frydman, J; Gozani, O)

BIO 203. Advanced Genetics

(Same as DBIO 203, GENE 203) For graduate students in Bioscience programs; may be appropriate for graduate students in other programs. The genetic toolbox. Examples of analytic methods, genetic manipulation, genome analysis, and human genetics. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Faculty-led discussion sections with evaluation of papers. Students with minimal experience in genetics should prepare by working out problems in college level textbooks.

4 units, Aut (Stearns, T; Sidow, A; Kim, S)

BIO 206. Field Studies in Earth Systems

(Same as EARTHSYS 189, EESS 189) For advanced upper-division undergraduates and graduate students. Field-based, focusing on the components and processes by which terrestrial ecosystems function. Topics from biology, chemistry, ecology, geology, and soil science. Lecture, field, and lab studies emphasize standard field techniques, experimental design, analysis of data, and written and oral presentation. Small team projects test the original questions in the functioning of natural ecosystems. Admission by application; see Axess. Prerequisites: BIO 141 or EESS 160 (formerly GES 160), or equivalent.

5 units, not given this year

BIO 207. Life and Death of Proteins

How proteins are made and degraded in the cell. Discussion of primary literature. Case studies follow the evolution of scientific ideas, and evaluate how different experimental approaches contribute to our understanding of a biological problem. Emphasis on multidisciplinary approaches. Topics: protein folding and assembly, mechanisms of chaperone action, sorting into organelles, misfolding and disease, and the ubiquitin-proteasome pathway. Enrollment limited to 30.

3 units, Win (Frydman, J)

BIO 209A. The Human Genome and Disease

(Same as BIO 109A, HUMBIO 158) The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers.

3 units, Win (Heller, R)

BIO 209B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine

(Same as BIO 109B) Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core.

3 units, Spr (Heller, R)

BIO 210. DNA Replication and Genomic Maintenance

Maintenance of the genome and its accurate replication are prerequisites for life. Lecture topics include: Structural biology of DNA/RNA polymerases, DNA repair enzymes and accessory factors in functional complexes; Molecular mechanisms of replication and repair, mechanisms of chromatin remodeling and interfacing of repair pathways with other DNA transactions; Endogenous/environmental genotoxins, DNA structure alterations and inducible responses to genotoxic insult; Relationships of DNA damage processing to mutagenesis, carcinogenesis, aging and human genetic disease; Emphasis on fundamental principles and current research literature.

3 units, Win (Hanawalt, P; Morrison, A)

BIO 212. Human Physiology

(Same as BIO 112, HUMBIO 133) The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core.

4 units, Win (Garza, D)

BIO 214. Advanced Cell Biology

(Same as BIOC 224, MCP 221) For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor.

2-5 units, Win (Kopito, R; Theriot, J; Pfeffer, S; Straight, A; Nachury, M)

BIO 215. Biochemical Evolution

Biochemical viewpoints on the evolutionary process. Topics: prebiotic biochemistry and the origins of life; adaptive organization of metabolism; enzyme polymorphisms and other biochemical aspects of population genetics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.

3 units, Win (Watt, W), alternate years, not given next year

BIO 216. Terrestrial Biogeochemistry

(Same as EESS 216) Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.

3 units, Spr (Vitousek, P), alternate years, not given next year

BIO 217. Neuronal Biophysics

Biophysical descriptions and mechanisms of passive and excitable membranes, ion channels and pumps, action potential propagation, and synaptic transmission. Introduction to dynamics of single neurons and neuronal networks. Emphasis is on the experimental basis for modern research applications. Interdisciplinary aspects of biology and physics. Literature, problem sets, and student presentations. Prerequisites: undergraduate physics, calculus, and biology.

4 units, not given this year

BIO 218. Genetic Analysis of Biological Processes

(Same as BIO 118) Genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core.

5 units, Spr (Staff)

BIO 222. Exploring Neural Circuits

Seminar. The logic of how neural circuits control behavior; how neural circuits are assembled during development and modified by experience. Emphasis is on primary literature. Topics include: neurons as information processing units; simple and complex circuits underlying sensory information processing and motor control; and development and plasticity of neural circuits. Advanced undergraduates with background in physical science, engineering, and biology may apply to enroll. Recommended: background in neuroscience.

3 units, Win (Luo, L)

BIO 223. Stochastic and Nonlinear Dynamics

(Same as APPPHYS 223) Theoretical analysis of dynamical processes: dynamical systems, stochastic processes, and spatiotemporal dynamics. Motivations and applications from biology and physics. Emphasis is on methods including qualitative approaches, asymptotics, and multiple scale analysis. Prerequisites: ordinary and par-

tial differential equations, complex analysis, and probability or statistical physics.

3 units, alternate years, not given this year

BIO 230. Molecular and Cellular Immunology

For advanced undergraduate and graduate students who have no previously taken an introductory immunology course. Components of the immune system and mechanisms of immune responses: structure, function, and genetics of antibody molecules; cellular basis of immunity and its regulation; molecular biology and biochemistry of antigen receptors and signaling pathways; genetic control of immunity and disease susceptibility. Emphasis is on key experimental approaches. Satisfies Central Menu Areas 1 or 2. Prerequisite for undergraduates: Biology or Human Biology core, or consent of instructor.

4 units, Aut (Jones, P)

BIO 230A. Molecular and Cellular Immunology Literature Review

Special discussion section for graduate students. Supplement to 230. Corequisite: 230.

1 unit, Aut (Jones, P)

BIO 231. Evolution of Life Histories

Life histories as descriptions of reproduction, survival, and growth over the lives of individuals. Theoretical approaches to the dynamics and evolution of life histories and of populations with different life histories. Experimental data on natural populations and methods for their analysis.

3 units, not given this year

BIO 232. Advanced Imaging Lab in Biophysics

(Same as APPPHYS 232, BIO 132, BIOPHYS 232, MCP 232) Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.

4 units, Spr (Block, S; Smith, S; Stearns, T)

BIO 237. Plant Genetics

(Same as BIO 137) Gene analysis, mutagenesis, transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; scientific and societal lessons from transgenic plants. Satisfies Central Menu Area 2. Prerequisite: Biology core or consent of instructor.

3-4 units, Spr (Walbot, V)

BIO 243. Evolution

(Same as BIO 143) The basic facts and principles of the evolution of all life. The logic of and evidence for the correctness of Darwin's argument for evolution by natural selection. How Mendelian genetics was integrated into evolutionary thinking. The integration of physiological and ecological perspectives into the study of evolutionary adaptation within species. Species formation and evolutionary divergence among species. Patterns of evolution over long time scales. Satisfies Central Menu Area 4.

3 units, Aut (Watt, W)

BIO 244. Fundamentals of Molecular Evolution

(Same as BIO 113) The inference of key molecular evolutionary processes from DNA and protein sequences. Topics include random genetic drift, coalescent models, effects and tests of natural selection, combined effects of linkage and natural selection, codon bias and genome evolution. Satisfies Central Menu Areas 1 or 4. Prerequisites: Biology core or graduate standing in any department, and consent of instructor.

4 units, Spr (Petrov, D)

BIO 245. Behavioral Ecology

(Same as BIO 145) Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Satisfies Central Menu Area 4. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics.

4 units, Spr (Gordon, D)

BIO 249. The Neurobiology of Sleep

(Same as BIO 149, HUMBIO 161) (Graduate students register for 249.) Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16.

4 units, not given this year

BIO 250. Human Behavioral Biology

(Same as BIO 150, HUMBIO 160) Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness.

5 units, alternate years, not given this year

BIO 254. Molecular and Cellular Neurobiology

(Same as BIO 154, NBIO 254) For advanced undergraduates and graduate students. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases. Satisfies Central Menu Areas 2 or 3. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors.

4-5 units, Aut (Clandinin, T; Luo, L; Shen, K), alternate years, not given next year

BIO 256. Epigenetics

(Same as BIO 156, GENE 206, PATH 206) For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in Drosophila in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42 , or GENE 203, or consent of instructor.

2 units, Spr (Lipsick, J; Gozani, O), alternate years, not given next year

BIO 257. Biochemistry and Molecular Biology of Plants

(Same as BIO 157) Biochemical and molecular basis of plant growth and adaptation. Topics include: hormone signal transduction; photoreceptor chemistry and signaling; metabolite sensing and transport; dynamics of photosynthesis; plant innate immunity and symbiosis. Lectures and readings will emphasize research methods. Prerequisite: Biology core or equivalent, or consent of instructor.

3-4 units, Spr (Mudgett, M)

BIO 258. Neural Development

For Ph.D. students. Seminar; students also attend BIO 158 lectures. Topics: neural induction and patterning, cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior.

4 units, Spr (McConnell, S; Shen, K; Garner, C; Shatz, C), alternate years, not given next year

BIO 263. Neural Systems and Behavior

(Same as BIO 163, HUMBIO 163) The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A.

4 units, alternate years, not given this year

BIO 264. Biosphere-Atmosphere Interactions

(Same as BIO 164) Physiological, ecological, and physical aspects of ecosystem function, emphasizing how ecosystems influence and are influenced by the atmosphere. Prerequisites: 42, 43; or consent of instructor.

4 units, Win (Field, C; Berry, J), alternate years, not given next year

BIO 266. Faunal Analysis: Animal Remains for the Archaeologist
(Same as ANTHRO 113, ANTHRO 213, BIO 166) The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodoloigcal issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

5 units, Spr (Klein, R)

BIO 267. Molecular Mechanisms of Neurodegenerative Disease
(Same as NENS 267) The epidemic of neurodegenerative disorders such as Alzheimer's and Parkinson's disease occasioned by an aging human population. Genetic, molecular, and cellular mechanisms. Clinical aspects through case presentations.

4 units, alternate years, not given this year

BIO 272. Molecular Basis of Body Plan Evolution
(Same as BIO 172) Developmental biology research, from arthropods and chordates, over the past 25 years has revealed astonishing levels of shared developmental similarities, despite large morphological differences between the two groups, and has led to speculation about the morphology of the earliest animals. This has led to a synthesis between developmental biology, zoology, and paleontology and sparked molecular developmental studies in diverse metazoan phyla. Focus is on the latest findings from comparative development and what they reveal about the early evolution of the animal phyla.

4 units, Spr (Lowe, C)

BIO 277. Plant Microbe Interaction
(Same as BIO 177) Molecular basis of plant symbiosis and pathogenesis. Topics include mechanisms of recognition and signaling between microbes and plant hosts, with examples such as the role of small molecules, secreted peptides, and signal transduction pathways in symbiotic or pathogenic interactions. Readings include landmark papers together with readings in the contemporary literature. Prerequisites: Biology core and two or more upper division courses in genetics, molecular biology, or biochemistry. Recommended: plant genetics or plant biochemistry.

3 units, alternate years, not given this year

BIO 278. Microbiology Literature
(Same as BIO 178) For advanced undergraduates and first-year graduate students. Critical reading of the research literature in prokaryotic genetics and molecular biology, with particular applications to the study of major human pathogens. Classic and foundational papers in pathogenesis, genetics, and molecular biology; recent literature on bacterial pathogens such as Salmonella, Vibrio, and/or Yersinia. Diverse experimental approaches: biochemistry, genomics, pathogenesis, and cell biology. Prerequisites: Biology Core and two upper-division courses in genetics, molecular biology, or biochemistry.

3 units, Win (Long, S)

BIO 283. Theoretical Population Genetics
(Same as BIO 183) Models in population genetics and evolution. Selection, random drift, gene linkage, migration, and inbreeding, and their influence on the evolution of gene frequencies and chromosome structure. Models are related to DNA sequence evolution. Prerequisites: calculus and linear algebra, or consent of instructor.

3 units, alternate years, not given this year

BIO 286. Natural History of the Vertebrates
(Same as BIO 186) Broad survey of the diversity of vertebrate life. Discussion of the major branches of the vertebrate evolutionary tree, with emphasis on evolutionary relationships and key adaptations as revealed by the fossil record and modern phylogenetics. Modern orders introduced through an emphasis on natural history, physiology, behavioral ecology, community ecology, and conservation. Lab sessions focused on comparative skeletal morphology through hands-on work with skeletal specimens. Discussion of field methods and experience with our local vertebrate communities through field trips to several of California¿s distinct biomes. Prerequisite: Biology core.

4 units, alternate years, not given this year

BIO 288. Biochemistry I
(Same as BIO 188, CHEMENG 181, CHEMENG 281, CHEM 181) (CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 135 or 171.

3 units, Win (Zare, R; Cegelski, L)

BIO 289. Biochemistry II
(Same as BIO 189, CHEMENG 183, CHEMENG 283, CHEM 183) Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

3 units, Spr (Dunn, A)

BIO 290. Teaching of Biology
Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

BIO 291. Development and Teaching of Core Experimental Laboratories
Preparation for teaching the core experimental courses (44X and 44Y). Emphasis is on lab, speaking, and writing skills. Focus is on updating the lab to meet the changing technical needs of the students. Taken prior to teaching either of the above courses. May be repeated for credit. Prerequisite: selection by instructor.

1-2 units, Aut (Malladi, S), Win (Malladi, S)

BIO 294. Cellular Biophysics
(Same as APPPHYS 294) Physical biology of dynamical and mechanical processes in cells. Emphasis is on qualitative understanding of biological functions through quantitative analysis and simple mathematical models. Sensory transduction, signaling, adaptation, switches, molecular motors, actin and microtubules, motility, and circadian clocks. Prerequisites: differential equations and introductory statistical mechanics.

3 units, Spr (Fisher, D), alternate years, not given next year

BIO 299. Biology PhD Lab Rotation
Limited to first year Biology PhD students. Lab rotations with Biosciences faculty.

1-10 units, Aut (Nelson, W), Win (Staff)

BIO 300. Graduate Research
For graduate students only. Individual research by arrangement with in-department instructors.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 300X. Out-of-Department Graduate Research
Individual research by arrangement with out-of-department instructors. Master's students: credit for work arranged with out-of-department instructors is restricted to Biology students and requires approved department petition. See http://biohonors.stanford.edu for more information. May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 301. Frontiers in Biology
Limited to and required of first-year Ph.D. students in molecular, cellular, and developmental biology. Current research in molecular, cellular, and developmental biology emphasizing primary research literature. Held in conjunction with the department's Monday seminar series. Students and faculty meet weekly before the seminar for a student presentation and discussion of upcoming papers.

1-3 units, Aut (Skotheim, J; Morrison, A), Win (Skotheim, J; Morrison, A)

BIO 302. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.

1 unit, Aut (Ehrlich, P)

BIO 303. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.
1 unit, Win (Ehrlich, P)

BIO 304. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.
1 unit, Spr (Ehrlich, P)

BIO 306. Current Topics in Integrative Organismal Biology
Limited to and required of graduate students doing research in this field. At Hopkins Marine Station.
1 unit, Aut (Heller, C; Sapolsky, R; Fernald, R; Somero, G)

BIO 312. Ethical Issues in Ecology and Evolutionary Biology
Focus is on ethical issues addressed in Donald Kennedy's Academic Duty and others of importance to academics and scientists in the fields of ecology, behavior, and evolutionary biology. Discussions led by faculty and outside guests. Satisfies ethics course requirement for ecology and evolutionary biology. Prerequisite: PhD student in the ecology and evolutionary biology or marine program, or consent of instructor.
1 unit, Aut (Ehrlich, P)

BIO 315. Seminar in Biochemical Evolution
Literature review and discussion of current topics in biochemical evolution and molecular evolutionary genetics. Prerequisite: consent of instructor.
1-3 units, Aut (Watt, W), Win (Watt, W)

BIO 323. Detecting Climate-Driven Changes in California Plant Ranges
Seminar. For advanced undergraduates and graduate students. Future anthropogenic climate change will continue to alter plant communities, plant ranges, and ecosystems. Studies have already documented plant and animal range shifts across the globe, yet many questions remain as to how plants will respond to climate change. Which taxa and functional groups will be most sensitive to changes in climate? What will happen to ecological communities with differential response of plant species to climate? Focus is on analyzing trends in climate change and long-term plant distribution data in California. May be repeated for credit. Prerequisite: familiarity with statistical, spatial, or modeling analyses.
1-2 units, not given this year

BIO 324. Interpreting Ecological Data
Experimental design and the theory behind and appropriate use of parametric statistics including: student t-test; analysis of variance; linear regression and some variations including logistic regression and multiple regression; analysis of covariance; chi-squared similarity test; testing the independence of multiple tests; Monte Carlo and bootstrapping methods. Students encouraged to use data from their own research. Course does not fulfill undergraduate statistics requirement. Prerequisite: consent of instructor.
4 units, not given this year

BIO 326. Foundations in Biogeography
Seminar. Focus on classic papers covering the global distribution and abundance of organisms through time. Topics include: phylogenetics, phylogeography, plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity, conservation and a history of the field.
2 units, Win (Hadly, E; Fukami, T), alternate years, not given next year

BIO 342. Plant Biology Seminar
Topics announced at the beginning of each quarter. Current literature. May be repeated for credit. See http://carnegiedpb.stanford.edu/seminars/seminars.php.
1-3 units, Aut (Walbot, V), Win (Walbot, V), Spr (Walbot, V)

BIO 344. Advanced Seminar in Cellular Biology
Enrollment limited to graduate students directly associated with departmental research groups working in cell biology.
1 unit, not given this year

BIO 383. Seminar in Population Genetics
Literature review, research, and current problems in the theory and practice of population genetics and molecular evolution. May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Aut (Feldman, M), Win (Feldman, M), Spr (Feldman, M)

BIO 384. Theoretical Ecology
Recent and classical research papers in ecology, and presentation of work in progress by participants. Prerequisite: consent of instructor.
1-3 units, not given this year

BIO 388. Communication and Leadership Skills
(Same as ENVRES 210) Focus is on delivering information to policy makers and the lay public. How to speak to the media, Congress, and the general public; how to write op-eds and articles; how to package ideas including titles, abstracts, and CVs; how to survive peer review, the promotion process, and give a job talk; and how to be a responsible science advocate.
2 units, not given this year

BIO 459. Frontiers in Interdisciplinary Biosciences
(Same as BIOC 459, BIOE 459, CHEMENG 459, CHEM 459, PSYCH 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.
1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson)

BIO 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIO 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOLOGY, HOPKINS MARINE STATION (BIOHOPK) COURSES

UNDERGRADUATE COURSES IN BIOLOGY, HOPKINS MARINE STATION

Primarily for undergraduates; graduate students may enroll with consent of adviser.

BIOHOPK 43. Plant Biology, Evolution, and Ecology
Introduction to biology in a marine context. Principles of plant biology: physiology, structure, diversity. Principles of evolution: macro and microevolution, population genetics. Ecology: the principles governing the distribution and abundance of organisms; population, community, and ecosystem ecology. Equivalent to BIO 43. Corequisite: BIOHOPK 44Y. GER:DB-NatSci
5 units, Spr (Denny, M; Palumbi, S; Watanabe, J)

BIOHOPK 44Y. Core Experimental Laboratory
Laboratory and field projects provide working familiarity with the concepts, organisms, and techniques of plant and evolutionary biology, and ecology. Emphasis is on hands-on experimentation in the marine environment, analysis of data, and written and oral presentation of the experiments. Equivalent to BIO 44Y. Corequisite: BIOHOPK 43. GER:DB-NatSci, WIM
5 units, Spr (Denny, M; Palumbi, S; Watanabe, J)

BIOHOPK 161H. Invertebrate Zoology
(Same as BIOHOPK 261H) (Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine forms as examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Lectures, lab, plus field trips. Satisfies Central Menu Area 3 for Bio

majors. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5 units, Win (Watanabe, J)

BIOHOPK 163H. Oceanic Biology

(Same as BIOHOPK 263H) (Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affect marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Lectures, discussion, and field trips. Satisfies Central Menu Area 4 for Bio majors. Recommended: PHYSICS 21 or 51, CHEM 31, Biology core, or consent of instructor. GER:DB-NatSci

4 units, Win (Denny, M; Somero, G)

BIOHOPK 164H. Marine Botany

(Same as BIOHOPK 264H) (Graduate students register for 264H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity; macrophytes and nearshore ecology; marine angiosperms from taxonomical, physiological, and ecological perspectives. Lectures, lab. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5 units, Win (Staff), alternate years, not given next year

BIOHOPK 166H. Molecular Ecology

(Same as BIOHOPK 266H) (Graduate students register for 266H.) How modern technologies in gene sequencing, detection of nuclear nucleotide polymorphisms, and other approaches are used to gather data on genetic variation that allow measurement of population structure, infer demographic histories, inform conservation efforts, and advance understanding of the ecology of diverse types of organisms. GER:DB-NatSci

5 units, Win (Palumbi, S)

BIOHOPK 167H. Nerve, Muscle, and Synapse

(Same as BIOHOPK 267H) (Graduate students register for 267H.) Fundamental aspects of membrane excitability, nerve conduction, synaptic transmission, and excitation-contraction coupling. Emphasis is on biophysical, molecular, and cellular level analyses of these processes in vertebrate and invertebrate systems. Labs on intra- and extracellular recording and patch clamp techniques. Lectures, discussions, and labs. Satisfies Central Menu Area 3 for Bio majors Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31, 135; calculus; or consent of instructor. GER:DB-NatSci

5 units, Spr (Gilly, W), alternate years, not given next year

BIOHOPK 170H. Topics in Marine Biology

(Same as BIOHOPK 270H) (Graduate students register for 270H.) A topic of current interest to marine science explored through primary literature. Prerequisite: Biology core or consent of instructor. May be repeated for credit.

1 unit, Win (Lowe, C)

BIOHOPK 171H. Ecological and Evolutionary Physiology

(Same as BIOHOPK 271H) (Graduate students register for 271H.) The interplay between environmental factors, such as temperature, light, nutrient supply, salinity, and oxygen availability, and adaptive change at the physiological level. Emphasis is on marine species and the roles played by physiological adaptations in establishing their distribution and performance. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

4 units, Spr (Somero, G)

BIOHOPK 172H. Marine Ecology

(Same as BIOHOPK 272H) (Graduate students register for 272H.) Focus is on quantitative approaches to questions in marine ecology and ecophysiology. Statistical methods, including multivariate statistical approaches and meta-analysis. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5 units, Win (Micheli, F)

BIOHOPK 173H. Marine Conservation Biology

(Same as BIOHOPK 273H) (Graduate students register for 273H.) The science of preserving marine diversity. Goal is to introduce students to major conservation issues associated with marine ecosystems. Topics include decline of open ocean fisheries, salmon conservation, bycatch issues in fisheries, use of marine reserves, marine invasions, marine pollution, and global warming. Includes five lecturers from other universities who specialize in marine conservation.

1-3 units, Spr (Block, B)

BIOHOPK 174H. Experimental Design and Probability

(Same as BIOHOPK 274H) (Graduate students register for 274H.) Variability is an integral part of biology. Introduction to probability and its use in designing experiments to address biological problems. Focus is on analysis of variance, when and how to use it, why it works, and how to interpret the results. Design of complex, but practical, asymmetrical experiments and environmental impact studies, and regression and analysis of covariance. Computer-based data analysis. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci, WIM

3 units, Spr (Watanabe, J)

BIOHOPK 175H. Problems in Marine Ecology and Ecophysiology

Field-based, emphasizing individual and small group research for advanced undergraduates. Students learn field and laboratory techniques to address ecological, ecophysiological, and biomechanical problems faced by marine organisms. Original research projects may be integrated with ongoing research programs in the Hopkins Marine Life refuge. Prerequisites: Biology core, consent of instructor. GER:DB-NatSci, WIM

3-10 units, Spr (Palumbi, S)

BIOHOPK 182H. Stanford at Sea

(Same as BIOHOPK 323H, EESS 323, EARTHSYS 323) (Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major. GER:DB-NatSci

16 units, Spr (Block, B; Dunbar, R), alternate years, not given next year

BIOHOPK 185H. Ecology and Conservation of Kelp Forest Communities

(Same as BIOHOPK 285H) Eight week course. Daily lectures, labs, and scuba dives focused on kelp forest communities. Physical environment, identification, and natural history of resident organisms; ecological processes that maintain biodiversity and community organization; field methods, data analysis, and research diving techniques. Field research component contribut e to ongoing studies associated with Hopkins Marine Life Observatory. Training meets requirements for Stanford scientific diver certification. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: BIO 42 and 43, or BIO 42 and BIOHOPK 43, or consent of instructor; and advanced scuba certification and scuba equipment.

12 units, Sum (Watanabe, J)

BIOHOPK 187H. Sensory Ecology

(Same as BIOHOPK 287H) (Graduate students register for 287H.) Topics: the ways animals receive, filter, and process information gleaned from the environment, sensory receptor mechanisms, neural processing, specialization to life underwater, communication within and between species, importance of behavior to ecosystem structure and dynamics, impact of acoustic and light pollution on marine animals. Emphasis is on the current scientific literature. The laboratory portion of the class explores sensory mechanisms using neurobiological methods and methods of experimental animal behavior.

4 units, Win (Thompson, S)

BIOHOPK 198H. Directed Instruction or Reading

May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research. Credit for work arranged with out-of-department instructors restricted to Biology majors and requires department approval. May be repeated for credit. (Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOHOPK 199H. Undergraduate Research
Qualified undergraduates undertake individual work in the fields listed under 300H. Arrangements must be made by consultation or correspondence.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOHOPK 162H. Comparative Animal Physiology
(Same as BIOHOPK 262H) (Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology, and locomotion. Evolutionary and ecological physiology. Lectures, lab, and field research. An option to combine the course work with a more intensive research focus, with more units, is available. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5-8 units, Spr (Staff), alternate years, not given this year

BIOHOPK 184H. Holistic Biology: Monterey Bay and the Sea of Cortez
(Same as BIOHOPK 284H) (Graduate students register for 284H.) For majors and non-majors. Complexity in natural systems from complementary points of view, including scientific, historical, philosophical, and literary. The work and writings of Ed Ricketts and John Steinbeck and historical and contemporary works concerning marine ecology and fisheries. Field work, laboratory studies with living invertebrates, and an individual research project. Course includes a component in Baja California, Mexico. Only 6 units may count towards the Biology major. GER:DB-NatSci

16 units, alternate years, not given this year

GRADUATE COURSES IN BIOLOGY, HOPKINS MARINE STATION

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIOHOPK 261H. Invertebrate Zoology
(Same as BIOHOPK 161H) (Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine forms as examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Lectures, lab, plus field trips. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.

5 units, Win (Watanabe, J)

BIOHOPK 263H. Oceanic Biology
(Same as BIOHOPK 163H) (Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affect marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Lectures, discussion, and field trips. Satisfies Central Menu Area 4 for Bio majors. Recommended: PHYSICS 21 or 51, CHEM 31, Biology core, or consent of instructor.

4 units, Win (Denny, M; Somero, G)

BIOHOPK 264H. Marine Botany
(Same as BIOHOPK 164H) (Graduate students register for 264H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity; macrophytes and nearshore ecology; marine angiosperms from taxonomical, physiological, and ecological perspectives. Lectures, lab. Prerequisite: Biology core or consent of instructor.

5 units, Win (Staff), alternate years, not given next year

BIOHOPK 266H. Molecular Ecology
(Same as BIOHOPK 166H) (Graduate students register for 266H.) How modern technologies in gene sequencing, detection of nuclear nucleotide polymorphisms, and other approaches are used to gather data on genetic variation that allow measurement of population structure, infer demographic histories, inform conservation efforts, and advance understanding of the ecology of diverse types of organisms.

5 units, Win (Palumbi, S)

BIOHOPK 267H. Nerve, Muscle, and Synapse
(Same as BIOHOPK 167H) (Graduate students register for 267H.) Fundamental aspects of membrane excitability, nerve conduction, synaptic transmission, and excitation-contraction coupling. Emphasis is on biophysical, molecular, and cellular level analyses of these processes in vertebrate and invertebrate systems. Labs on intra- and extracellular recording and patch clamp techniques. Lectures, discussions, and labs. Satisfies Central Menu Area 3 for Bio majors Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31, 135; calculus; or consent of instructor.

5 units, Spr (Gilly, W), alternate years, not given next year

BIOHOPK 270H. Topics in Marine Biology
(Same as BIOHOPK 170H) (Graduate students register for 270H.) A topic of current interest to marine science explored through primary literature. Prerequisite: Biology core or consent of instructor. May be repeated for credit.

1 unit, Win (Lowe, C)

BIOHOPK 271H. Ecological and Evolutionary Physiology
(Same as BIOHOPK 171H) (Graduate students register for 271H.) The interplay between environmental factors, such as temperature, light, nutrient supply, salinity, and oxygen availability, and adaptive change at the physiological level. Emphasis is on marine species and the roles played by physiological adaptations in establishing their distribution and performance. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.

4 units, Spr (Somero, G)

BIOHOPK 272H. Marine Ecology
(Same as BIOHOPK 172H) (Graduate students register for 272H.) Focus is on quantitative approaches to questions in marine ecology and ecophysiology. Statistical methods, including multivariate statistical approaches and meta-analysis. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: Biology core or consent of instructor.

5 units, Win (Micheli, F)

BIOHOPK 273H. Marine Conservation Biology
(Same as BIOHOPK 173H) (Graduate students register for 273H.) The science of preserving marine diversity. Goal is to introduce students to major conservation issues associated with marine ecosystems. Topics include decline of open ocean fisheries, salmon conservation, bycatch issues in fisheries, use of marine reserves, marine invasions, marine pollution, and global warming. Includes five lecturers from other universities who specialize in marine conservation.

1-3 units, Spr (Block, B)

BIOHOPK 274. Hopkins Microbiology Course
(Same as BIO 274S, CEE 274S, EESS 253S) (Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

9-12 units, Sum (Spormann, A; Francis, C)

BIOHOPK 274H. Experimental Design and Probability
(Same as BIOHOPK 174H) (Graduate students register for 274H.) Variability is an integral part of biology. Introduction to probability and its use in designing experiments to address biological problems. Focus is on analysis of variance, when and how to use it, why it works, and how to interpret the results. Design of complex, but practical, asymmetrical experiments and environmental impact studies, and regression and analysis of covariance. Computer-based data analysis. Prerequisite: Biology core or consent of instructor.

3 units, Spr (Watanabe, J)

BIOHOPK 277H. Biomechanics, Ecological Physiology, and Genetics of Intertidal Communities
Four week course. Introduction to the mechanical and physiological design of wave-swept organisms. How different abiotic stresses (wave exposure, wind speed, temperature, light) influence marine animals and plants, and adaptive responses to these stresses. Lab introduces methods for measuring environmental stress and organ-

ismal responses. Recommended: background in algology, intertidal ecology, or invertebrate zoology; basic physics and calculus.

4 units, Sum (Denny, M; Palumbi, S; Somero, G)

BIOHOPK 285H. Ecology and Conservation of Kelp Forest Communities

(Same as BIOHOPK 185H) Eight week course. Daily lectures, labs, and scuba dives focused on kelp forest communities. Physical environment, identification, and natural history of resident organisms; ecological processes that maintain biodiversity and community organization; field methods, data analysis, and research diving techniques. Field research component contribut e to ongoing studies associated with Hopkins Marine Life Observatory. Training meets requirements for Stanford scientific diver certification. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: BIO 42 and 43, or BIO 42 and BIOHOPK 43, or consent of instructor; and advanced scuba certification and scuba equipment.

12 units, Sum (Watanabe, J)

BIOHOPK 287H. Sensory Ecology

(Same as BIOHOPK 187H) (Graduate students register for 287H.) Topics: the ways animals receive, filter, and process information gleaned from the environment, sensory receptor mechanisms, neural processing, specialization to life underwater, communication within and between species, importance of behavior to ecosystem structure and dynamics, impact of acoustic and light pollution on marine animals. Emphasis is on the current scientific literature. The laboratory portion of the class explores sensory mechanisms using neurobiological methods and methods of experimental animal behavior.

4 units, Win (Thompson, S)

BIOHOPK 290H. Teaching of Biological Science

Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. Prerequisite: consent of instructor. (Staff)

1-15 units, Win (Staff), Spr (Staff), Sum (Staff)

BIOHOPK 300H. Research

Graduate study involving original work undertaken with staff in the fields indicated. B. Block: Comparative Vertebrate Physiology (biomechanics, metabolic physiology and phylogeny of pelagic fishes, evolution of endothermy); M. Denny: Biomechanics (the mechanical properties of biological materials and their consequences for animal size, shape, and performance); W. Gilly: Neurobiology (analysis of giant axon systems in marine invertebrates from molecular to behavioral levels); C. Lowe: Evolution of Development (origin of chordates, early evolution of body plans); F. Micheli: Marine Ecology (species interactions and community ecology, scale-dependent aspects of community organization, marine conservation and design of multi-species marine protected areas, behavioral ecology); S. Palumbi: Molecular Evolution (mechanisms of speciation, genetic differentiations of populations, use of molecular tools in conservation biology, design of marine protected areas); G. Somero: Ecological and Evolutionary Physiology (adaptations of marine organisms to the environment: temperature, pressure, desiccation, and oxygen availability); S. Thompson: Neurobiology (neuronal control of behavior and mechanisms of ion permeation, signal transduction, calcium homeostasis, and neutrotransmission); J. Watanabe: Marine Ecology (kelp forest ecology and invertebrate zoology).

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOHOPK 323H. Stanford at Sea

(Same as BIOHOPK 182H, EESS 323, EARTHSYS 323) (Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

16 units, Spr (Block, B; Dunbar, R), alternate years, not given next year

BIOHOPK 262H. Comparative Animal Physiology

(Same as BIOHOPK 162H) (Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology, and locomotion. Evolutionary and ecological physiology. Lectures, lab, and field research. An option to combine the course work with a more intensive research focus, with more units, is available. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.

5-8 units, Spr (Staff), alternate years, not given this year

BIOHOPK 284H. Holistic Biology: Monterey Bay and the Sea of Cortez

(Same as BIOHOPK 184H) (Graduate students register for 284H.) For majors and non-majors. Complexity in natural systems from complementary points of view, including scientific, historical, philosophical, and literary. The work and writings of Ed Ricketts and John Steinbeck and historical and contemporary works concerning marine ecology and fisheries. Field work, laboratory studies with living invertebrates, and an individual research project. Course includes a component in Baja California, Mexico. Only 6 units may count towards the Biology major.

16 units, alternate years, not given this year

BIOMEDICAL INFORMATICS (BIOMEDIN) COURSES

UNDERGRADUATE COURSES IN BIOMEDICAL INFORMATICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution

(Stanford Introductory Seminar) (Same as GENE 109Q) Preference to sophomores. Concepts of genomics, high-throughput methods of data collection, and computational approaches to analysis of data. The social, ethical, and economic implications of genomic science. Students may focus on computational or social aspects of genomics.

3 units, Win (Altman, R)

BIOMEDIN 156. Economics of Health and Medical Care

(Same as BIOMEDIN 256, ECON 126, HRP 256) Graduate students with research interests should take ECON 248. Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisites: ECON 50 and ECON 102A or equivalent statistics. Recommended: ECON 51.

5 units, Aut (Bhattacharya, J)

GRADUATE COURSES IN BIOMEDICAL INFORMATICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIOMEDIN 200. Biomedical Informatics Colloquium

Series of colloquia offered by program faculty, students, and occasional guest lecturers. May be repeated three times for credit.

1 unit, Aut (Musen, M), Win (Musen, M), Spr (Musen, M)

BIOMEDIN 201. Biomedical Informatics Student Seminar

Participants report on recent articles from the Biomedical Informatics literature or their research projects. Goal is to teach presentation skills. May be repeated three times for credit.

1 unit, Aut (Musen, M), Win (Musen, M), Spr (Musen, M)

BIOMEDIN 204. Pharmacogenomics

Via Internet. Genetically determined responses to drugs; applications focusing on the PharmGKB database, a publicly available Internet tool to aid researchers in understanding how genetic variation among individuals contributes to differences in reactions to drugs. Topics include: introduction to pharmacogenomics and pharmacology; the genome and genetics; human polymorphisms, frequencies, significance, and populations; informatics in pharmacogenomics; genotype to phenotype and phenotype to genotype

approaches; drug discovery and validation; genomic variation discovery and genotyping; adverse drug reactions and interactions; pathways of drug metabolism; and cancer pharmacogenomics. Prerequisites: two of BIOSCI 41, 42, 43, and 44X,Y or consent of instructor.

1 unit, Aut (Cheng, B; Fagan, L), Win (Staff), Spr (Fagan, L; Cheng, B), Sum (Staff)

BIOMEDIN 205. Biomedical Informatics for Medicine

Primarily for M.D. students; open to other graduate students. Emphasis is on practical applications of bioinformatics and medical informatics for medicine, health care, clinicians, and biomedical research, focused on work at Stanford. Topics may include: methods to analyze genetic conditions, integrative methods for microarray, proteomic, and genomic data to understand the etiology of disease, clinical information systems in local healthcare facilities, cellular and radiology imaging, and pharmacogenomics. Enrollment for 2 units includes weekly assignments. Non-MD students may enroll for 1 unit. May be repeated for credit. Prerequisite: background in biomedicine. Recommended: background in programming.

1-2 units, Aut (Butte, A), Spr (Butte, A)

BIOMEDIN 206. Informatics in Industry

Effective management, modeling, acquisition, and mining of biomedical information in healthcare and biotechnology companies and approaches to information management adopted by companies in this ecosystem. Guest speakers from pharmaceutical/biotechnology companies, clinics/hospitals, health communities/portals, instrumentation/software vendors. May be repeated for credit.

1 unit, Spr (Kotecha, N; Shah, N; Altman, R)

BIOMEDIN 207. Digital Medicine: Promise and Peril in the Age of Electronic Health Records

Topical discussions of the use of electronic health records in clinical care and clinical research. Lectures by faculty, students and guest speakers are augmented by site visits to local clinical institutions that have implemented electronic health records systems. Goal is exposure to practical challenges of system implementation and to research opportunities in clinical informatics.

1 unit, Sum (Das, A)

BIOMEDIN 210. Modeling Biomedical Systems: Ontology, Terminology, Problem Solving

(Same as CS 270) Methods for modeling biomedical systems and for making those models explicit in the context of building software systems. Emphasis is on intelligent systems for decision support and Semantic Web applications. Topics: knowledge representation, controlled terminologies, ontologies, reusable problem solvers, and knowledge acquisition. Recommended: exposure to object-oriented systems, basic biology.

3 units, Win (Musen, M; Ghazvinian, A; Tirrell, R; Beck, A)

BIOMEDIN 211. Effective Design in Clinical Informatics

(Same as CS 271) Methods of designing and engineering software systems in complex clinical environments. Case studies illustrate factors leading to success or failure of systems. Project assignments involve focused team-based design work. Topics: user and organizational requirements, data and knowledge modeling, component-based system design, system prototyping, and human-systems interaction. Prerequisite: BIOMEDIN 210 recommended, or database or object-oriented programming course.

3 units, not given this year

BIOMEDIN 212. Introduction to Biomedical Informatics Research Methodology

(Same as BIOE 212, CS 272, GENE 212) Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor.

3 units, Spr (Altman, R)

BIOMEDIN 214. Representations and Algorithms for Computational Molecular Biology

(Same as BIOE 214, CS 274, GENE 214) Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Aut (Altman, R)

BIOMEDIN 216. Representations and Algorithms for Molecular Biology: Lectures

Lecture component of BIOMEDIN 214. One unit for medical and graduate students who attend lectures only; may be taken for 2 units with participation in limited assignments and final project. Lectures also available via internet. Prerequisite: familiarity with biology recommended.

1-2 units, Aut (Altman, R)

BIOMEDIN 217. Translational Bioinformatics

(Same as CS 275) Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming ability at the level of CS 106A and familiarity with statistics and biology.

4 units, Spr (Butte, A)

BIOMEDIN 218. Translational Bioinformatics Lectures

Same content as BIOMEDIN 217; for medical and graduate students who attend lectures and participate in limited assignments and final project. Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming at the level of CS 106A; familiarity with statistics and biology.

2 units, Spr (Butte, A)

BIOMEDIN 219. Mathematical Models and Medical Decisions

Analytic methods for determining the optimal diagnostic and therapeutic decisions for the care of individual patients and for the design of policies affecting the care of patient populations. Topics: utility theory and probability modeling, empirical methods for estimating disease prevalence, probability models for periodic processes, binary decision-making techniques, Markov models of dynamic disease state problems, utility assessment techniques, parametric utility models, utility models for multidimensional outcomes, analysis of time-varying clinical outcomes, and the design of cost-contstrained clinical policies. 2 units requires completion of a case study project. Prerequisites: introduction to calculus and basic statistics.

1-2 units, Win (Higgins, M; Musen, M)

BIOMEDIN 231. Computational Molecular Biology

(Same as BIOC 218) For molecular biologists and computer scientists. Representation and analysis of genomes, sequences, and proteins. Strengths and limitations of existing methods. Course work performed on web or using downloadable applications. See http://biochem218.stanford.edu/. Prerequisites: introductory molecular biology course at level of BIOSCI 41 or consent of instructor. All offerings are via internet only.

3 units, Aut (Brutlag, D), Win (Brutlag, D), Spr (Brutlag, D)

BIOMEDIN 233. Intermediate Biostatistics: Analysis of Discrete Data

(Same as HRP 261, STATS 261) Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, condi-

tional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference.

3 units, Win (Sainani, K)

BIOMEDIN 251. Outcomes Analysis

(Same as HRP 252) Methods of conducting empirical studies which use large existing medical, survey, and other databases to ask both clinical and policy questions. Econometric and statistical models used to conduct medical outcomes research. How research is conducted on medical and health economics questions when a randomized trial is impossible. Problem sets emphasize hands-on data analysis and application of methods, including re-analyses of well-known studies. Prerequisites: one or more courses in probability, and statistics or biostatistics.

3 units, Spr (Bhattacharya, J)

BIOMEDIN 256. Economics of Health and Medical Care

(Same as BIOMEDIN 156, ECON 126, HRP 256) Graduate students with research interests should take ECON 248. Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisites: ECON 50 and ECON 102A or equivalent statistics. Recommended: ECON 51.

5 units, Aut (Bhattacharya, J)

BIOMEDIN 262. Computational Genomics

(Same as CS 262) Applications of computer science to genomics, and concepts in genomics from a computer science point of view. Topics: dynamic programming, sequence alignments, hidden Markov models, Gibbs sampling, and probabilistic context-free grammars. Applications of these tools to sequence analysis: comparative genomics, DNA sequencing and assembly, genomic annotation of repeats, genes, and regulatory sequences, microarrays and gene expression, phylogeny and molecular evolution, and RNA structure. Prerequisites: 161 or familiarity with basic algorithmic concepts. Recommended: basic knowledge of genetics.

3 units, Win (Batzoglou, S)

BIOMEDIN 273A. A Computational Tour of the Human Genome

(Same as CS 273A, DBIO 273A) Introduction to computational biology through an informatic exploration of the human genome. Topics include: genome sequencing (technologies, assembly, personalized sequencing); functional landscape (genes, gene regulation, repeats, RNA genes, epigenetics); genome evolution (comparative genomics, ultraconservation, co-option). Additional topics may include population genetics, personalized genomics, and ancient DNA. Course includes primers on molecular biology, the UCSC Genome Browser, and text processing languages. Guest lectures from genomic researchers. No prerequisites. See http://cs273a.stanford.edu/.

3 units, Aut (Batzoglou, S; Bejerano, G)

BIOMEDIN 299. Directed Reading and Research

For students wishing to receive credit for directed reading or research time. Prerequisite: consent of instructor. (Staff)

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOMEDIN 366. Computational Biology

(Same as STATS 166, STATS 366) Course is designed to introduce students from the mathematical, physical and engineering sciences to selected current issues in computational biology and bioinformatics. Topics: principles of gene expression measurement by microarrays and sequencing, methods to measure locations of protein-DNA interaction, the application of these techniques in the study of gene regulation, approaches to the mapping of genes by association studies. Emphasis is on the statistical and computational issues in these studies. Assignments: weekly reading of papers and a final project.

2-3 units, Spr (Wong, W)

BIOMEDIN 370. Medical Scholars Research

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOMEDIN 374. Algorithms in Biology

(Same as CS 374) Algorithms and computational models applied to molecular biology and genetics. Topics vary annually. Possible topics include biological sequence comparison, annotation of genes and other functional elements, molecular evolution, genome rearrangements, microarrays and gene regulation, protein folding and classification, molecular docking, RNA secondary structure, DNA computing, and self-assembly. May be repeated for credit. Prerequisites: 161, 262 or 274, or BIOCHEM 218, or equivalents.

2-3 units, Aut (Batzoglou, S)

BIOMEDIN 390A. Curricular Practical Training

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

1 unit, Aut (Musen, M), Win (Staff), Spr (Musen, M), Sum (Musen, M)

BIOMEDIN 390B. Curricular Practical Training

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

1 unit, Aut (Musen, M), Win (Staff), Spr (Musen, M), Sum (Musen, M)

BIOMEDIN 390C. Curricular Practical Training

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

1 unit, Aut (Musen, M), Win (Staff), Spr (Musen, M), Sum (Musen, M)

BIOMEDIN 432. Analysis of Costs, Risks, and Benefits of Health Care

(Same as HRP 392) (Same as MGTECON 332) For graduate students. How to do cost/benefit analysis when the output is difficult or impossible to measure. How do M.B.A. analytic tools apply in health services? Literature on the principles of cost/benefit analysis applied to health care. Critical review of actual studies. Emphasis is on the art of practical application.

4 units, Aut (Garber, A; Owens, D)

BIOMEDIN 801. TGR Master's Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOMEDIN 802. TGR PhD Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOPHYSICS (BIOPHYS) COURSES

GRADUATE COURSES IN BIOPHYSICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

BIOPHYS 227. Functional MRI Methods

(Same as RAD 227) Basics of functional magnetic resonance neuroimaging, including data acquisition, analysis, and experimental design. Journal club sections. Cognitive neuroscience and clinical applications. Prerequisites: basic physics, mathematics; neuroscience recommended.

3 units, Win (Glover, G)

BIOPHYS 228. Computational Structural Biology
(Same as SBIO 228) Interatomic forces and interactions such as electrostatics and hydrophobicity, and protein structure in terms of amino acid properties, local chain conformation, secondary structure, domains, and families of folds. How protein motion can be simulated. Bioinformatics introduced in terms of methods that compare proteins via their amino acid sequences and their three-dimensional structures. Structure prediction via simple comparative modeling. How to detect and model remote homologues. Predicting the structure of a protein from knowledge of its amino acid sequence. Via Internet.

3 units, not given this year

BIOPHYS 232. Advanced Imaging Lab in Biophysics
(Same as APPPHYS 232, BIO 132, BIO 232, MCP 232) Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.

4 units, Spr (Block, S; Smith, S; Stearns, T)

BIOPHYS 241. Biological Macromolecules
(Same as BIOC 241, SBIO 241) The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 40. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only.

3-5 units, Aut (Herschlag, D; Ferrell, J; Block, S; Weis, W; Garcia, K; Puglisi, J)

BIOPHYS 242. Methods in Molecular Biophysics
(Same as SBIO 242) Experimental methods in molecular biophysics from theoretical and practical standpoints. Emphasis is on X-ray diffraction, nuclear magnetic resonance, and fluorescence spectcroscopy. Prerequisite: physical chemistry or consent of instructor.

3 units, Win (Staff)

BIOPHYS 250. Seminar in Biophysics
Required of Biophysics graduate students. Presentation of current research projects and results by faculty in the Biophysics program. May be repeated for credit.

1 unit, Aut (Weis, W), Win (Weis, W)

BIOPHYS 297. Bio-Inorganic Chemistry
(Same as CHEM 297) Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique features of the protein ligand, and the physical methods used to study active sites. Active site structures are correlated with function. Prerequisites: 153 and 173, or equivalents.

3 units, not given this year

BIOPHYS 300. Graduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOPHYS 399. Directed Reading in Biophysics
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOPHYS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOPHYS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CANCER BIOLOGY (CBIO) COURSES

UNDERGRADUATE COURSES IN CANCER BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CBIO 101. Cancer Biology
(Same as PATH 101) Experimental approaches to understanding the origins, diagnosis, and treatment of cancer. Focus on key experiments and discoveries with emphasis on genetics, molecular biology, and cell biology. Topics include carcinogens, tumor virology, oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, invasion and metastasis, cancer genomics, cancer epidemiology, and cancer therapies. Discussion sections based on primary research articles that describe key experiments in the field. Satisfies Central Menu Areas 1 or 2 for Bio majors. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor.

4 units, Win (Lipsick, J)

GRADUATE COURSES IN CANCER BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CBIO 241. Molecular, Cellular, and Genetic Basis of Cancer
Core course required for first-year Cancer Biology graduate students. Focus is on key experiments and classic primary research papers in cancer biology. Letter grade required. Undergraduates require consent of course director.

5 units, Aut (Giaccia, A; Graves, E)

CBIO 242. Scientific Basis of Clinical Cancer Therapy
Required for first- and second-year medical students who wish to join the Cancer Biology Scholarly Concentration Program. Also open to advanced undergraduates; limited enrollment. The curriculum includes a sampling of recent biomedical research discoveries that led to the current cancer diagnosis and therapeutic treatments.

3 units, Spr (Koong, A)

CBIO 260. Teaching in Cancer Biology
Practical experience in teaching by serving as a teaching assistant in a cancer biology course. Unit values are allotted individually to reflect the level of teaching responsibility assigned to the student.

1-10 units, Aut (Giaccia, A), Win (Lipsick, J), Spr (Giaccia, A)

CBIO 275. Tumor Immunology
(Same as IMMUNOL 275) Focuses on the ability of innate and adaptive immune responses to recognize and control tumor growth. Topics include: tumor antigens, tumor immunosurveillance and immunoediting, tumor immunotherapy, cancer vaccines and dendritic cell therapy. Tracks the historical developments of our understanding of modulating tumor immune response and discusses their relative significance in the light of current research findings. Prerequisite: for undergraduates, human biology or biology core.

3 units, not given this year

CBIO 280. Cancer Biology Journal Club
Required of and limited to first- and second-year graduate students in Cancer Biology. Recent papers in the literature presented by graduate students. When possible, discussion relates to and precedes cancer-related seminars at Stanford. Attendance at the relevant seminar required.

1 unit, Aut (Giaccia, A), Win (Giaccia, A), Spr (Giaccia, A)

CBIO 299. Directed Reading in Cancer Biology
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CBIO 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Cancer Biology Ph.D. students must register as soon as they begin dissertation-related research work.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CBIO 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CBIO 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CATALAN LANGUAGE (CATLANG) COURSES

UNDERGRADUATE COURSES IN CATALAN LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CATLANG 1A. Accelerated First-Year Catalan, Part A
For students with knowledge of another Romance language, preferably Spanish. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Completion of 2A fulfills the University language requirement. Prerequisite: consent of instructor.
5 units, Aut (Casas Roige, R)

CATLANG 2A. Accelerated First-Year Catalan, Part B
For students with knowledge of another Romance language, preferably Spanish. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Completion of 2A fulfills the University language requirement. Prerequisite: consent of instructor.
5 units, Win (Mack, T)

CATLANG 11A. Accelerated Second-Year Catalan, Part A
Sequence integrating culture and language of the Catalan-speaking world. Socially and culturally appropriate forms in narrations, descriptions, and expression of ideas and opinions. Emphasis is on oral and written proficiency in formal, informal, academic, and professional contexts. Prerequisite: consent of instructor.
3-5 units, Spr (Mack, T)

CATLANG 12A. Accelerated Second-Year Catalan, Part B
Sequence integrating culture and language of the Catalan-speaking world. Socially and culturally appropriate forms in narrations, descriptions, and expression of ideas and opinions. Emphasis is on oral and written proficiency in formal, informal, academic, and professional contexts. Prerequisite: consent of instructor.
3-5 units, not given this year

CATLANG 199. Individual Work
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN CATALAN LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CATLANG 395. Graduate Studies in Catalan
May be repeated for credit. Prerequisite consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CENTER FOR TEACHING AND LEARNING (CTL) COURSES

UNDERGRADUATE COURSES IN CENTER FOR TEACHING AND LEARNING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CTL 53. Working Smarter
College-level strategies and skills in time management, reading, speaking, writing, and test preparation. Students explore learning preferences to develop strategies in different academic settings.
2 units, Sum (Townsend, L)

CTL 105. Voice and Articulation Intensive for Non-Native English Speakers
Workshop focusing on exercises designed to help foreign students improve their articulation and delivery in English. Work includes breath, sound, enunciation, melody, and colloquialism.
1-2 units, Win (Freeland, T)

CTL 115. Voice Workshop
(Same as CTL 215) Focus is on breath, voice production, expansion of vocal range and stamina, and clarity of articulation. Geared toward public speaking including presentations, lectures, and job talks. May be taken in conjunction with CTL 117.
1-2 units, Aut (Freeland, T), Spr (Freeland, T)

CTL 117. The Art of Effective Speaking
(Same as CTL 217) The principles and practice of effective oral communication. Through formal and informal speaking activities, students develop skills framing and articulating ideas through speech. Strategies for speaking extemporaneously, preparing and delivering multimedia presentations, formulating persuasive arguments, refining critical clarity of thought, and enhancing general facility and confidence in oral self-expression.
3 units, Aut (Neuwirth, M), Win (Allen, D)

CTL 118. Public Speaking: Romancing the Room
A practical approach to the art of public speaking. Emphasis is on developing skills in speech types including impromptu, personal experience, interviewing, demonstration, persuasive, and special occasion. Materials include videotape, texts of famous speeches, and a final dinner program of speeches. Students evaluate presentations by others. $55 materials fee.
3 units, Sum (Wagstaffe, J)

CTL 119. Oral Communication Tutor Teaching Practicum
Seminar. For students with a strong background in public speaking who wish to train as public speaking tutors for CTL's Oral Communication Program. Readings, exercises, and supervised teaching refine speaking skills. Preparation to serve as a peer tutor in a variety of academic disciplines. Prerequisite: application and consent of instructor.
1-3 units, Spr (Allen, D; Paul, L)

CTL 120. Peer Tutor Training
Goal is to help students become effective peer tutors for course material already mastered by articulating aims; developing practical tutoring skills including strategies for drop-in sessions; observing experienced tutors; discussing reading assignments; role playing; and reflecting on experiences as a peer tutor intern. Prerequisite: consent of instructor.
1 unit, Aut (Glickman, A; Chambers, A), Win (Glickman, A; Chambers, A)

CTL 125. From the Page to the Stage: The Performance of Literature
The oral interpretation of literature as performance art and mode of literary analysis. Focus is on contemporary and local expression including topics such as the Spoken Word Collective at Stanford, the ensemble performance of short works of fiction by San Francisco's Word for Word Performing Arts Company, and the storytelling art of Awele Makeba which combines theater, oral history, and music. No performance experience necessary.
3 units, not given this year

CTL 130. Beyond Stereotype Threat: Claiming a Rightful Place in an Academic Community
(Same as PSYCH 125) Stereotype threat as mitigating the quality of a student's test performance; its impact on academic success at Stanford. How to reduce the impact of stereotype threat on Stanford students.
3 units, Win (Glickman, A)

CTL 175. Intertextuality, Interpretation, and Performance
Literary and performance theories from the late 20th century to the present. The performative link between writing and speech. Students apply theories in critical writings, performances, and intertextual assemblages. How to find and refine one's own voices in writing and vocality.
4 units, not given this year

CTL 177. Performance of Power: Oratory and Authority from the Ancient World to the Postmodern
Speech as action has long been seen as essential to leadership. Theories and examples of oratory, from Aristotle to George W.

Bush, assessing each as model of voice-activated authority. The impact of mass media technologies as they transform the public space of oratory.

4 units, Aut (Freeland, T)

CTL 180. Interpersonal and Small Group Communication
(Same as CTL 280) Communication effectiveness in the contexts of dyads, the workplace, family, and society. Listening, conflict resolution, leadership, power and its implementation, group dynamics, emotions, and cultural influences on interactions. Sources include readings videos/DVDs, role playing, interviews, individual and group presentations, and group exercises.

3 units, Spr (Neuwirth, M)

CTL 190. Persuasive Speaking
(Same as CTL 290) Persuasion is the act of influencing others to see, feel, think, believe, and/or act in a way that is consistent with what the speaker or sender advocates. Persuasion seeks to engender power, and how that power is used can vary widely. How to effectively persuade others in interpersonal, family, workplace, and public spheres. How to be astute consumers of persuasive messages, including those from other individuals and from public sources such as media, advertising, and politics. In-class exercises and speeches to assist participants in developing and executing persuasive skills.

3 units, Win (Neuwirth, M)

CTL 199. Independent Study
Special study under lecturer direction, usually leading to a written report or an oral presentation. Prerequisite: consent of instructor.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CENTER FOR TEACHING AND LEARNING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CTL 215. Voice Workshop
(Same as CTL 115) Focus is on breath, voice production, expansion of vocal range and stamina, and clarity of articulation. Geared toward public speaking including presentations, lectures, and job talks. May be taken in conjunction with CTL 117.

1-2 units, Aut (Freeland, T), Spr (Freeland, T)

CTL 217. The Art of Effective Speaking
(Same as CTL 117) The principles and practice of effective oral communication. Through formal and informal speaking activities, students develop skills framing and articulating ideas through speech. Strategies for speaking extemporaneously, preparing and delivering multimedia presentations, formulating persuasive arguments, refining critical clarity of thought, and enhancing general facility and confidence in oral self-expression.

3 units, Aut (Neuwirth, M), Win (Allen, D)

CTL 219. Oral Communication for Graduate Students
Graduate student speaking activities such as teaching (delivering lectures, guiding discussion, and facilitating small groups), professional presentations and conference papers, and preparing for oral exams and defenses. In-class projects, discussion, and individual evaluation assist students in developing effective techniques for improving oral communication skills.

1-3 units, Spr (Freeland, T), Sum (Staff)

CTL 224. Fundamentals of College Teaching in the Humanities and Humanistic Social Sciences
For teaching assistants in the humanities and humanistic social sciences. Topics include current research on learning and teaching, practice teaching sessions, leading discussions, designing assignments and group activities, grading and feedback practices, and teaching with technology.

1-3 units, Win (Denman, M)

CTL 225. Teaching Development Series
Teaching and academic career topics from CTL's workshops series. Documented participation in a minimum of 10 hours required for credit. Offerings vary quarterly. See http://ctl.stanford.edu for current information. May be repeated for credit. Prerequisite: consent of instructor.

1 unit, Aut (Clerici-Arias, M), Win (Clerici-Arias, M), Spr (Clerici-Arias, M)

CTL 226. Advanced College Teaching and Professional Development in Humanities and Humanistic Social Sciences
For advanced graduate students in the humanities and humanistic social sciences interested in an academic career. Topics include current research on teaching and learning, effective lecturing, designing courses and assignments, writing a persuasive teaching statement, disciplinary and interdisciplinary teaching, and research on early career faculty.

1-3 units, Spr (Denman, M)

CTL 230. Mentoring in Research
Knowledge, skills, and hands-on training to mentor undergraduate research assistants and to impact relationships with your own mentors and advisers. Topics include communication and project management skills, different learning styles, and cultural, ethnic and socioeconomic diversity. Case studies, scenarios, and small group activities. Five weeks.

1 unit, not given this year

CTL 231. Future Faculty Seminar
(Same as INDE 231) For graduate students from all disciplines who are considering faculty careers. Postdoctoral fellows, TGR students, and research/clinical trainees may audit by consent of instructor. Explores the broad spectrum of duties and opportunities presented through faculty positions beyond the research-related aspects. Develops awareness of resources and skills that lead to faculty success; answers field-specific and related faculty job questions through discussions with representatives of a variety of academic institutions and fellow course participants. Topics include: finding and obtaining faculty positions, negotiating and navigating the first year, and working toward tenure. May be repeated for credit.

1 unit, Aut (Eberle, S; Puglisi, J; Wright-Dunbar, R)

CTL 280. Interpersonal and Small Group Communication
(Same as CTL 180) Communication effectiveness in the contexts of dyads, the workplace, family, and society. Listening, conflict resolution, leadership, power and its implementation, group dynamics, emotions, and cultural influences on interactions. Sources include readings videos/DVDs, role playing, interviews, individual and group presentations, and group exercises.

3 units, Spr (Neuwirth, M)

CTL 290. Persuasive Speaking
(Same as CTL 190) Persuasion is the act of influencing others to see, feel, think, believe, and/or act in a way that is consistent with what the speaker or sender advocates. Persuasion seeks to engender power, and how that power is used can vary widely. How to effectively persuade others in interpersonal, family, workplace, and public spheres. How to be astute consumers of persuasive messages, including those from other individuals and from public sources such as media, advertising, and politics. In-class exercises and speeches to assist participants in developing and executing persuasive skills.

3 units, Win (Neuwirth, M)

CTL 297X. Teaching and Learning in Higher Education
(Same as EDUC 297X) Open to master's and doctoral students in all disciplines. How teachers can promote lasting learning and ask which pedagogies are most effective in today's college classrooms. Readings analyze teaching and learning in diverse disciplines and institutional types. Students observe the instruction of a Stanford master teacher. Students write a paper about the instruction of the teacher they observe or prepare a syllabus and commentary for a course of their design.

3-4 units, Win (Ehrlich, T)

CTL 299. Independent Study
Special study under lecturer direction, usually leading to a written report or an oral presentation. Prerequisite: consent of instructor.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CTL 312. Science and Engineering Course Design
(Same as ENGR 312) For students interested in an academic career and who anticipate designing science courses at the undergraduate or graduate level. Goal is to apply research on science learning to the design of effective course materials. Topics include syllabus design, course content and format decisions, assessment planning and grading, and strategies for teaching improvement.

2-3 units, Win (Wright-Dunbar, R; Sheppard, S)

CHEMICAL ENGINEERING (CHEMENG) COURSES

UNDERGRADUATE COURSES IN CHEMICAL ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHEMENG 10. The Chemical Engineering Profession
Open to all undergraduates. Overview of and careers in chemical engineering; opportunities to develop networks with working professionals. Panel discussions on career paths and post-graduation opportunities available. Areas include biotechnology, electronics, energy, environment, management consulting, nanotechnology, and graduate school in business, law, medicine, and engineering.
1 unit, Aut (Jaramillo, T)

CHEMENG 20. Introduction to Chemical Engineering
(Same as ENGR 20) Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balances, concepts of rate processes, energy and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, energy, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. GER:DB-EngrAppSci
3 units, Spr (Hwang, L; Khosla, C)

CHEMENG 25B. Biotechnology
(Same as ENGR 25B) Biology and chemistry fundamentals, genetic engineering, cell culture, protein production, pharmaceuticals, genomics, viruses, gene therapy, evolution, immunology, antibodies, vaccines, transgenic animals, cloning, stem cells, intellectual property, governmental regulations, and ethics. Prerequisites: CHEM 31 and MATH 41 or equivalent courage. GER:DB-EngrAppSci
3 units, Spr (Wang, C)

CHEMENG 25E. Energy: Chemical Transformations for Production, Storage, and Use
(Same as ENGR 25E) An introduction and overview to the challenges and opportunities of energy supply and consumption. Emphasis on energy technologies where chemistry and engineering play key roles. Review of energy fundamentals along with historical energy perspectives and current energy production technologies. In depth analysises of solar thermal systems, biofuels, photovoltaics and electrochemical devices (batteries and fuel cells). Prerequisites: high school chemistry or equivalent. GER:DB-EngrAppSci
3 units, Win (Robertson, C; Bent, S)

CHEMENG 35N. Renewable Energy for a Sustainable World
(Stanford Introductory Seminar) Preference to freshmen. An overall world energy assessment, projections, and technologies. How to assess good and bad potential impacts of leading renewable energy candidates: benefit versus impact ratio using quantitative cradle-to-grave approach. Technologies suitable for near-term application in developing economic systems. Governmental policies, governmental versus private sector investments, raw materials supply issues, and impact of cultural influences on technology choices and speed of implementation. GER:DB-EngrAppSci
3 units, Aut (Swartz, J)

CHEMENG 60Q. Environmental Regulation and Policy
(Stanford Introductory Seminar) Preference to sophomores. How environmental policy is formulated in the U.S. How and what type of scientific research is incorporated into decisions. How to determine acceptable risk, the public's right to know of chemical hazards, waste disposal and clean manufacturing, brownfield redevelopment, and new source review regulations. The proper use of science and engineering including media presentation and misrepresentation, public scientific and technical literacy, and emotional reactions. Alternative models to formulation of environmental policy. Political and economic forces, and stakeholder discussions. GER:DB-EngrAppSci
3 units, Aut (Robertson, C; Libicki, S)

CHEMENG 70Q. Masters of Disaster
(Stanford Introductory Seminar) Preference to sophomores. For students interested in science, engineering, politics, and the law. Learn from past disasters to avoid future ones. How disasters can be tracked to failures in the design process. The roles of engineers, artisans, politicians, lawyers, and scientists in the design of products. Failure as rooted in oversight in adhering to the design process. Student teams analyze real disasters and design new products presumably free from the potential for disastrous outcomes. GER:DB-EngrAppSci
3 units, Aut (Robertson, C; Moalli, J)

CHEMENG 80Q. Art, Chemistry, and Madness: The Science of Art Materials
(Stanford Introductory Seminar) Preference to sophomores. Chemistry of natural and synthetic pigments in five historical palettes: earth (paleolithic), classical (Egyptian, Greco-Roman), medieval European (Middle Ages), Renaissance (old masters), and synthetic (contemporary). Composite nature of paints using scanning electron microscopy images; analytical techniques used in art conservation, restoration, and determination of provenance; and inherent health hazards. Paintings as mechanical structures. Hands-on laboratory includes stretching canvas, applying gesso grounds, grinding pigments, preparing egg tempera paint, bamboo and quill pens, gilding and illumination, and papermaking. GER:DB-EngrAppSci
3 units, Spr (Frank, C; Loesch-Frank, S)

CHEMENG 100. Chemical Process Modeling, Dynamics, and Control
Mathematical methods applied to engineering problems using chemical engineering examples. The development of mathematical models to describe chemical process dynamic behavior. Analytical and computer simulation techniques for the solution of ordinary differential equations. Dynamic behavior of linear first- and second-order systems. Introduction to process control. Dynamics and stability of controlled systems. Prerequisites: CHEMENG 20 or ENGR 20; CME 102 or MATH 53.
3 units, Aut (Hwang, L)

CHEMENG 110. Equilibrium Thermodynamics
Thermodynamic properties, equations of state, properties of non-ideal systems including mixtures, and phase and chemical equilibria. Prerequisite: CHEM 171 or equivalent.
3 units, Win (Bao, Z)

CHEMENG 120A. Fluid Mechanics
The flow of isothermal fluids from a momentum transport viewpoint. Continuum hypothesis, scalar and vector fields, fluid statics, non-Newtonian fluids, shell momentum balances, equations of motion and the Navier-Stokes equations, creeping and potential flow, parallel and nearly parallel flows, time-dependent parallel flows, boundary layer theory and separation, introduction to drag correlations. Prerequisites: junior in Chemical Engineering or consent of instructor; 100 and CME 102 or equivalent.
4 units, Win (Staff)

CHEMENG 120B. Energy and Mass Transport
General diffusive transport, heat transport by conduction, Fourier's law, conduction in composites with analogies to electrical circuits, advection-diffusion equations, forced convection, boundary layer heat transport via forced convection in laminar flow, forced convection correlations, free convection, free convection boundary layers, free convection correlations and application to geophysical flows, melting and heat transfer at interfaces, radiation, diffusive transport of mass for dilute and non-dilute transfer, mass and heat transport analogies, mass transport with bulk chemical reaction, mass transport with interfacial chemical reaction, evaporation. Prerequisite 120A or consent of instructor.
4 units, Spr (Spakowitz, A)

CHEMENG 130. Separation Processes
Analysis and design of equilibrium and non-equilibrium separation processes. Possible examples: distillation, liquid-liquid extraction, flash distillation, electrophoresis, centrifugation, membrane separations, chromatography, and reaction-assisted separation processes.
3 units, Spr (Jaramillo, T)

CHEMENG 140. Micro and Nanoscale Fabrication Engineering
(Same as CHEMENG 240) (Same as CHEMENG 140) Survey of fabrication and processing technologies in industrial sectors, such

as semiconductor, biotechnology, and energy. Chemistry and transport of electronic and energy device fabrication. Solid state materials, electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, thin film deposition, plasma processing. Micro and nanopatterning involving photolithography, unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55

3 units, Win (Bao, Z)

CHEMENG 150. Biochemical Engineering

Systems-level combination of chemical engineering concepts with biological principles. The production of protein pharmaceuticals as a paradigm to explore quantitative biochemistry and cellular physiology, the elemental stoichiometry of metabolism, recombinant DNA technology, synthetic biology and metabolic engineering, fermentation development and control, product isolation and purification, protein folding and formulation, and biobusiness and regulatory issues. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41 or equivalent.

3 units, Win (Staff)

CHEMENG 160. Polymer Science and Engineering

(Same as CHEMENG 260) Interrelationships among molecular structure, morphology, and mechanical behavior of polymers. Topics include amorphous and semicrystalline polymers, glass transitions, rubber elasticity, linear viscoelasticity, and rheology. Applications of polymers in biomedical devices and microelectronics. Recommended: CHEM 33 and 171, or equivalent.

3 units, Spr (Hwang, L)

CHEMENG 170. Kinetics and Reactor Design

Chemical kinetics, elementary reactions, mechanisms, rate-limiting steps, and quasi-steady state approximations. Ideal isothermal and non-isothermal reactors; design principles. Steady state and unsteady state operation of reactors; conversion and limitations of thermodynamic equilibrium. Enzymes and heterogeneous catalysis and catalytic reaction mechanisms. Prerequisites: 110, 120A, 120B.

3 units, Aut (Bent, S)

CHEMENG 174. Environmental Microbiology I

(Same as CHEMENG 274, CEE 274A) Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents.

3 units, Aut (Spormann, A), Sum (Krieger, C)

CHEMENG 180. Chemical Engineering Plant Design

Open to seniors in chemical engineering or by consent of instructor. Application of chemical engineering principles to the design of practical plants for the manufacture of chemicals and related materials. Topics: flow-sheet development from a conceptual design, equipment design for distillation, chemical reactions, heat transfer, pumping, and compression; estimation of capital expenditures and production costs; plant construction.

3 units, Spr (Pavone, A)

CHEMENG 181. Biochemistry I

(Same as BIO 188, BIO 288, CHEMENG 281, CHEM 181) (CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 135 or 171. GER:DB-NatSci

3 units, Win (Zare, R; Cegelski, L)

CHEMENG 183. Biochemistry II

(Same as BIO 189, BIO 289, CHEMENG 283, CHEM 183) Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). GER:DB-NatSci

3 units, Spr (Dunn, A)

CHEMENG 185A. Chemical Engineering Laboratory A

Experimental aspects of chemical engineering science. Emphasizes laboratory work and development of communication skills. Lab work in student groups. Student presentations. Prerequisites: 120A,B. Corequisite: 170.

4 units, Aut (Dunn, A; Hwang, L)

CHEMENG 185B. Chemical Engineering Laboratory B

Methods and techniques in molecular biology and biochemical engineering. Emphasis is on team organization, communiction skills, experimental design, and project execution. Creation of presentations, experiments, and demonstrations for high school students. Additional laboratory times to be arranged. Prerequisite: BIO 41, CHEMENG 181, or equivalent.

4 units, Win (Wang, C)

CHEMENG 190. Undergraduate Research in Chemical Engineering

Laboratory or theoretical work for undergraduates under the supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergraduate chemical engineering lab. Students should consult advisers for information on available projects.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEMENG 190H. Undergraduate Honors Research in Chemical Engineering

For Chemical Engineering majors pursuing a B.S. with Honors degree who have submitted an approved research proposal to the department. Unofficial transcript must document BSH status and at least 9 units of 190H research for a minimum of 3 quarters May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEMENG 191H. Undergraduate Honors Seminar

For Chemical Engineering majors approved for B.S. with Honors research program. Honors research proposal must be submitted and unofficial transcript document BSH status prior to required concurrent registration in 190H and 191H. May be repeated for credit. Corequisite: 190H

1 unit, Aut (Hwang, L), Win (Hwang, L), Spr (Hwang, L), Sum (Hwang, L)

GRADUATE COURSES IN CHEMICAL ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHEMENG 240. Micro and Nanoscale Fabrication Engineering

(Same as CHEMENG 140) (Same as CHEMENG 140) Survey of fabrication and processing technologies in industrial sectors, such as semiconductor, biotechnology, and energy. Chemistry and transport of electronic and energy device fabrication. Solid state materials, electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, thin film deposition, plasma processing. Micro and nanopatterning involving photolithography, unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55

3 units, Win (Bao, Z)

CHEMENG 260. Polymer Science and Engineering

(Same as CHEMENG 160) Interrelationships among molecular structure, morphology, and mechanical behavior of polymers. Topics include amorphous and semicrystalline polymers, glass transitions, rubber elasticity, linear viscoelasticity, and rheology. Applications of polymers in biomedical devices and microelectronics. Recommended: CHEM 33 and 171, or equivalent.

3 units, Spr (Hwang, L)

CHEMENG 274. Environmental Microbiology I

(Same as CHEMENG 174, CEE 274A) Basics of microbiology and biochemistry. The biochemical and biophysical principles of

biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents.

3 units, Aut (Spormann, A), Sum (Krieger, C)

CHEMENG 281. Biochemistry I

(Same as BIO 188, BIO 288, CHEMENG 181, CHEM 181) (CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 135 or 171.

3 units, Win (Zare, R; Cegelski, L)

CHEMENG 283. Biochemistry II

(Same as BIO 189, BIO 289, CHEMENG 183, CHEM 183) Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

3 units, Spr (Dunn, A)

CHEMENG 310. Microhydrodynamics

(Same as ME 451D) Transport phenomena on small-length scales appropriate to applications in microfluidics, complex fluids, and biology. The basic equations of mass, momentum, and energy, derived for incompressible fluids and simplified to the slow-flow limit. Topics: solution techniques utilizing expansions of harmonic and Green's functions; singularity solutions; flows involving rigid particles and fluid droplets; applications to suspensions; lubrication theory for flows in confined geometries; slender body theory; and capillarity and wetting. Prerequisites: 120A,B, 300, or equivalents.

3 units, Aut (Shaqfeh, E)

CHEMENG 320. Chemical Kinetics and Reaction Engineering

Theoretical and experimental tools useful in understanding and manipulating reactions mediated by small-molecules and biological catalysts. Theoretical: first classical chemical kinetics and transition state theory; then RRKM theory and Monte Carlo simulations. Experimental approaches include practical application of modern spectroscopic techniques, stopped-flow measurements, temperature-jump experiments, and single-molecule approaches to chemical and biological systems. Both theory and application are framed with regard to systems of particular interest, including industrially relevant enzymes, organometallic catalysts, heterogeneous catalysis, electron transfer reactions, and chemical kinetics within living cells.

3 units, Win (Staff)

CHEMENG 340. Molecular Thermodynamics

Classical thermodynamics and quantum mechanics. Development of statistical thermodynamics to address the collective behavior of molecules. Establishment of theories for gas, liquid, and solid phases, including phase transitions and critical behavior. Applications include electrolytes, ion channels, surface adsorption, ligand binding to proteins, hydrogen bonding in water, hydrophobicity, polymers, and proteins.

3 units, Aut (Spakowitz, A)

CHEMENG 345. Fundamentals and Applications of Spectroscopy

Development of theoretical approaches to spectroscopy, including spectroscopic transitions, transition probabilities, and selection rules. Application to photon and electron spectroscopies of the gas and solid phases. Topics: rotational spectroscopy; infrared and Raman vibrational spectroscopies; fluorescence spectroscopy; Auger, x-ray and ultraviolet photoelectron spectroscopies. Prerequisite: CHEM 271 or course in quantum mechanics.

3 units, Win (Jaramillo, T)

CHEMENG 355. Advanced Biochemical Engineering

(Same as BIOE 355) Combines biological knowledge and methods with quantitative engineering principles. Quantitative review of biochemistry and metabolism; recombinant DNA technology and synthetic biology (metabolic engineering). The production of protein pharaceuticals as a paradigm for the application of chemical engineering principles to advanced process development within the framework of current business and regulatory requirements. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41, or equivalent.

3 units, Win (Swartz, J)

CHEMENG 442. Structure and Reactivity of Solid Surfaces

The structure of solid surfaces including experimental methods for determining the structure of single crystal surfaces. The adsorption of molecules on these surfaces including the thermodynamics of adsorption processes, surface diffusion, and surface reactions. Molecular structure of adsorbates. Current topics in surface structure and reactivity, including systems for heterogeneous catalysis and electronic materials.

3 units, not given this year

CHEMENG 448. Molecular Catalysis

Chemical transformation of organic molecules in the energy and chemical industries. The focus on molecular metal catalysis in various environments including homogeneous, multi-phase, and on solid supports. Possible examples: isomerization, hydrogenation, oligo-polymerization, oxidation, methathesis, hydroformylation, and carbonylation of olefins.

3 units, Win (Staff), given occasionally

CHEMENG 450. Advances in Biotechnology

Guest academic and industrial speakers. Latest developments in fields such as bioenergy, green process technology, production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.

3 units, Spr (Swartz, J; Hwang, L)

CHEMENG 451. Chemical Principles in Drug Discovery and Development

Application of physical and organic chemistry to the discovery and subsequent product development of small molecule and macromolecular drugs. Course discusses key physical, chemical, and biological properties of drug candidates and how to measure them, how to engineer them. Discussion of principles of drug formulation and delivery. Graduate-level background in physical and organic chemistry recommended.

3 units, Aut (Khosla, C)

CHEMENG 454. Synthetic Biology and Metabolic Engineering

(Same as BIOE 454) Principles for the design and optimization of new biological systems. Development of new enzymes, metabolic pathways, other metabolic systems, and communication systems among organisms. Example applications include the production of central metabolites, amino acids, pharmaceutical proteins, and isoprenoids. Economic challenges and quantitative assessment of metabolic performance. Pre- or corequisite: CHEMENG 355 or equivalent.

3 units, alternate years, not given this year

CHEMENG 456. Metabolic Biochemistry of Microorganisms

(Same as CEE 274B) Microbial metabolism, biochemical and metabolic principles, unity and diversity of metabolic pathways, evolution of enzymes and metabolic pathways, microbial degradation of natural and anthropogenic organic compounds, predicting biodegradation, and metabolic origin of life.

3 units, Win (Spormann, A)

CHEMENG 457. Microbial Ecology and Evolution
(Same as CEE 274C) Structure/function relationship of microbial communities; metabolic and ecological basis of interactions in microbial communities; microbial ecology and population biology in natural and human host systems; and evolution of microbial life. Prerequisite: CEE 274A, CHEMENG 281 (formerly 288), or equivalent.

3 units, not given this year

CHEMENG 458. Recent Advances in Genetic, Cellular, and Biomolecular Systems
Current topics, experimental methods, technologies, quantitative analysis, and mathematical models.

3 units, not given this year

CHEMENG 459. Frontiers in Interdisciplinary Biosciences
(Same as BIO 459, BIOC 459, BIOE 459, CHEM 459, PSYCH 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.

1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson)

CHEMENG 460. Polymer Surfaces and Interfaces
Principles of interfacial thermodynamics and polymer physics applied to polymer surfaces and interfaces, particularly in relation to biomedical devices. Treatments of intermolecular forces; conformational statistics of macromolecular structure; tethering of polymers at different interfaces; techniques for chemical modification of surfaces; methods for physical characterization of polymer surfaces and interfaces. Applications in adhesion, biocompatibility, prosthetic orthopedic devices, and ophthalmic devices. Prerequisite: exposure to principles of polymer science or consent of instructor.

3 units, Win (Frank, C), alternate years, not given next year

CHEMENG 461. Polymeric Materials in Medical Devices
Integrated approach to polymer synthesis, characterization, and processing for polymer properties of technological benefit in biomedical devices. Classes of materials include ultra high molecular weight polyethylene, silicone elastomers, block copolymer segmented polyurethanes, highly orientated nylon fibers, hydrogels, and biodegradable polymers. Applications include prosthetic orthopedic devices, ophthalmic devices, sutures, and drug delivery systems.

3 units, not given this year

CHEMENG 462. Complex Fluids and Non-Newtonian Flows
Division of complex fluids into suspensions, solutions, and melts. Suspensions as colloidal and non-colloidal. Extra stress and relation to the stresslet. Suspension rheology including Brownian and non-Brownian fibers. Microhydrodynamics and the Fokker-Planck equation. Linear viscoelasticity and the weak flow limit. Polymer solutions including single mode (dumbbell) and multimode models. Nonlinear viscoelasticity. Intermolecular effects in nondilute solutions and melts and the concept of reptation. Prerequisites: low Reynolds number hydrodynamics or consent of instructor.

3 units, Spr (Shaqfeh, E)

CHEMENG 464. Polymer Chemistry
Polymer material design, synthesis, characterization, and application. Topics include organic and kinetic aspects of polymerization, polymer characterization techniques, and structure and properties of bulk polymers for commercial applications and emerging technologies.

3 units, alternate years, not given this year

CHEMENG 466. Polymer Physics
Concepts and applications in the equilibrium and dynamic behavior of complex fluids. Topics include solution thermodynamics, scaling concepts, semiflexibility, characterization of polymer size (light scattering, osmotic pressure, size-exclusion chromatography, intrinsic viscosity), viscoelasticity, rheological measurements, polyelectrolytes, liquid crystals, biopolymers, and gels.

3 units, Win (Spakowitz, A)

CHEMENG 467. Physics of Biomacromolecules
Advanced topics in the equilibrium and dynamic behavior of biomacromolecules. Theoretical approaches addressed include path integral approaches to polymer Green function theory, polymer field theory, application of Smoluchowski and fractional Fokker Planck equations to biopolymer transport, and Brownian dynamics and Monte Carlo simulations. These methods will be applied to topics such as DNA/protein semiflexibility, DNA supercoiling, lyotropic polymer ordering, anomalous diffusion in crowded environments, motor-protein transport, and protein dynamics. Prerequisites: CHEMENG 340 and 466 or consent of the instructor.

3 units, not given this year

CHEMENG 500. Special Topics in Protein Biotechnology
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Swartz, J), Win (Swartz, J), Spr (Swartz, J), Sum (Swartz, J)

CHEMENG 501. Special Topics in Semiconductor Processing
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Bent, S), Win (Bent, S), Spr (Bent, S), Sum (Bent, S)

CHEMENG 503. Special Topics in Biocatalysis
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Khosla, C), Win (Khosla, C), Spr (Khosla, C), Sum (Khosla, C)

CHEMENG 504. Special Topics in Bioengineering
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson, C), Sum (Robertson, C)

CHEMENG 505. Special Topics in Microrheology
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Fuller, G), Win (Fuller, G), Spr (Fuller, G), Sum (Fuller, G)

CHEMENG 507. Special Topics in Polymer Physics and Molecular Assemblies
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Frank, C), Win (Frank, C), Spr (Frank, C), Sum (Frank, C)

CHEMENG 510. Special Topics in Transport Mechanics
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Shaqfeh, E), Win (Shaqfeh, E), Spr (Shaqfeh, E), Sum (Shaqfeh, E)

CHEMENG 513. Special Topics in Functional Organic Materials for Electronic and Optical Devices
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Bao, Z), Win (Bao, Z), Spr (Bao, Z), Sum (Bao, Z)

CHEMENG 514. Special Topics in Biopolymer Physics
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Spakowitz, A), Win (Spakowitz, A), Spr (Spakowitz, A), Sum (Spakowitz, A)

CHEMENG 515. Special Topics in Molecular and Systems Biology
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.

1 unit, Aut (Wang, C), Win (Wang, C), Spr (Wang, C), Sum (Wang, C)

CHEMENG 516. Special Topics in Energy and Catalysis
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.
1 unit, Aut (Jaramillo, T), Win (Jaramillo, T), Spr (Jaramillo, T), Sum (Jaramillo, T)

CHEMENG 517. Special Topics in Microbial Physiology and Metabolism
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.
1 unit, Aut (Spormann, A), Win (Spormann, A), Spr (Spormann, A), Sum (Spormann, A)

CHEMENG 518. Special Topics in Advanced Biophysics and Protein Design
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.
1 unit, Aut (Dunn, A), Win (Dunn, A), Spr (Dunn, A), Sum (Dunn, A)

CHEMENG 519. Special Topics in Interface Science and Catalysis
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.
1 unit, Aut (Noerskov, J), Win (Noerskov, J), Spr (Noerskov, J), Sum (Staff)

CHEMENG 520. Special Topics in Biological Chemistry
Recent developments and current research. May be repeated for credit. Prerequisite: graduate standing and consent of instructor.
1 unit, Win (Staff), Spr (Staff), Sum (Staff)

CHEMENG 600. Graduate Research in Chemical Engineering
Laboratory and theoretical work leading to partial fulfillment of requirements for an advanced degree.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEMENG 699. Colloquium
Weekly lectures by experts from academia and industry in the field of chemical engineering.
1 unit, Aut (Wang, C), Win (Wang, C), Spr (Wang, C)

CHEMICAL SYSTEMS BIOLOGY (CSB) COURSES

UNDERGRADUATE COURSES IN CHEMICAL SYSTEMS BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CSB 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CHEMICAL SYSTEMS BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CSB 210. Signal Transduction Pathways and Networks
The molecular mechanisms through which cells receive and respond to external signals. Emphasis is on principles of cell signaling, the systems-level properties of signal transduction modules, and experimental strategies through which cell signaling pathways are being studied. Prerequisite: working knowledge of biochemistry and genetics.
4 units, not given this year

CSB 220. Chemistry of Biological Processes
(Same as BIOC 220) The principles of organic and physical chemistry as applied to biomolecules. Goal is a working knowledge of chemical principles that underlie biological processes, and chemical tools used to study and manipulate biological systems. Prerequisites: organic chemistry and biochemistry, or consent of instructor.
4 units, Spr (Wandless, T), alternate years, not given next year

CSB 240A. A Practical Approach to Drug Discovery and Development
Advancing a drug from discovery of a therapeutic target to human trials and commercialization. Topics include: high throughput assay development, compound screening, lead optimization, protecting intellectual property, toxicology testing, regulatory issues, assessment of clinical need, defining the market, conducting clinical trials, project management, and commercialization issues, including approach to licensing and raising capital.
3 units, Win (Mochly-Rosen, D; Grimes, K)

CSB 240B. A Practical Approach to Drug Discover and Development
(Continuation of 240A) Advancing a drug from discovery of a therapeutic target to human trials and commercialization. Topics include: high throughput assay development, compound screening, lead optimization, protecting intellectual property, toxicology testing, regulatory issues, assessment of clinical need, defining the market, conducting clinical trials, project management, and commercialization issues, including approach to licensing and raising capital. Prerequisite: 240A.
3 units, Spr (Mochly-Rosen, D; Grimes, K)

CSB 242. A seminar series on Drug Discovery and Development.
The scientific principles and technologies involved in making the transition from a basic biological observation to the creation of a new drug emphasizing molecular and genetic issues. Prerequisite: biochemistry, chemistry, or bioengineering.
1 unit, Win (Mochly-Rosen, D; Grimes, K), Spr (Mochly-Rosen, D; Grimes, K)

CSB 250. The Biology of Chromatin Templated Processes
Topics include mechanisms of DNA replication; gene expressions regulation; DNA damage sensing and DNA repair; chromatin structure and function; and epigenetics and nuclear reprogramming. Prerequisite: working knowledge of molecular biology, biochemistry and genetics, or instructor consent.
4 units, Win (Staff), alternate years, not given next year

CSB 260. Quantitative Chemical Biology
Current topics including protein and small molecule engineering, cell signaling sensors and modulators, molecular imaging, chemical genetics, combinatorial chemistry, in vitro evolution, and signaling network modeling. Prerequisites: undergraduate organic chemistry, and biochemistry or cell biology.
4 units, alternate years, not given this year

CSB 270. Research Seminar
Guest speakers and discussion on current research in pharmacology.
1-2 units, not given this year

CSB 271. Principles of Cell Cycle Control
(Same as BIO 171, BIO 271) Genetic analysis of the key regulatory circuits governing the control of cell division. Illustration of key principles that can be generalized to other synthetic and natural biological circuits. Focus on tractable model organisms; growth control; irreversible biochemical switches; chromosome duplication; mitosis; DNA damage checkpoints; MAPK pathway-cell cycle interface; oncogenesis. Analysis of classic and current primary literature. Satisfies Central Menu Area 2.
3 units, Aut (Skotheim, J; Ferrell, J)

CSB 278. Systems Biology
(Same as BIOE 310, CS 278) Experimental and computational approaches to the dissection of complex biologcal systems. Topics include network structure, non-linear dynamics, numerical modeling approaches, noise, and robustness. Topics are introduced in the context of recent papers from the primary literature.
4 units, Win (Ferrell, J)

CSB 299. Directed Reading in Chemical and Systems Biology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CSB 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CSB 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CSB 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CSB 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEMISTRY (CHEM) COURSES

UNDERGRADUATE COURSES IN CHEMISTRY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHEM 24N. Nutrition and History
(Stanford Introductory Seminar) Preference to freshmen. Intended to broaden the introductory chemistry experience. The biochemical basis of historically important nutritional deficiencies (vitamins, minerals, starvation, metabolic variants that predispose to disease) and environmental toxins is related to physiological action and the sociological, political, and economic consequences of its effect on human populations. Prerequisite: high school chemistry. Recommended: 31A,B, or 31X, or 33.
3 units, Spr (Huestis, W)

CHEM 25N. Science in the News
(Stanford Introductory Seminar) Preference to freshmen. Possible topics include: diseases such as avian flu, HIV, and malaria; environmental issues such as climate change, atmospheric pollution, and human population; energy sources in the future; evolution; stem cell research; nanotechnology; and drug development. Focus is on the scientific basis for these topics as a basis for intelligent discussion of societal and political implications. Sources include the popular media and scientific media for the nonspecialist, especially those available on the web.
3 units, Aut (Andersen, H)

CHEM 25Q. Science-in-Theatre: A New Genre?
(Stanford Introductory Seminar) (Same as DRAMA 25N) Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Frankensteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment.
3 units, Win (Djerassi, C)

CHEM 26N. The What, Why, How and wow's of Nanotechnology
(Stanford Introductory Seminar) Preference to freshmen. Introduction to nanotechnology with discussion of basic science at the nanoscale, its difference from molecular and macroscopic scales, and implications and applications. Developments in nanotechnology in the past two decades, from imaging and moving single atoms on surfaces to killing cancer cells with nanoscale tools and gadgets. GER:DB-NatSci
3 units, Spr (Dai, H)

CHEM 31A. Chemical Principles I
For students with moderate or no background in chemistry. Stoichiometry; periodicity; electronic structure and bonding; gases; enthalpy; phase behavior. Emphasis is on skills to address structural and quantitative chemical questions; lab provides practice. Recitation. GER:DB-NatSci
4 units, Aut (Dai, H; Schwartz, J), Sum (Schwartz, J)

CHEM 31AC. Problem Solving in Science
Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 31A.
1 unit, Aut (Schwartz, J)

CHEM 31B. Chemical Principles II
Chemical equilibrium; acids and bases; oxidation and reduction reactions; chemical thermodynamics; kinetics. Lab. Prerequisite: 31A. GER:DB-NatSci
4 units, Win (Fayer, M; Schwartz, J), Sum (Schwartz, J)

CHEM 31BC. Problem Solving in Science
Development and practice of critical problem solving skills using chemical examples. Students should also be concurrently enrolled in the parent course 31B. Limited enrollment and with permission of the instructor.
1 unit, Win (Schwartz, J)

CHEM 31X. Chemical Principles
Accelerated; for students with substantial chemistry background. Chemical equilibria concepts, equilibrium constants, acids and bases, chemical thermodynamics, quantum concepts, models of ionic and covalent bonding, atomic and molecular orbital theory, periodicity, and bonding properties of matter. Recitation. Prerequisites: AP chemistry score of 5 or passing score on chemistry placement test. Recommended: high school physics. GER:DB-NatSci
4 units, Aut (Moerner, W; Waymouth, R)

CHEM 33. Structure and Reactivity
Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics, chemical equilibria. Recitation. Prerequisite: 31A,B, or 31X, or an AP Chemistry score of 5. GER:DB-NatSci
4 units, Win (Stack, T; Kanan, M), Spr (Schwartz, J; Wender, P), Sum (Kahl, S)

CHEM 33C. Problem Solving in Science
Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 33.
1 unit, Spr (Schwartz, J)

CHEM 34X. General Chemistry Laboratory
Introduction to chemical laboratory practice. Topics include preparation of compounds and characterization of their properties by modern spectroscopic techniques. Corequisite: Chemistry 31X or the equivalent. Limited to 12 students; enrollment by consent of the instructor.
1 unit, Aut (Zare, R)

CHEM 35. Organic Monofunctional Compounds
Organic chemistry of oxygen and nitrogen aliphatic compounds. Recitation. Prerequisite: 33. GER:DB-NatSci
4 units, Aut (Du Bois, J), Spr (Du Bois, J), Sum (Hua, Y)

CHEM 36. Organic Chemistry Laboratory I
Techniques for separations of compounds: distillation, crystallization, extraction, and chromatographic procedures. Lecture treats theory; lab provides practice. Prerequisite: 33. GER:DB-NatSci
3 units, Aut (Cox, C), Spr (Hua, Y), Sum (Safi, S)

CHEM 110. Directed Instruction/Reading
Undergraduates pursue a reading program under supervision of a faculty member in Chemistry; may also involve participation in lab. Prerequisites: superior work in 31A,B, 31X, or 33; and consent of instructor and the Chemistry undergraduate study committee.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEM 111. Exploring Chemical Research at Stanford
Preference to freshmen and sophomores. Department faculty describe their cutting-edge research and its applications.
1 unit, Win (Cegelski, L)

CHEM 130. Organic Chemistry Laboratory II
Diels-Alder, reduction, and Wittig reactions; qualitative analysis. Lab. Limited enrollment Autumn Quarter. Prerequisite: 36. Corequisite: 35. GER:DB-NatSci
4 units, Aut (Hua, Y), Win (Hua, Y)

CHEM 131. Organic Polyfunctional Compounds
Aromatic compounds, polysaccharides, amino acids, proteins, natural products, dyes, purines, pyrimidines, nucleic acids, and polymers. Prerequisite: 35. GER:DB-NatSci
3 units, Aut (Huestis, W), Win (Trost, B)

CHEM 132. Synthesis Laboratory
Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 35, 130. GER:DB-NatSci
3 units, Win (Cox, C)

CHEM 134. Analytical Chemistry Laboratory
Methods include gravimetric, volumetric, spectrophotometric, and chromatographic. Writing instruction includes communications, full papers, research proposals, and referee papers. Lab. Prerequisite: 130. GER:DB-NatSci
5 units, Spr (Cox, C)

CHEM 135. Physical Chemical Principles
Introductory physical chemistry intended for students of the life sciences, geology and environmental engineering. Chemical kinetics: rate laws, integration of rate laws, reaction mechanisms, enzyme kinetics. Chemical thermodynamics: first, second and third laws, thermochemistry, entropy, free energy, chemical equilibrium, physical equilibrium, osmotic pressure, other colligative properties. Prerequisites: 31A,B, or 31X, calculus. GER:DB-NatSci
3 units, Aut (Pande, V)

CHEM 137. Special Topics in Organic Chemistry
(Formerly 181.) Chemical view of the biological processes of life. Topics include: structure and function of proteins, peptides, and nucleic acids; and how to use chemistry to mediate biological processes. GER:DB-NatSci
3 units, Win (Flygare, J)

CHEM 151. Inorganic Chemistry I
Theories of electronic structure, stereochemistry, and symmetry properties of inorganic molecules. Topics: ionic and covalent interactions, electron-deficient bonding, and molecular orbital theories. Emphasis is on the chemistry of the metallic elements. Prerequisites: 35. Recommended: 171. GER:DB-NatSci
3 units, Win (Stack, T)

CHEM 153. Inorganic Chemistry II
The theoretical aspects of inorganic chemistry. Group theory; many-electron atomic theory; molecular orbital theory emphasizing general concepts and group theory; ligand field theory; application of physical methods to predict the geometry, magnetism, and electronic spectra of transition metal complexes. Prerequisites: 151, 173. GER:DB-NatSci
3 units, Spr (Solomon, E)

CHEM 155. Advanced Inorganic Chemistry
(Same as CHEM 255) Chemical reactions of organotransition metal complexes and their role in homogeneous catalysis. Analogous patterns among reactions of transition metal complexes in lower oxidation states. Physical methods of structure determination. Prerequisite: one year of physical chemistry.
3 units, Spr (Waymouth, R)

CHEM 171. Physical Chemistry
Chemical thermodynamics; fundamental principles, Gibbsian equations, systematic deduction of equations, equilibrium conditions, phase rule, gases, solutions. Prerequisites: 31A,B, or 31X, 35; MATH 51. GER:DB-NatSci
3 units, Aut (Pecora, R)

CHEM 173. Physical Chemistry
Introduction to quantum chemistry: the basic principles of wave mechanics, the harmonic oscillator, the rigid rotator, infrared and microwave spectroscopy, the hydrogen atom, atomic structure, molecular structure, valence theory. Prerequisites: MATH 51, 53; PHYSICS 41, 43. Recommended: PHYSICS 45. GER:DB-NatSci
3 units, Win (Boxer, S)

CHEM 174. Physical Chemistry Laboratory I
Experimental investigations in spectroscopy, thermodynamics, and electronics. Students take measurements on molecular systems, design and build scientific instruments, and computer-automate them with software that they write themselves. Prerequisites: 134, MATH 51, PHYSICS 44. Corequisite 173. GER:DB-NatSci
4 units, Win (Chidsey, C)

CHEM 175. Physical Chemistry
Introduction to kinetic theory and statistical mechanics: molecular theory of matter and heat, transport phenomena in gases, Boltzmann distribution law, partition functions for ideal gases. Introduction to chemical kinetics: measurement of rates of reactions, relationship between rate and reaction mechanism, consideration of specific reactions, transition-state theory of reaction rates. Prerequisites: 171, 173. GER:DB-NatSci
3 units, Spr (Moerner, W)

CHEM 176. Physical Chemistry Laboratory II
Use of chemical instrumentation to study physical chemical time-dependent processes. Experiments include reaction kinetics, fluorimetry, and nuclear magnetic and electron spin resonance spectroscopy. Lab. Prerequisite: 173. GER:DB-NatSci
3 units, Spr (Cui, B)

CHEM 181. Biochemistry I
(Same as BIO 188, BIO 288, CHEMENG 181, CHEMENG 281) (CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 135 or 171. GER:DB-NatSci
3 units, Win (Zare, R; Cegelski, L)

CHEM 183. Biochemistry II
(Same as BIO 189, BIO 289, CHEMENG 183, CHEMENG 283) Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). GER:DB-NatSci
3 units, Spr (Dunn, A)

CHEM 184. Biological Chemistry Laboratory
Modern techniques in biological chemistry including protein purification, characterization of enzyme kinetics, heterologous expression of His-tagged fluorescent proteins, site-directed mutagenesis, and single-molecule fluorescence microscopy. Prerequisite: 181. GER:DB-NatSci
4 units, Spr (Cegelski, L)

CHEM 185. Biochemistry III
Advanced biophysical chemistry. Topics include: protein and DNA structure, stability, and folding, membrane lateral organization and dynamics, and transmembrane transport. Prerequisites: 171, 173, 183. GER:DB-NatSci
3 units, Spr (Boxer, S)

CHEM 190. Introduction to Methods of Investigation
Limited to undergraduates admitted under the honors program or by special arrangement with a member of the teaching staff. For general character and scope, see 200. Prerequisite:130. Corequisite: 300.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CHEMISTRY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHEM 200. Research and Special Advanced Work
Qualified graduate students undertake research or advanced lab work not covered by listed courses under the direction of a member of the teaching staff. For research and special work, students register for 200.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEM 221. Advanced Organic Chemistry
Molecular orbital theory and orbital symmetry. Thermochemistry and thermochemical kinetics. Unimolecular reaction rate theory. Methods of determining organic reaction mechanisms from a theoretical and experimental point of view. Prerequisites: 137, 175.
3 units, Aut (Kanan, M)

CHEM 223. Advanced Organic Chemistry
Continuation of 221 with emphasis on physical methods. Prerequisite: 221 or consent of instructor.
3 units, Win (Trost, B)

CHEM 225. Advanced Organic Chemistry
Continuation of 223. Organic reactions, new synthetic methods, conformational analysis, and exercises in the syntheses of complex molecules. Prerequisite: 223 or consent of instructor.
3 units, Spr (Wender, P)

CHEM 227. Synthesis and Analysis at the Chemistry-Biology Interface
Focus on organic chemistry of biomacromolecules. Synthetic methods and conjugation chemistry; labeling and chemical modification of nucleic acids and peptides; combinatorial library construction and selection methods. Prerequisite: One year of undergraduate organic chemistry.
3 units, Spr (Kool, E)

CHEM 229. Organic Chemistry Seminar
Required of graduate students majoring in organic chemistry. Students giving seminars register for 231.
1 unit, Aut (Trost, B), Win (Trost, B), Spr (Trost, B)

CHEM 231. Organic Chemistry Seminar Presentation
Required of graduate students majoring in organic chemistry for the year in which they present their organic seminar. Second-year students must enroll all quarters.
1 unit, Aut (Waymouth, R), Win (Waymouth, R), Spr (Waymouth, R)

CHEM 233A. Creativity in Organic Chemistry
Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr
1 unit, Aut (Waymouth, R)

CHEM 233B. Creativity in Organic Chemistry
Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr
1 unit, Spr (Waymouth, R)

CHEM 233C. Creativity in Organic Chemistry
Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr
1 unit, Spr (Staff)

CHEM 235. Applications of NMR Spectroscopy
The uses of NMR spectroscopy in chemical and biochemical sciences, emphasizing data acquisition for liquid samples and including selection, setup, and processing of standard and advanced experiments.
3 units, Win (Lynch, S)

CHEM 237. Electrochemistry
Principles of electrochemistry and their application to redox systems, electron transfer, electroanalysis, electrodeposition, electrocatalysis, batteries, and fuel cells. Prerequisite: 171 or equivalent.
3 units, not given this year

CHEM 251. Advanced Inorganic Chemistry
Chemical reactions of inorganic compounds with focus on mechanisms of reactions mediated by inorganic and organometallic complexes. The structural and electronic basis of reactivity including oxidation and reduction; kinetics and thermodynamics of inorganic reactions. Prerequisite: one year of physical chemistry.
3 units, not given this year

CHEM 253. Advanced Inorganic Chemistry
Electronic structure and physical properties of transition metal complexes. Ligand field and molecular orbital theories, magnetism and magnetic susceptibility, electron paramagnetic resonance including hyperfine interactions and zero field splitting and electronic absorption spectroscopy including vibrational interactions. Prerequisite: 153 or the equivalent.
3 units, not given this year

CHEM 255. Advanced Inorganic Chemistry
(Same as CHEM 155) Chemical reactions of organotransition metal complexes and their role in homogeneous catalysis. Analogous patterns among reactions of transition metal complexes in lower oxidation states. Physical methods of structure determination. Prerequisite: one year of physical chemistry.
3 units, Spr (Waymouth, R)

CHEM 258A. Research Progress in Inorganic Chemistry
Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.
1 unit, Win (Solomon, E)

CHEM 258B. Research Progress in Inorganic Chemistry
Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.
1 unit, Spr (Solomon, E)

CHEM 258C. Research Progress in Inorganic Chemistry
Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.
1 unit, Win (Solomon, E)

CHEM 259. Inorganic Chemistry Seminar
Required of graduate students majoring in inorganic chemistry.
1 unit, Aut (Solomon, E), Win (Solomon, E), Spr (Solomon, E)

CHEM 271. Advanced Physical Chemistry
The principles of quantum mechanics. General formulation, mathematical methods, and applications of quantum theory. Exactly solvable problems and approximate methods including time independent perturbation theory and the variational method. Time dependent methods including exactly solvable problems, time dependent perturbation theory, and density matrix formalism. Different representations of quantum theory including the Schrödinger, matrix, and density matrix methods. Absorption and emission of radiation Angular momentum. Atomic structure calculations and simple molecular structure methods. Prerequisite: 175.
3 units, Aut (Fayer, M)

CHEM 273. Advanced Physical Chemistry
Topics in advanced quantum mechanics: ab initio electronic structure theory (Hartree-Fock, configuration interaction, multiconfiguration self-consistent-field, and many-body perturbation theory techniques) and density functional theory, time-dependent quantum mechanics (time evolution operator, Feynman path integrals, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules), and vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wave functions and energy levels of rigid rotations, vibration-rotation interaction). Prerequisite: Chem 271 or Physics 230.
3 units, Win (Martinez, T)

CHEM 275. Advanced Physical Chemistry
The principles and methods of statistical mechanics from the ensemble point of view, statistical thermodynamics, heat capacities of solids and polyatomic gases, chemical equilibria, equations of state of fluids, and phase transitions. Prerequisite: 271.
3 units, Spr (Pecora, R)

CHEM 276. Advanced Physical Chemistry
The statistical mechanical basis for computer simulations of atomic and molecular liquids. Principles of the Monte Carlo method, Metropolis algorithm, and application to lattice models and continuum fluids. Principles of molecular dynamics calculations, methods for sampling equilibrium ensembles, algorithms for dynamics. Periodic boundary conditions, methods for dealing with long-ranged forces, construction of potential energy functions, estimation of statistical error in results of simulations. Prerequisite: 275. it might be repeatable for credit.
3 units, not given this year

CHEM 277. Topics in Physical Chemistry
Possible topics: structure elucidation using diffraction techniques, advanced statistical mechanics, crystal field theory, advanced quantum mechanics, magnetic relaxation, advanced thermodynamics, chemical applications of group theory. May be repeated for credit. Prerequisite: 275 or consent of instructor.
3 units, Spr (Pecora, R)

CHEM 278A. Research Progress in Physical Chemistry
Required of all second- and third-year Ph.D. candidates in physical and biophysical chemistry and chemical physics. Second-year students present their research progress and plans in brief written and oral summaries (A); third-year students prepare a written progress report (B). A: Win, B: Win
1 unit, Win (Pecora, R)

CHEM 278B. Research Progress in Physical Chemistry
Required of all second- and third-year Ph.D. candidates in physical and biophysical chemistry and chemical physics. Second-year students present their research progress and plans in brief written and oral summaries (A); third-year students prepare a written progress report (B). A: Win, B: Win
1 unit, Win (Pecora, R)

CHEM 279. Physical Chemistry Seminar
Required of graduate students majoring in physical chemistry. May be repeated for credit.
1 unit, Aut (Chidsey, C), Win (Chidsey, C), Spr (Chidsey, C)

CHEM 280. Single-Molecule Spectroscopy and Imaging
Theoretical and experimental techniques necessary to achieve single-molecule sensitivity in laser spectroscopy: interaction of radiation with spectroscopic transitions; systematics of signals, noise, and signal-to-noise; modulation and imaging methods; and analysis of fluctuations; applications to modern problems in biophysics, cellular imaging, physical chemistry, single-photon sources, and materials science. Prerequisites: 271, previous or concurrent enrollment in 273.
3 units, not given this year

CHEM 285. Chemical Principles in Drug Discovery and Development
Application of physical organic chemistry to the discovery and subsequent product development of small molecule and macromolecular drugs. Key physical, chemical, and biological properties of drug candidates, how to measure them, and how to engineer them. Principles of drug formulation and delivery. Recommended: graduate-level background in physical and organic chemistry.
3 units, Aut (Khosla, C)

CHEM 297. Bio-Inorganic Chemistry
(Same as BIOPHYS 297) Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique features of the protein ligand, and the physical methods used to study active sites. Active site structures are correlated with function. Prerequisites: 153 and 173, or equivalents.
3 units, not given this year

CHEM 299. Teaching of Chemistry
Required of all teaching assistants in Chemistry. Techniques of teaching chemistry by means of lectures and labs.
1-3 units, Aut (Hua, Y), Win (Hua, Y), Spr (Hua, Y)

CHEM 300. Department Colloquium
Required of graduate students. May be repeated for credit.
1 unit, Aut (Trost, B), Win (Trost, B), Spr (Trost, B)

CHEM 301. Research in Chemistry
Required of graduate students who have passed the qualifying examination. Open to qualified graduate students with the consent of the major professor. Research seminars and directed reading deal with newly developing areas in chemistry and experimental techniques. May be repeated for credit. Search for adviser name on Axess.
2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHEM 309. Navigating Career Options for Ph.D. Chemists
Planning a post-graduate career. Topics include career options, job search strategies, job application process, long-term career planning, and minority issues in science careers. Workshops focused on developing professional skills working with CDC and CTL, and panel discussions with chemistry Ph.D.s working in a range of fields. (Zare)
1 unit, not given this year

CHEM 390. Curricular Practical Training for Chemists
For Chemistry majors who need work experience as part of their program of study.
1 unit, Aut (Staff)

CHEM 459. Frontiers in Interdisciplinary Biosciences
(Same as BIO 459, BIOC 459, BIOE 459, CHEMENG 459, PSYCH 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.
1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson)

CHEM 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHICANA/O STUDIES (CHICANST) COURSES

UNDERGRADUATE COURSES IN CHICANA/O STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHICANST 117N. Film, Nation, Latinidad
(Stanford Introductory Seminar) (Same as CSRE 117N, ILAC 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.
3-4 units, Spr (Yarbro-Bejarano, Y)

CHICANST 125S. Chicano/Latino Politics
(Same as POLISCI 125S) The political position of Latinos and Latinas in the U.S.. Focus is on Mexican Americans, with attention to Cuban Americans, Puerto Ricans, and other groups. The history of each group in the American polity; their political circumstances with respect to the electoral process, the policy process, and government; the extent to which the demographic category Latino is meaningful; and group identity and solidarity among Americans of Latin American ancestry. Topics include immigration, education, affirmative action, language policy, and environmental justice.
5 units, Aut (Michelson, M)

CHICANST 167. Chicana and Chicano Representation in Cinema
(Same as CSRE 167) Representations of Chicana/os and Latinas/os in independent and Hollywood film and video across genres such as narrative, documentary, and experimental. How film and video are social and artistic phenomenon where cultural and political debates about cultural identity and community are narrated and imagined. Screened works historically situated in relation to the Chicano civil rights movement, the emergence of Chicano film and television, international film movements, the struggle for access to the means for self-representation, and challenges in distribution, exhibition, and reception. The role of visual media in struggles for social change and political enfranchisement. How visual media are a vehicle for creative and personal expression.
5 units, Spr (Staff)

CHICANST 168. New Citizenship: Grassroots Movements for Social Justice in the U.S.
(Same as CSRE 168) This class focuses on the contributions of immigrants and communities of color to the meaning of citizenship in the U.S. Citizenship, more than only a legal status, is a dynamic cultural field in which people claim equal rights while demanding respect for differences. Academic studies of citizenship will be examined in dialogue with the theory and practice of activists and movements. Engagement with immigrant organizing and community-based research will be a central feature of this course.
5 units, Win (Staff)

CHICANST 180E. Introduction to Chicana/o Studies
(Same as CSRE 180E) Historical and contemporary experiences that have defined the status of Mexican-origin people living in the U.S. Topics include the U.S./Mexico border and the borderlands; immigration and anti-immigration sentiment; literary and cultural traditions; music; labor; historical perspectives on Mexicans in the U.S. and the Chicano movement; urban realities; gender relations; political and economic changes; and inter- and intra-group interactions. Sources include social science and humanities scholarship. GER:DB-Hum, EC-AmerCul
5 units, Spr (Gallardo, S)

CHICANST 189W. Language and Minority Rights
(Same as CSRE 189W, EDUC 189X) Language as it is implicated in migration and globalization. The effects of globalization processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages. GER:EC-GlobalCom
3 units, not given this year

CHICANST 199A. Race, Sex, Gender in Cultural Representations
(Same as CSRE 199A, ILAC 389E) Critical theory and cultural representations in media that address issues surrounding the representation of race, gender, sexuality, and politics. How is desire racialized? How is racial difference produced through sex as a material practice and what is the function of sex in racial self formation ? How are questions of pleasure, desire, and the structures of power reconciled? How do these texts reinforce or contest stereotypes and the ideal bodies of national identity? Is it desirable to envision a bridging of queer communities of color, or a transnational or global network?
3-5 units, Spr (Yarbro-Bejarano, Y)

CHICANST 200. Latina/o Literature
(Same as CSRE 200, ILAC 280) Examination of a diverse set of literary texts by Latinas/os, bringing history, politics, and cultural theory to bear in order to apprehend the significant intracultural differences amongst Latinas/os (most notably concerning im/migration). Gender and sexuality as critical lenses that reflect and refract themes such as identity, language politics, transnationalism, political turmoil, socioeconomic status, and the notion of home/land and its loss, reinvention, and/or reclamation
3-5 units, Aut (Yarbro-Bejarano, Y)

CHICANST 200R. Directed Research
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHICANST 200W. Directed Reading
(Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHICANST 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era
(Same as CSRE 201B) How creative projects build and strengthen communities of common concern. Projects focus on cultural reclamation, multiculturalism, cultural equity and contemporary cultural wars, media literacy, independent film, and community-based art. Guest artists and organizers, films, and case studies.
5 units, Aut (Hernandez, G)

GRADUATE COURSES IN CHICANA/O STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHICANST 201C. Critical Concepts in Chicana/o Literature
(Same as CSRE 201C, ILAC 380E) Interrogation of the critical discourses that have configured and reconfigured the canon of Chicana/o literature over the last thirty years. Close textual readings of primary texts, mainly narrative, within the development of Chicana/o literary and cultural criticism. Construction of narrative genealogies and foundational texts. Impact of the publication of late-nineteenth or pre-movement novels and Chicana feminist/lesbian/queer critiques. Consideration of alternative paradigms such as positioning Chicana/o literature within a U.S. Latina/o literary imaginary, and the shift of critical discourse in the field of visual art from a paradigm of resistance and affirmation to one of post-Chicano.
3-5 units, Aut (Yarbro-Bejarano, Y)

CHINESE GENERAL (CHINGEN) COURSES

UNDERGRADUATE COURSES IN CHINESE GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHINGEN 51. Chinese Calligraphy
Practice in writing Chinese characters with a brush, emphasizing standardized script and the composition of the characters and improving handwriting. Limited enrollment. May be repeated for credit. Prerequisite: CHINLANG 3 or equivalent.
1-2 units, Spr (Chuang, Y)

CHINGEN 70N. Marvelous Creatures: Animals and Humans in Chinese Literature
(Stanford Introductory Seminar) Preference to freshmen. Read novels and short stories as well as view films that feature an array of marvelous creatures from late imperial times to the contemporary era. What animal imageries and metaphors can reveal about the Chinese and how they relate to the natural, supernatural, and human worlds across the centuries. GER:DB-Hum, EC-GlobalCom
3-4 units, Spr (Lee, H)

CHINGEN 73. Chinese Language, Culture, and Society
(Same as CHINGEN 173) Topics include the origin of Chinese, development of dialects, emergence of the standard, preferred formulaic expressions, the evolution of writing, and language policies in greater China. Prerequisite: CHINLANG 1 or 1B, or equivalent. GER:DB-SocSci, EC-GlobalCom
4 units, not given this year

CHINGEN 91. Traditional East Asian Culture: China
Required for Chinese and Japanese majors. Introduction to Chinese culture in a historical context. Topics include political and socioeconomic institutions, religion, ethics, education, and art and literature. GER:DB-Hum, EC-GlobalCom
5 units, Aut (Lee, H)

CHINGEN 114. Chinese Imagination of Death
(Same as EASTASN 114, EASTASN 214) Examines the popular representations and imaginations of death and the afterlife in the Chinese tradition. Sources include philosophical discourses, literary and visual representations, religious and popular practices, and modern imaginations. All readings in English.
3-4 units, Win (Son, S), given once only

CHINGEN 117. Worship of Buddhist Images in Medieval China
(Same as CHINGEN 217) Explores Buddhist image-making practices from Han to Tang China from a trans-Asian perspective. Topics include characteristics of earliest Chinese images (vis-a-vis those of Indian subcontinent), their growth as a dominant artistic genre, inroads of foreign images and Chinese interactions, con-

structions of Buddhist ritual spaces such as monumental pagodas and cave temples, crosscultural contexts of image worship.

3-5 units, Spr (Staff)

CHINGEN 119. Popular Culture and Casino Capitalism in China

(Same as CHINGEN 219) Examination of different forms of Chinese popular culture used to gauge or control fate and uncertainty, from geomancy and qigong to ghost culture and mahjong. Ways in which Chinese are incorporating these cultural forms into the informal economy to get rich quick: rotating credit associations, stock market speculation, pyramid schemes, underground lotteries, counterfeiting. Impact of casino capitalism on Chinese culture and social life today.

3-4 units, not given this year

CHINGEN 120. Soldiers and Bandits in Chinese Culture

(Same as CHINGEN 220) Social roles and literary images of two groups on the margins of traditional Chinese society; historical and comparative perspectives.

3-5 units, not given this year

CHINGEN 121. Classical Chinese Rituals

(Same as CHINGEN 221) Meanings of rituals regarding death, wedding, war, and other activities; historical transformations of classical rituals throughout the premodern period; legacy of the Chinese ritual tradition. Sources include canonical texts.

3-5 units, not given this year

CHINGEN 131. Chinese Poetry in Translation

(Same as CHINGEN 231) From the first millennium B.C. through the 12th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. History, language, and culture. Chinese language not required. GER:DB-Hum, EC-GlobalCom

4 units, Win (Sargent, S)

CHINGEN 132. Chinese Fiction and Drama in Translation

(Same as CHINGEN 232) From early times to the 18th century, emphasizing literary and thematic discussions of major works in English translation. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

CHINGEN 133. Literature in 20th-Century China

(Same as CHINGEN 233) (Graduate students register for 233.) How modern Chinese culture evolved from tradition to modernity; the century-long drive to build a modern nation state and to carry out social movements and political reforms. How the individual developed modern notions of love, affection, beauty, and moral relations with community and family. Sources include fiction and film clips. GER:DB-Hum, EC-GlobalCom

4-5 units, Aut (Wang, B)

CHINGEN 134. Early Chinese Mythology

(Same as CHINGEN 234) The definition of a myth. Major myths of China prior to the rise of Buddhism and Daoism including: tales of the early sage kings such as Yu and the flood; depictions of deities in the underworld; historical myths; tales of immortals in relation to local cults; and tales of the patron deities of crafts. GER:DB-Hum

3-5 units, not given this year

CHINGEN 136. The Chinese Family

(Same as CHINGEN 236) History and literature. Institutional, ritual, affective, and symbolic aspects. Perspectives of gender, class, and social change. GER:EC-GlobalCom

3-5 units, Spr (Zhou, Y)

CHINGEN 137. Tiananmen Square: History, Literature, Iconography

(Same as CHINGEN 237) Multidisciplinary. Literary and artistic representations of this site of political and ideological struggles throughout the 20th century. Tiananmen-themed creative, documentary, and scholarly works that shed light on the dynamics and processes of modern Chinese culture and politics. No knowledge of Chinese required. GER:DB-Hum, EC-GlobalCom

3-5 units, not given this year

CHINGEN 138. Love and Politics in Chinese Cinema

(Same as CHINGEN 238) How films work as expressions of desire, impulse, emotional connection, and communal attachment during times of social upheaval and reconstruction. Film theory and aesthetics, and alternative paradigms about world and social relations. Chinese language not required. GER:DB-Hum

4-5 units, not given this year

CHINGEN 139. Cultural Revolution as Literature

(Same as CHINGEN 239) Literary form, aesthetic sensibility, and themes of trauma, identity, and the limits of representation in major literary works concerning the Cultural Revolution in China. Recommended: background in Chinese history or literature.

4 units, not given this year

CHINGEN 140. Chinese Justice: Law, Morality, and Literature

(Same as CHINGEN 240) Explores the relationship between law and morality in Chinese literature, culture, and society. Readings include court case romances, crime plays, detective novels, and legal dramas from traditional era and modern and contemporary periods. Prior coursework in Chinese history, civilization, or literature is recommended. All readings are in English. GER:EC-GlobalCom

3-5 units, Spr (Lee, H)

CHINGEN 141. Emergence of Chinese Civilization from Caves to Palaces

(Same as ARCHLGY 111, CHINGEN 241) Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.

3-4 units, Spr (Staff)

CHINGEN 142. Early Chinese Thought

(Same as CHINGEN 342) The classical age of Chinese philosophy, when the major intellectual traditions that defined Chinese thought were first formulated and elaborated. How each of the traditions developed in response to problems presented by the social background and by other traditions. Texts attributed to Confucius, Mozi, Sunzi, Yangists, Mencius, early histories, Zhuangzi, Laozi, Xunzi, Shang Yang, Han Fei, the Guodian texts, early encyclopedic works.

3-5 units, Win (Lewis, M)

CHINGEN 193E. Female Divinities in China

(Same as CHINGEN 393E) The role of powerful goddesses, such as the Queen Mother of the West, Guanyin, and Chen Jinggu, in Chinese religion. Imperial history to the present day. What roles goddesses played in the spirit world, how this related to the roles of human women, and why a civilization that excluded women from the public sphere granted them such a major, even dominant place, in the religious sphere. Readings in English-language secondary literature. GER:DB-Hum, EC-Gender

3-5 units, not given this year

CHINGEN 198. Senior Colloquium in Chinese Studies

Students research, write, and present a capstone essay or honors thesis.

1 unit, Win (Zhou, Y)

GRADUATE COURSES IN CHINESE GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHINGEN 173. Chinese Language, Culture, and Society

(Same as CHINGEN 73) Topics include the origin of Chinese, development of dialects, emergence of the standard, preferred formulaic expressions, the evolution of writing, and language policies in greater China. Prerequisite: CHINLANG 1 or 1B, or equivalent.

4 units, not given this year

CHINGEN 200. Directed Readings in Asian Languages

For Chinese literature. Prerequisite: consent of instructor. (Staff)

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINGEN 201. Teaching Chinese Humanities

Prepares graduate students to teach humanities at the undergraduate level. Topics include syllabus development and course design,

techniques for generating discussion, effective grading practices, and issues particular to the subject matter.

1 unit, Win (Staff)

CHINGEN 217. Worship of Buddhist Images in Medieval China

(Same as CHINGEN 117) Explores Buddhist image-making practices from Han to Tang China from a trans-Asian perspective. Topics include characteristics of earliest Chinese images (vis-a-vis those of Indian subcontinent), their growth as a dominant artistic genre, inroads of foreign images and Chinese interactions, constructions of Buddhist ritual spaces such as monumental pagodas and cave temples, cross-cultural contexts of image worship.

3-5 units, Spr (Staff)

CHINGEN 219. Popular Culture and Casino Capitalism in China

(Same as CHINGEN 119) Examination of different forms of Chinese popular culture used to gauge or control fate and uncertainty, from geomancy and qigong to ghost culture and mahjong. Ways in which Chinese are incorporating these cultural forms into the informal economy to get rich quick: rotating credit associations, stock market speculation, pyramid schemes, underground lotteries, counterfeiting. Impact of casino capitalism on Chinese culture and social life today.

3-4 units, not given this year

CHINGEN 220. Soldiers and Bandits in Chinese Culture

(Same as CHINGEN 120) Social roles and literary images of two groups on the margins of traditional Chinese society; historical and comparative perspectives.

3-5 units, not given this year

CHINGEN 221. Classical Chinese Rituals

(Same as CHINGEN 121) Meanings of rituals regarding death, wedding, war, and other activities; historical transformations of classical rituals throughout the premodern period; legacy of the Chinese ritual tradition. Sources include canonical texts.

3-5 units, not given this year

CHINGEN 231. Chinese Poetry in Translation

(Same as CHINGEN 131) From the first millennium B.C. through the 12th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. History, language, and culture. Chinese language not required.

4 units, Win (Sargent, S)

CHINGEN 232. Chinese Fiction and Drama in Translation

(Same as CHINGEN 132) From early times to the 18th century, emphasizing literary and thematic discussions of major works in English translation.

4 units, not given this year

CHINGEN 233. Literature in 20th-Century China

(Same as CHINGEN 133) (Graduate students register for 233.) How modern Chinese culture evolved from tradition to modernity; the century-long drive to build a modern nation state and to carry out social movements and political reforms. How the individual developed modern notions of love, affection, beauty, and moral relations with community and family. Sources include fiction and film clips. WIM course.

4-5 units, Aut (Wang, B)

CHINGEN 234. Early Chinese Mythology

(Same as CHINGEN 134) The definition of a myth. Major myths of China prior to the rise of Buddhism and Daoism including: tales of the early sage kings such as Yu and the flood; depictions of deities in the underworld; historical myths; tales of immortals in relation to local cults; and tales of the patron deities of crafts.

3-5 units, not given this year

CHINGEN 236. The Chinese Family

(Same as CHINGEN 136) History and literature. Institutional, ritual, affective, and symbolic aspects. Perspectives of gender, class, and social change.

3-5 units, Spr (Zhou, Y)

CHINGEN 237. Tiananmen Square: History, Literature, Iconography

(Same as CHINGEN 137) Multidisciplinary. Literary and artistic representations of this site of political and ideological struggles throughout the 20th century. Tiananmen-themed creative, documentary, and scholarly works that shed light on the dynamics and processes of modern Chinese culture and politics. No knowledge of Chinese required.

3-5 units, not given this year

CHINGEN 238. Love and Politics in Chinese Cinema

(Same as CHINGEN 138) How films work as expressions of desire, impulse, emotional connection, and communal attachment during times of social upheaval and reconstruction. Film theory and aesthetics, and alternative paradigms about world and social relations. Chinese language not required.

4-5 units, not given this year

CHINGEN 239. Cultural Revolution as Literature

(Same as CHINGEN 139) Literary form, aesthetic sensibility, and themes of trauma, identity, and the limits of representation in major literary works concerning the Cultural Revolution in China. Recommended: background in Chinese history or literature.

4 units, not given this year

CHINGEN 240. Chinese Justice: Law, Morality, and Literature

(Same as CHINGEN 140) Explores the relationship between law and morality in Chinese literature, culture, and society. Readings include court case romances, crime plays, detective novels, and legal dramas from traditional era and modern and contemporary periods. Prior coursework in Chinese history, civilization, or literature is recommended. All readings are in English.

3-5 units, Spr (Lee, H)

CHINGEN 241. Emergence of Chinese Civilization from Caves to Palaces

(Same as ARCHLGY 111, CHINGEN 141) Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.

3-4 units, Spr (Staff)

CHINGEN 342. Early Chinese Thought

(Same as CHINGEN 142) The classical age of Chinese philosophy, when the major intellectual traditions that defined Chinese thought were first formulated and elaborated. How each of the traditions developed in response to problems presented by the social background and by other traditions. Texts attributed to Confucius, Mozi, Sunzi, Yangists, Mencius, early histories, Zhuangzi, Laozi, Xunzi, Shang Yang, Han Fei, the Guodian texts, early encyclopedic works.

3-5 units, Win (Lewis, M)

CHINGEN 393E. Female Divinities in China

(Same as CHINGEN 193E) The role of powerful goddesses, such as the Queen Mother of the West, Guanyin, and Chen Jinggu, in Chinese religion. Imperial history to the present day. What roles goddesses played in the spirit world, how this related to the roles of human women, and why a civilization that excluded women from the public sphere granted them such a major, even dominant place, in the religious sphere. Readings in English-language secondary literature.

3-5 units, not given this year

CHINESE LANGUAGE (CHINLANG) COURSES

UNDERGRADUATE COURSES IN CHINESE LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHINLANG 1. First-Year Modern Chinese, First Quarter

Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.

5 units, Aut (Zeng, H)

CHINLANG 1B. First-Year Modern Chinese for Bilingual Students, First Quarter
For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition.
3 units, Aut (Rozelle, Y)

CHINLANG 2. First-Year Modern Chinese, Second Quarter
Continuation of 1. Daily sections may be set at the beginning of the quarter to suit schedule requirements.
5 units, Win (Zeng, H)

CHINLANG 2B. First-Year Modern Chinese for Bilingual Students, Second Quarter
Continuation of 1B.
3 units, Win (Rozelle, Y)

CHINLANG 3. First-Year Modern Chinese, Third Quarter
Continuation of 2. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Fulfills the University language requirement.
5 units, Spr (Zeng, H)

CHINLANG 3B. First-Year Modern Chinese for Bilingual Students, Third Quarter
Continuation of 2B.
3 units, Spr (Rozelle, Y)

CHINLANG 5. Intensive First-Year Modern Chinese
Equivalent to 1,2,3 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University.
8 units, Sum (Staff)

CHINLANG 6. Beginning Conversational Chinese, First Quarter
Three quarter sequence. Basic language skills in Mandarin to function abroad.
2 units, Aut (Rozelle, Y)

CHINLANG 7. Beginning Conversational Chinese, Second Quarter
Continuation of 6.
2 units, Win (Rozelle, Y)

CHINLANG 8. Beginning Conversational Chinese, Third Quarter
Continuation of 7.
2 units, Spr (Rozelle, Y)

CHINLANG 15. Beginning Conversational Cantonese, First Quarter
Three quarter sequence. Basic language skills for everyday life situations and for functioning abroad. 15: Aut, 16: Win, 17: Spr. Internet tools will be incorporated in this course.
2 units, Aut (Dennig, S)

CHINLANG 15M. Beginning Conversational Cantonese for Mandarin Speakers, First Quarter
Conversational skills and special written characters in Cantonese. Internet tools will be incorporated in this course.
2 units, Aut (Dennig, S)

CHINLANG 16. Beginning Cantonese Conversation, Second Quarter
Continuation of 15.
2 units, Win (Dennig, S)

CHINLANG 16M. Beginning Conversational Cantonese for Mandarin Speakers, Second Quarter
Continuation of 15M.
2 units, Win (Dennig, S)

CHINLANG 17. Beginning Conversational Cantonese, Third Quarter
Continuation of 16.
2 units, Spr (Dennig, S)

CHINLANG 17M. Beginning Conversational Cantonese for Mandarin Speakers, Third Quarter
Continuation of 16M.
2 units, Spr (Dennig, S)

CHINLANG 18. Intermediate Cantonese Conversation, First Quarter
Continuation of CHINLANG 17. Further develop students' conversational skills and expand their vocabulary and grammar for talking about a wide range of topics relevant to college students. Internet tools will be incorporated in this course.
2 units, Aut (Dennig, S)

CHINLANG 19. Intermediate Conversational Cantonese, Second Quarter
Continuation of 18 or 18M.
2 units, Win (Dennig, S)

CHINLANG 20. Intermediate Conversational Cantonese, Third Quarter
Continuation of 19 or 19M.
2 units, Spr (Dennig, S)

CHINLANG 20A. Advanced Conversational Cantonese, First Quarter
Viewing and discussion of authentic multimedia materials on cultural topics and current events: movies, video clips, radio, TV broadcasts, and Internet tools. Prerequisite 20 or consent of instructor.
2 units, Aut (Dennig, S)

CHINLANG 20B. Advanced Conversational Cantonese, Second Quartet
Prerequisite 20A or consent of instructor.
2 units, Win (Dennig, S)

CHINLANG 20C. Advanced Cantonese Conversation - Third Quarter
Continuation of 20B. Improving Cantonese through Hong Kong movies. Prerequisite 20B or consent of instructor.
2 units, Spr (Dennig, S)

CHINLANG 21. Second-Year Modern Chinese, First Quarter
Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: 3 or equivalent. 21: Aut, 22: Win, 23: Spr
5 units, Aut (Chung, M)

CHINLANG 21B. Second-Year Modern Chinese for Bilingual Students, First Quarter
For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Equivalent to 21,22,23. 21B: Aut, 22B: Win, 23B: Spr
3 units, Aut (Zhu, Q)

CHINLANG 22. Second-Year Modern Chinese, Second Quarter
Prerequisite: 21 or equivalent.
5 units, Win (Chung, M)

CHINLANG 22B. Second-Year Chinese for Bilingual Students, Second Quarter
Continuation of 21B. Prerequisite 21B.
3 units, Win (Zhu, Q)

CHINLANG 23. Second-Year Modern Chinese, Third Quarter
Prerequisite: 22 or equivalent.
5 units, Spr (Chung, M)

CHINLANG 23B. Second-Year Chinese for Bilingual Students, Third Quarter
Continuation of 22B. Prerequisite 22B.
3 units, Spr (Zhu, Q)

CHINLANG 24A. Second-Year Comprehensive Cantonese, First Quarter
5 units, not given this year

CHINLANG 24B. Second-Year Comprehensive Cantonese, Second Quarter
Continuation of 24A.
5 units, not given this year

CHINLANG 24C. Second-Year Comprehensive Cantonese, Third Quarter
Continuation of 24B.
5 units, not given this year

CHINLANG 25. Intensive Second-Year Modern Chinese
Equivalent to 21,22,23 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 3 or equivalent.
8 units, Sum (Chung, M)

CHINLANG 27. Intermediate Chinese Conversation, First Quarter
Prerequisite: 3 or consent of instructor.
2 units, Aut (Zhang, Y)

CHINLANG 28. Intermediate Chinese Conversation, Second Quarter
Continuation of 27. Prerequisite: 27 or consent of instructor.
2 units, Win (Zhang, Y)

CHINLANG 29. Intermediate Chinese Conversation, Third Quarter
Continuation of 28. Prerequisite: 28 or consent of instructor.
2 units, Spr (Zhang, Y)

CHINLANG 31E. Accelerated Beginning Mandarin for Engineering Students, First Quarter
Restricted to engineering students participating in the China Internship Program. Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: 23 or equivalent. Grad students enroll in 331E.
2-5 units, Spr (Staff)

CHINLANG 99. Language Specials
Prerequisite: consent of instructor. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHINLANG 101. Third-Year Modern Chinese, First Quarter
Written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and email network to facilitate study. Prerequisite: 23 or equivalent. 101: Aut, 102: Win, 103: Spr
5 units, Aut (Wang, H)

CHINLANG 101B. Third-Year Modern Chinese for Bilingual Students, First Quarter
For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Equivalent to 101.
3 units, Aut (Wang, H)

CHINLANG 102. Third-Year Modern Chinese, Second Quarter
Continuation of 101. Prerequisite: 101 or equivalent.
5 units, Win (Wang, H)

CHINLANG 102B. Third-Year Modern Chinese for Bilingual Students, Second Quarter
Continuation of 101B. Equivalent of 102.
3 units, Win (Wang, H)

CHINLANG 103. Third-Year Modern Chinese, Third Quarter
Continuation of 102. Prerequisite: 102.
5 units, Spr (Wang, H)

CHINLANG 103B. Third-Year Modern Chinese for Bilingual Students, Third Quarter
Continuation of 102B. Equivalent of 103.
3 units, Spr (Wang, H)

CHINLANG 105. Intensive Third-Year Modern Chinese
Equivalent to 101,102,103 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent.
8 units, Sum (Wang, H)

CHINLANG 121. Advanced Chinese Conversation, First Quarter
Prerequisite: 23 or equivalent.
2 units, Aut (Chung, M)

CHINLANG 122. Advanced Chinese Conversation, Second Quarter
Prerequisite: 122 or equivalent.
2 units, Win (Chung, M)

CHINLANG 123. Advanced Chinese Conversation, Third Quarter
Continuation of 122. Prerequisite: 122 or equivalent.
2 units, Spr (Chung, M)

CHINLANG 131. Business Chinese, First Quarter
Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: 23 or equivalent.
3-4 units, Aut (Wang, H)

CHINLANG 132. Business Chinese, Second Quarter
Continuation of 131. Prerequisite: 131 or equivalent.
3-4 units, Win (Wang, H)

CHINLANG 133. Business Chinese, Third Quarter
Continuation of 132. Prerequisite: 132 or equivalent.
3-4 units, Spr (Wang, H)

CHINLANG 200. Directed Reading
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHINLANG 211. Fourth-Year Modern Chinese, First Quarter
Year-long sequence. Goal is to become functional speakers, readers, and writers of modern Chinese through articles and essays from newspapers, magazines, scholarly journals, and the Internet. Cultural and social science themes: students may take both themes for 5 units or one theme for reduced units. Prerequisite211: Aut, 212: Win, 213: Spr
2-5 units, Aut (Zhu, Q)

CHINLANG 211B. Fourth year Modern Chinese for Bilingual Students, First Quarter
Emphasis is on listening, speaking, reading, and writing. The main textbook for the class is Boya Hanyu: Feixiang pian, comprised of well-crafted essays rich in vocabulary. In-depth discussions; goal is to help students develop a natural feel for word choice, sentence structure, and paragraph organization.
3 units, Aut (Zhu, Q)

CHINLANG 212. Fourth-Year Modern Chinese, Second Quarter
Continuation of 211. Prerequisite: 211.
2-5 units, Win (Zhu, Q)

CHINLANG 212B. Fourth-Year Modern Chinese for Bilingual Students, Second Quarter
Emphasis is on listening, speaking, reading, and writing. The main textbook for the class is Boya Hanyu: Feixiang pian, comprised of well-crafted essays rich in vocabulary. In-depth discussions; goal is to help students develop a natural feel for word choice, sentence structure, and paragraph organization.
3 units, Win (Staff)

CHINLANG 213. Fourth-Year Modern Chinese, Third Quarter
Continuation of 212. Prerequisite: 212.
2-5 units, Spr (Zhu, Q)

CHINLANG 213B. Fourth-Year Modern Chinese for Bilingual Students. Third Quarter
Emphasis is on listening, speaking, reading, and writing. The main textbook for the class is Boya Hanyu: Feixiang pian, comprised of well-crafted essays rich in vocabulary. In-depth discussions; goal is to help students develop a natural feel for word choice, sentence structure, and paragraph organization.
3 units, Spr (Staff)

CHINLANG 221. Fourth-Year Modern Chinese for Social Science Students, First Quarter
Goal is to become functional speakers, readers, and writers of modern Chinese through articles, essays, newspapers, magazines, and scholarly journals in social sciences. Prerequisite: three years of Chinese. 221.
3 units, not given this year

CHINLANG 222. Fourth-Year Modern Chinese for Social Science Students, Second Quarter
Continuation of 221. Prerequisite: 221.
3 units, not given this year

CHINLANG 223. Fourth-Year Modern Chinese for Social Science Students, Third Quarter
Continuation of 222. Prerequisite: 222.
3 units, not given this year

CHINLANG 231. Fifth-Year Modern Chinese: Cultural China, First Quarter
Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions.
2-5 units, Aut (Staff)

CHINLANG 232. Fifth-Year Modern Chinese: Cultural China, Second Quarter
Continuation of 231.
2-5 units, Win (Staff)

CHINLANG 233. Fifth-Year Modern Chinese: Cultural China, Third Quarter
Continuation of 232.
2-5 units, Spr (Zhu, Q)

GRADUATE COURSES IN CHINESE LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHINLANG 31G. Accelerated Beginning Mandarin I
For GSB students only.
4 units, Win (DiBello, M)

CHINLANG 32G. Accelerated Beginning Mandarin II
For GSB students only.
4 units, Spr (DiBello, M)

CHINLANG 33G. Accelerated Beginning Mandarin III
For GSB students only.
4 units, Aut (DiBello, M)

CHINLANG 199. individual Reading
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHINLANG 205S. Intensive Third-Year Modern Chinese
Equivalent to 101, 102, 103 if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent. Grads only.
8 units, Sum (Staff)

CHINLANG 331E. Beginning Madarin for Engineering Students, First Quarter
Restricted to graduate engineering students participating in the China Internship Program. Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: 23 or equivalent.Prerequisite: consent of instructor.
2-5 units, Spr (Staff)

CHINLANG 394. Graduate Studies in Chinese Conversation
Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

CHINLANG 395. Graduate Studies in Chinese
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINESE LITERATURE (CHINLIT) COURSES

UNDERGRADUATE COURSES IN CHINESE LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CHINLIT 125. Beginning Classical Chinese, First Quarter
(Same as CHINLIT 205) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Prerequisite: CHINLANG 23 or equivalent.
2-5 units, Aut (Sun, C)

CHINLIT 126. Beginning Classical Chinese, Second Quarter
(Same as CHINLIT 206) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 125/205 or equivalent.
2-5 units, Win (Sun, C)

CHINLIT 127. Beginning Classical Chinese, Third Quarter
(Same as CHINLIT 207) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 126/206 or equivalent.
2-5 units, Spr (Zhou, Y)

CHINLIT 161. Passion in Late Imperial Literature
(Same as CHINLIT 261A) The treatment of romantic passion and related emotions in late imperial fiction and theater. Focus is on secondary literature. GER:DB-Hum
4 units, Win (Lewis, M)

CHINLIT 174. Modern Chinese Novel: Theory, Aesthetics, History
(Same as CHINLIT 274, COMPLIT 254) From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese.
4 units, Aut (Wang, B)

CHINLIT 189A. Honors Research
2-5 units, Aut (Staff), Spr (Staff)

CHINLIT 189B. Honors Research
Open to senior honors students to write thesis.
5 units, Win (Staff)

CHINLIT 190. Chinese Cultural Revolution: Performance, Politics, and Aesthetics
(Same as CHINLIT 290, COMPLIT 135) Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required.
4 units, Win (Wang, B)

CHINLIT 191. The Structure of Modern Chinese
(Same as CHINLIT 291) Focus is on on syntax and semantics. Prerequisite: CHINLANG 3 or equivalent, or consent of instructor. GER:DB-SocSci
2-4 units, Aut (Sun, C)

CHINLIT 199. Individual Reading in Chinese
Asian Language majors only. Prerequisite: CHINLANG 103 or consent of instructor. Units by arrangement.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CHINESE LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHINLIT 200. Directed Reading in Chinese
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINLIT 201. Proseminar: Bibliographic and Research Methods in Chinese Studies
Bibliographic and research methods in Chinese studies. Prerequisite: 127/207 or equivalent.
3-5 units, not given this year

CHINLIT 205. Beginning Classical Chinese, First Quarter
(Same as CHINLIT 125) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Prerequisite: CHINLANG 23 or equivalent.
2-5 units, Aut (Sun, C)

CHINLIT 206. Beginning Classical Chinese, Second Quarter
(Same as CHINLIT 126) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 125/205 or equivalent.
2-5 units, Win (Sun, C)

CHINLIT 207. Beginning Classical Chinese, Third Quarter
(Same as CHINLIT 127) Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 126/206 or equivalent.
2-5 units, Spr (Zhou, Y)

CHINLIT 218. Constructing National History in East Asian Archaeology
(Same as ARCHLGY 302) Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.
2-4 units, Spr (Staff)

CHINLIT 221. Advanced Classical Chinese: Philosophical Texts
Prerequisite: 207 or equivalent.
3-5 units, not given this year

CHINLIT 222. Advanced Classical Chinese: Historical Narration
Prerequisite: 127/207 or equivalent.
2-5 units, not given this year

CHINLIT 223. Advanced Classical Chinese: Literary Essays
Readings and grammatical analyses of literary essays thoughout imperial China. Prerequisite: CHINLIT 127/207 or equivalent.
2-5 units, Win (Wang, J)

CHINLIT 232. Chinese Biographies of Women
Generic and historical analysis of the two-millennia long biographical tradition inaugurated by Liu Xiang, ca. 79-8 B.C.E. Chinese women's history, intellectual history, historiography, and literary studies. Prerequisite: 127/207 or consent of instructor.
4 units, not given this year

CHINLIT 261. Sources of Chinese Poetry
The Book of Songs(ca. 1000-500 B.C.E.) and Songs of Chu (ca. 400 B.C.E.), the earliest anthologies of Chinese poetry.
4 units, not given this year

CHINLIT 261A. Passion in Late Imperial Literature
(Same as CHINLIT 161) The treatment of romantic passion and related emotions in late imperial fiction and theater. Focus is on secondary literature.
4 units, Win (Lewis, M)

CHINLIT 263. Lyric (Shih) I
Han through Sui dynasties.
2-4 units, not given this year

CHINLIT 265. Major Figures in Classical Chinese Shi Poetry
Focus is on a major poet and relationships to previous and later poetry. Poetic form, including meter and rhyme schemes. Historical context. This year's poet is Tao Yuanming. May be repeated for credit. Prerequisites: 201, 207.
2-4 units, Spr (Sargent, S)

CHINLIT 266. Chinese Tz'u Poetry (Song Lyrics)
Highlights from the Northern and Southern Sung periods. Patterns of generic development correlated to social changes in historical context. Prerequisite: classical Chinese.
4 units, not given this year

CHINLIT 271. Traditional Chinese Fiction: Short Stories
Early times to Qing. Prerequisite: 127/207 or consent of instructor.
2-4 units, not given this year

CHINLIT 272. Traditional Chinese Fiction: Novels
Major novels of late imperial China. Prerequisite: 127/207 or consent of instructor.
2-4 units, not given this year

CHINLIT 273. Chinese Drama
Yuan, Ming, and Qing periods emphasizing literary not theatrical qualities. Prerequisite: 127/207 or consent of instructor.
2-4 units, Aut (Wang, J)

CHINLIT 274. Modern Chinese Novel: Theory, Aesthetics, History
(Same as CHINLIT 174, COMPLIT 254) From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese.
4 units, Aut (Wang, B)

CHINLIT 279. For Love of Country: National Narratives in Chinese Literature and Film
Explores the nation as it is constructed, deconstructed, and continuously contested in novels, short stories, films, and other media from the second half of the 20th century in mainland China and Taiwan. Asks how the trope of the nation and the ideology of nationalism mediate the relationships between politics and aesthetics. Explores the nation's internal fault lines of gender, ethnicity, geography, language, and citizenship.
3-5 units, Aut (Lee, H)

CHINLIT 289. The Poetics and Politics of Affect in Modern China
The role of affect in modern Chinese aesthetics and politics. Cultural and social theories of affect (love, hate, fear, grief, ressentiment, rage, sympathy, sincerity, shame, and nostalgia); affective discourses across agenres and media including fiction, poetry, film, journalism, and television; and mass social movements such as protest, uprising, and revolution. Advanced undergraduates requires consent of instructor. Recommended: reading knowledge of Chinese.
3-5 units, not given this year

CHINLIT 290. Chinese Cultural Revolution: Performance, Politics, and Aesthetics
(Same as CHINLIT 190, COMPLIT 135) Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required.
4 units, Win (Wang, B)

CHINLIT 291. The Structure of Modern Chinese
(Same as CHINLIT 191) Focus is on on syntax and semantics. Prerequisite: CHINLANG 3 or equivalent, or consent of instructor.
2-4 units, Aut (Sun, C)

CHINLIT 299. Master's Thesis or Translation
A total of 5 units taken in one or more quarters.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINLIT 369. Late Imperial Chinese Fiction
Primary works examined include Jin Ping Mei, Xingshi yinyuan zhuan, Hongloumeng, Qilu deng, Rulin waishi, and Ernu yingxiong zhuan. Secondary readings focus on social dimensions of the Chinese novel (ca. 1600-1850), but students may explore other aspects of the texts in their presentations and research papers. Comparisons with the English novel, particularly on the rise of the novel and the advent of modernity.
2-5 units, Win (Zhou, Y)

CHINLIT 371. Seminar in Chinese Literary Criticism
(Same as COMPLIT 371) How aesthetics and politics intertwine and break apart in Western and Eastern traditions. Aesthetics for understanding culture, morality, and power in crosscultural contexts. Readings include Hegel, Kant, Marcuse, Lukacs, and Adorno; and Chinese thinkers Wang Guowei, Lu Xun, Li Zehou, and Mao. Prerequisite: CHINLIT 127/207 or consent of instructor.
2-5 units, not given this year

CHINLIT 399. Dissertation Research
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINLIT 400. Advanced Language Training
For students in the Inter-University Program for Chinese Language Studies in Beijing or Taipei. For more information, contact the consortium office at UC Berkeley: (510) 642-3873, or see http://ieas.berkeley.edu/iup/contact_iup.html.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE) COURSES

UNDERGRADUATE COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CEE 31Q. Accessing Architecture Through Drawing
(Stanford Introductory Seminar) Preference to sophomores. Drawing architecture provides a deeper understanding of the intricacies and subtleties that characterize contemporary buildings. How to dissect buildings and appreciate the formal elements of a building, including scale, shape, proportion, colors and materials, and the problem solving reflected in the design. Students construct conventional architectural drawings, such as plans, elevations, and perspectives. Limited enrollment. GER:DB-EngrAppSci
4 units, Aut (Barton, J), Win (Barton, J)

CEE 32Q. Place: Making Space Now
(Stanford Introductory Seminar) This seminar argues that architects are ultimately place-makers and questions what that means in the contemporary world. The idea of contemporary place-making includes a critique of the history of modern place-making through an examination of modern form, a discussion of non-places and the role of cyber technologies in making space and place, as well as the nature of in-between spaces.
3 units, Spr (Barton, J; Beischer, T)

CEE 63. Weather and Storms
(Same as CEE 263C) Daily and severe weather and global climate. Topics: structure and composition of the atmosphere, fog and cloud formation, rainfall, local winds, wind energy, global circulation, jet streams, high and low pressure systems, inversions, el Niño, la Niña, atmosphere/ocean interactions, fronts, cyclones, thunderstorms, lightning, tornadoes, hurricanes, pollutant transport, global climate and atmospheric optics. GER:DB-NatSci
3 units, Aut (Jacobson, M)

CEE 64. Air Pollution: From Urban Smog to Global Change
(Same as CEE 263D) Survey of urban- through global-scale air pollution. Topics: the evolution of the Earth's atmosphere, indoor air pollution, urban smog formation, history of discovery of atmosphere chemicals, visibility, acid rain, the greenhouse effect, historical climate, global warming, stratospheric ozone reduction, Antarctic ozone destruction, air pollution transport across political boundaries, the effects of air pollution on ultraviolet radiation, and impacts of energy systems on the atmosphere. GER:DB-NatSci
3 units, Win (Jacobson, M)

CEE 70. Environmental Science and Technology
Introduction to environmental quality and the technical background necessary for understanding environmental issues, controlling environmental degradation, and preserving air and water quality. Material balance concepts for tracking substances in the environmental and engineering systems. GER:DB-EngrAppSci
3 units, Aut (Kopperud, R)

CEE 70N. Water, Public Health, and Engineering
(Stanford Introductory Seminar) Preference to sophomores. Linkages between water, wastewater and public health, with an emphasis on engineering interventions. Topics include the history of water and wastewater infrastructure development in the U.S. and Europe; evolution of epidemiological approaches for water-related health challenges; biological and chemical contaminants in water and wastewater and their management; and current trends and challenges in access to water and sanitation around the world. How to identify ways in which freshwater contributes to human health; exposure routes for water- and sanitation-illness; how to classify these illnesses by pathogen type and their geographic distribution; how to identify the health and economic consequences of water- and sanitation-related illnesses; costs and benefits of curative and preventative interventions; and how to interpret data related to epidemiological concepts. No previous experience in engineering is required. GER:DB-EngrAppSci
3 units, Spr (Davis, J)

CEE 80N. The Art of Structural Engineering
(Stanford Introductory Seminar) Preference to freshmen. The history of modern bridges, buildings, and other large-scale structures. Students learn about modern structures, the social context in which they are built and their symbolic value. Principles of structural engineering and calculating efficiency and safety taught through case studies. Field trip to Bay Area landmark and hands-on exercises including building and testing a model bridge. Students from all backgrounds welcome. GER:DB-EngrAppSci
4 units, Aut (Billington, S)

CEE 100. Managing Sustainable Building Projects
Managing the life cycle of buildings from the owner, designer, and contractor perspectives emphasizing sustainability goals; methods to define, communicate, coordinate, and manage multidisciplinary project objectives including scope, quality, life cycle cost and value, schedule, safety, energy, and social concerns; roles, responsibilities, and risks for project participants; virtual design and construction methods for product, organization, and process modeling; lifecycle assessment methods; individual writing assignment related to a real world project. GER:DB-EngrAppSci
4 units, Spr (Fischer, M)

CEE 101A. Mechanics of Materials
Introduction to beam and column theory. Normal stress and strain in beams under various loading conditions; shear stress and shear flow; deflections of determinate and indeterminate beams; analysis of column buckling; structural loads in design; strength and serviceability criteria. Lab experiments. Prerequisites: ENGR 14. GER:DB-EngrAppSci
4 units, Win (Baker, J)

CEE 101B. Mechanics of Fluids
Physical properties of fluids and their effect on flow behavior; equations of motion for incompressible ideal flow, including the special case of hydrostatics; continuity, energy, and momentum principles; control volume analysis; laminar and turbulent flows; internal and external flows in specific engineering applications including pipes, open channels, estuaries, and wind turbines. Prerequisites: PHYSICS 41 (formerly 53), MATH 51. GER:DB-EngrAppSci
4 units, Spr (Koseff, J)

CEE 101C. Geotechnical Engineering
Introduction to the principles of soil mechanics. Soil classification, shear strength and stress-strain behavior of soils, consolidation theory, analysis and design of earth retaining structures, introduction to shallow and deep foundation design, slope stability. Lab projects. Prerequisite: ENGR 14. Recommended: 101A. GER:DB-EngrAppSci
3-4 units, Aut (Borja, R)

CEE 101D. Computations in Civil and Environmental Engineering
(Same as CEE 201D) Computational and visualization methods in the design and analysis of civil and environmental engineering systems. Focus is on applications of MATLAB. How to develop a more lucid and better organized programming style.
3 units, Aut (Kitanidis, P)

CEE 102. Legal Aspects of Engineering and Construction
Introduction to the U.S. legal system as it applies to civil engineering and construction. Fundamental concepts of contract and tort law, claims, risk management, business formation and licensing, agency, insurance and bonding, and real property. (London)
3 units, Win (London, M)

CEE 109. Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision
(Same as EARTHSYS 109) Examination of program-based local actions that promote resource resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units.
2 units, Win (Koseff, J; Ahmed, F)

CEE 110. Building Information Modeling
(Same as CEE 210) (Graduate students register for 210.) Creation, management, and application of building information models. Process and tools available for creating 2D and 3D computer representations of building components and geometries. Organizing and operating on models to produce architectural views and construction documents, renderings and animations, and interface with analysis tools. Lab exercises, class projects. Limited enrollment.
4 units, Aut (Katz, G)

CEE 111. Multidisciplinary Modeling and Analysis
(Same as CEE 211) (Graduate students register for 211.) Computer modeling, visualization, analysis, and graphical communication of building projects. Use of 3D models in laser scanning, rendering, animation, daylight, energy, cost, structural, lighting analysis, and computer controlled fabrication. Underlying 3D computer representations, and analysis tools and their applications. Guest lectures, lab exercises, class project. Prerequisite: 110 or CAD experience. GER:DB-EngrAppSci
4 units, Win (Kunz, J)

CEE 115. Goals and Methods of Sustainable Building Projects
(Same as CEE 215) (Graduate students register for 215.) Goals related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and economic and social sustainability. Methods to integrate these goals and enhance the economic, ecological, and equitable value of building projects. Industry and academic rating systems, project case studies, guest lecturers, and group project.
3 units, Spr (Staff)

CEE 122A. Computer Integrated Architecture/Engineering/Construction (A/E/C)
Undergraduates serve as apprentices to graduate students in the AEC global project teams in CEE 222A. Apprentices participate in all activities of the AEC team, including the goals, objectives, constraints, tasks, and process of a crossdisciplinary global AEC teamwork in the concept development phase of a comprehensive building project. Prerequisite: consent of instructor.
2 units, Win (Fruchter, R)

CEE 122B. Computer Integrated A/E/C
Undergraduates serve as apprentices to graduate students in the AEC global project teams in CEE 222B. Project activity focuses on modeling, simulation, life-cycle cost, and cost benefit analysis in the project development phase. Prerequisite: CEE 122A.
2 units, Spr (Fruchter, R)

CEE 124. Sustainable Development Studio
(Graduate students register for 224A.) Project-based. Sustainable design, development, use and evolution of buildings; connections of building systems to broader resource systems. Areas include architecture, structure, materials, energy, water, air, landscape, and food. Projects use a cradle-to-cradle approach focusing on technical and biological nutrient cycles and information and knowledge generation and organization. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CEE 129. Engineering and Policy responses to Climate Change Impacts on Seaports
(Same as CEE 229) Interdisciplinary. Exploration of impacts of climate change on major coastal seaports around the world. Assessment of the minimum necessary response to protect ports from a significant sea-levels rise in terms of costs, material, labor, and time. Consideration of economic and policy implications. Class projects, case studies, guest speakers. May be credited for credit.
2-4 units, Aut (Fischer, M; Becker, A; Schwegler, B), Win (Fischer, M; Schwegler, B; Becker, A), Spr (Fischer, M; Becker, A; Schwegler, B), Sum (Staff)

CEE 130. Architectural Design: 3-D Modeling, Methodology, and Process
Preference to Architectural Design majors; others by consent of instructor. Projects investigate conceptual approaches to the design of key architectural elements, such as wall and roof. Functional and structural considerations. Focus is on constructing 3-D models in a range of materials; 3-D computer modeling. Students keep a graphic account of the evolution of their design process. Final project entails design of a simple structure. Limited enrollment. Pre- or corequisite: CEE 31 or 31Q.
4 units, Win (Walters, P)

CEE 131. Architectural Design Process
Preference to Architectural Design and CEE majors; others by consent of instructor. Issues in the architectural profession including programming, site analysis, design process, and professional practice concerns. Building/landscape design case study project using architectural graphics and models. Limited enrollment.
4 units, not given this year

CEE 131A. Introduction to the Design Professions
Seminar. Paths to careers that contribute to the design and construction of the built environment, including architecture, landscape architrecture, project management, construction management, civil engineering, urban planning, and sustainability coordination. Guest lecturers present their work, background, roles and relationships to the other disciplines. Field trips, written and oral presentations, and four Wednesday evening lectures of the Spring Architecture and Landscape Architecture series.
2 units, Spr (Blake, C)

CEE 132. Interplay of Architecture and Engineering
(Same as CEE 232) The range of requirements that drive a building's design including architecture, engineering, constructability, building codes, and budget. Case studies illustrate how structural and mechanical systems are integrated into building types including residential, office, commercial, and retail. In-class studio work.
4 units, not given this year

CEE 133F. Principles of Freehand Drawing
By studying traditional drawing techniques, students learn the principles of academic drawing using charcoal as the primary medium. Value, proportion, modeling, edge, and composition introduced in lectures, demonstrations, and drawing assignments. Emphasis is on still life and photographic references, allowing students to refine their rendering skills and develop their freehand drawing portfolio.
1 unit, not given next year

CEE 134A. Site and Space
Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring the Stanford Green Dorm project. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Enrollment limited to 14. Prerequisites: 31 or 31Q, and 110 and 130.
4 units, not given this year

CEE 134B. Architectural Studio: Special Topic
Preference to Architectural Design majors; others by consent of Instructor. Multi-view drawing and quick sketching. Drawings such as section cuts to enable development of designs. Functional, structural, site, and sustainable considerations. Final project entails design of a simple structure. Limited enrollment.
4 units, Spr (Barton, J)

CEE 135A. Parametrics: Applications in Architecture and Product Design
(Same as CEE 235A) Precedents in architecture and product design; methods for modeling, prototyping, and fabrication. How to combine design intentions and digital logics with physical and material constraints. Students develop a case study and small design projects using a parametric approach at the scales of architecture and product.
4 units, not given this year

CEE 136. Green Architecture
(Same as CEE 236) Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring green design and green design processes. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Enrollment limited to 14. Prerequisites: 31 or 31Q, and 110 and 130. GER:DB-EngrAppSci
4 units, Aut (Sperry, R)

CEE 137A. Form and Structure
Preference to Architectural Design and CEE majors; others by consent of instructor. Intermediate architectural studio. The integration of structure, form, site, and program. Emphasis is on developing a schematic design in the context of site topography and structural systems. Limited enrollment. Prerequisites: 31 or 31Q, and 130.
4 units, not given this year

CEE 137B. Intermediate Architecture Studio
Explore the relationship of site and building in the context of a rural Woodside landscape above the Stanford Campus. Issues of topography, microclimate and sustainable building strategies are key spring points of the studio. The class will start with a series of brief architectural case studies and then focus on one main design problem for the Djerassi Art Foundation. Some site visits. Prerequisites: CEE 31 (or 31Q), CEE 110, and CEE 130. Preference to architectural design majors.

5 units, Win (Haesloop, E)

CEE 138A. Contemporary Architecture: Materials, Structures, and Innovations
Structural and material bases for contemporary architecture; its roots in modern innovations. Recent technological developments; new materials and structural expressions. Sources include specific buildings and construction techniques. How to think critically about design strategies, material properties, and structural techniques.

3 units, not given this year

CEE 139. Design Portfolio Methods
Students present designs completed in other studio courses to communicate design intentions and other aspects of their work. Instruction in photography; preparation of a design portfolio; and short essays that characterize portfolio contents. Oral presentation workshops offered through the Center for Teaching and Learning. Limited enrollment. Prerequisites: two Art or Architecture studio courses, or consent of instructor.

2 units, Spr (Larimer, A)

CEE 140. Field Surveying Laboratory
(Same as CEE 225) Graduate students register for 225. Friday afternoon laboratory provides practical surveying experience. Additional morning classes to prepare for the afternoon sessions. Hands-on operation of common traditional field survey tools ; introduction to the newest generation of digital measuring, positioning, and mapping tools. Emphasis is on the concept of using the data collected in the field as the basis for subsequent engineering and economic decisions.

3 units, not given this year

CEE 141A. Infrastructure Project Development
(Same as CEE 241A) Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of the condition of the nation's infrastructure and how projects are planned and financed. Focus is on public works projects in the U.S.. The role of public and private sectors through a step-by-step study of the project development process. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project development.

3 units, Aut (Griggs, G)

CEE 141B. Infrastructure Project Delivery
(Same as CEE 241B) Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities ,and communications sectors. Analysis of how projects are designed, constructed, operated, and maintained. Focus is on public works projects in the U.S. Alternative project delivery approaches and organizational strategies. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project delivery.

3 units, Win (Griggs, G)

CEE 141C. Global Infrastructure Projects Seminar
(Same as CEE 241C) Infrastructure is critical to the economy, global competitiveness, and quality of life. Course analyzes and compares the development and delivery of mega-projects around the world. Alternative project delivery methods, the role of public and private sector, different project management strategies, and lessons learned. Case studies of real infrastructure projects. Industry guest speakers. Field trips to local projects.

1-2 units, Spr (Griggs, G)

CEE 142A. Negotiating Sustainable Development
(Same as CEE 242A, ENVRES 242) How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.

3 units, Win (Christensen, S)

CEE 147. Cases in Personality, Leadership, and Negotiation
(Same as CEE 247) Case studies target personality issues, risk willingness, and life skills essential for real world success. Failures, successes, and risk willingness in individual and group tasks based on the professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Application downloaded from coursework must be submitted before first class; mandatory first class attendance. No auditors.

3 units, Spr (Griggs, G)

CEE 151. Negotiation
(Same as CEE 251) Students learn to prepare for and conduct negotiations in a variety of arenas including getting a job, managing workplace conflict, negotiating transactions, and managing personal relationships. Interactive class. The internationally travelled instructor who has mediated cases in over 75 countries will require students to negotiate real life case studies and discuss their results in class. Application required before first day of class; see Coursework.

3 units, Aut (Christensen, S), Spr (Christensen, S)

CEE 154. Cases in Estimating Costs
(Same as CEE 254) Students participate in bidding contests requiring cost determination in competitive markets. Monetary forces driving the construction industry as general principles applicable to any competitive business. Cases based on field trips and professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Limited enrollment; no auditors. Prerequisites: consent or intructor and application downloaded from CourseWork prior to start of class. GER:DB-EngrAppSci

3 units, not given this year

CEE 155. Introduction to Sensing Technologies

4 units, Win (Staff)

CEE 156. Building Systems
(Same as CEE 256) HVAC, lighting, and envelope systems for commercial and institutional buildings, with a focus on energy efficient design. Knowledge and skills required in the development of low-energy buildings that provide high quality environment for occupants. GER:DB-EngrAppSci

4 units, Spr (Kolderup, E)

CEE 159. Career Skills Seminar
(Same as CEE 259) (Graduate students register for 259.) Factors required for successful careers. Guest speakers. Case studies. Participation in real world corporate interviews, testing, and reviews conducted by industry trainers. Limited enrollment; no auditors. Prerequisite: application downloaded from CourseWork prior to start of class.

2 units, not given this year

CEE 159C. Industry Applications of VDC
(Same as CEE 259C) In the context of design and construction projects in industry, students will develop VDC/BIM models using off-the-shelf authoring tools for project analysis, collaboration, and communication. Students will develop essential skills for industry practice and/or academic research in VDC. Remote web-participation is possible. Class content changes every quarter.

2-4 units, Win (Kam, C; Fischer, M)

CEE 159D. Advanced Industry Applications of VDC
(Same as CEE 259D) In the context of design and construction projects in industry, students will develop advanced VDC/BIM models using off-the-shelf and newly created tools for project analysis, collaboration, and communication. Students will develop advanced skills for industry practice and/or cutting edge academic research in VDC. Remote web-participation is possible. Class content changes every quarter. Pre-requisites: CEE 159C/259C

2-4 units, Spr (Kam, C; Fischer, M)

CEE 160. Mechanics of Fluids Laboratory
Lab experiments/demonstrations illustrate conservation principles and flows of real fluids. Corequisite: 101B.

2 units, Spr (Monismith, S)

CEE 161A. Rivers, Streams, and Canals
(Same as CEE 264A) The movement of water through natural and engineered channels, streams, and rivers. Equations and theory (mass, momentum, and energy equations) for steady and unsteady descriptions of the flow. Design of flood-control and canal systems. Flow controls such as weirs and sluice gates; gradually varied flow; Saint-Venant equations and flood waves; and method of characteristics. Open channel flow laboratory experiments: controls such as weirs and gates, gradually varied flow, and waves. Students taking lab section register for 4 units. Prerequisites: 101B, 160. (Fong) GER:DB-EngrAppSci
3-4 units, Aut (Fong, D), Sum (Fong, D)

CEE 164. Introduction to Physical Oceanography
(Same as CEE 262D, EARTHSYS 164) The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). GER:DB-NatSci
4 units, Win (Fong, D)

CEE 166A. Watersheds and Wetlands
(Same as CEE 266A) Introduction to the occurrence and movement of water in the natural environment and its role in creating and maintaining terrestrial, wetland, and aquatic habitat. Hydrologic processes, including precipitation, evaporation, transpiration, snowmelt, infiltration, subsurface flow, runoff, and streamflow. Rivers and lakes, springs and swamps. Emphasis is on observation and measurement, data analysis, modeling, and prediction. Prerequisite: 101B or equivalent. (Freyberg) GER:DB-EngrAppSci
3 units, Aut (Freyberg, D)

CEE 166B. Floods and Droughts, Dams and Aqueducts
(Same as CEE 266B) Sociotechnical systems associated with human use of water as a resource and the hazards posed by too much or too little water. Potable and non-potable water use and conservation. Irrigation, hydroelectric power generation, rural and urban water supply systems, storm water management, flood damage mitigation, and water law and institutions. Emphasis is on engineering design. Prerequisite: 166A or equivalent. GER:DB-EngrAppSci
3 units, Win (Freyberg, D)

CEE 166D. Water Resources and Water Hazards Field Trips
(Same as CEE 266D) Introduction to water use and water hazards via weekly field trips to local and regional water resources facilities (dams, reservoirs, fish ladders and hatcheries, pumping plants, aqueducts, hydropower plants, and irrigation systems) and flood damage mitigation facilities (storm water detention ponds, channel modifications, flood control dams, and reservoirs). Each trip preceded by an orientation lecture.
2 units, Win (Freyberg, D)

CEE 169. Environmental and Water Resources Engineering Design
Application of fluid mechanics, hydrology, water resources, environmental sciences, and engineering economy fundamentals to the design of a system addressing a complex problem of water in the natural and constructed environment. Problem changes each year, generally drawn from a challenge confronting the University or a local community. Student teams prepare proposals, progress reports, oral presentations, and a final design report. Prerequisite: senior in Civil Engineering or Environmental Engineering; 166B.
5 units, alternate years, not given this year

CEE 171. Environmental Planning Methods
For juniors and seniors. Use of microeconomics and mathematical optimization theory in the design of environmental regulatory programs; tradeoffs between equity and efficiency in designing regulations; techniques for predicting adverse effects in environmental impact assessments; information disclosure requirements; and voluntary compliance of firms with international regulating norms. Prerequisites: MATH 51. Recommended: 70. GER:DB-EngrAppSci
3 units, Win (Ortolano, L)

CEE 172. Air Quality Management
Quantitative introduction to the engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, urban sources of air pollution, indoor air quality problems, design and efficiencies of pollution control devices, and engineering strategies for managing air quality. Prerequisites: 70, MATH 51. GER:DB-EngrAppSci
3 units, Win (Hildemann, L)

CEE 172A. Indoor Air Quality
(Same as CEE 278C) Factors affecting the levels of air pollutants in the built indoor environment. The influence of ventilation, office equipment, floor coverings, furnishings, cleaning practices, and human activities on air quality including carbon dioxide, VOCs, resuspended dust, and airborne molds and fungi. Recommended: 172 or 278A.
2-3 units, Spr (Hildemann, L)

CEE 172P. Distributed Generation and Grid Integration of Renewables
(Same as CEE 272P) Renewable generation technologies and their use in the electric power system. Conventional electricity generation systems and the historical development of renewables. Development and operation of the electric power system for high penetrations of renewables and demand side participation. Wind energy and wind farms. Design of wind turbines. Photovoltaic systems (grid connected), micro-hydro and marine renewables (wave and tidal stream devices). Analysis of the electric power system and the integration of renewable energy generators.
3-4 units, Win (Jenkins, N)

CEE 172S. Technology and business strategies to reduce greenhouse gas emissions
(Same as CEE 272S) Concepts of greenhouse gas (GHG) emissions measurement and management, and mitigation options for reducing emissions or sequestering carbon dioxide. Technical aspects of GHG mitigation via energy efficiency and demand-side management, energy in high-technology industry, distributed power and co-generation, the role of renewable energy in GHG management, carbon sequestration in forestry, agriculture, and geological formations. Policy options, carbon trading, and business strategies for GHG mitigation.
3 units, Spr (Swisher, J)

CEE 173A. Energy Resources
(Same as CEE 207A, EARTHSYS 103) Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit. GER:DB-EngrAppSci
4-5 units, Aut (Woodward, J; Knapp, K)

CEE 175A. California Coast: Science, Policy, and Law
(Same as CEE 275A, EARTHSYS 175, EARTHSYS 275) Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates require consent of instructor. Students must participate in at least three mandatory field trips.
3-4 units, Spr (Caldwell, M; Boehm, A; Sivas, D)

CEE 176A. Energy Efficient Buildings
Analysis and design. Thermal analysis of building envelope, heating and cooling requirements, HVAC, and building integrated PV systems. Emphasis is on residential passive solar design and solar water heating. Lab. GER:DB-EngrAppSci
3-4 units, Win (Masters, G)

CEE 176B. Electric Power: Renewables and Efficiency
Renewable and efficient electric power systems emphasizing analysis and sizing of photovoltaic arrays and wind turbines. Basic electric power generation, transmission and distribution, distributed generation, combined heat and power, fuel cells. End use demand, including lighting and motors. Lab. GER:DB-EngrAppSci
3-4 units, Spr (Masters, G)

CEE 176F. Energy Systems Field Trips: China Energy Systems
(Same as CEE 276F) Energy resources and policies in use and under development in China. 12-day field trip to China during

Spring Break 2012. One unit for seminar and readings; one unit for field trip. Prerequisite: consent of instructor for field trip.

1-2 units, alternate years, not given this year

CEE 177. Aquatic Chemistry and Biology
(Same as CEE 277) Introduction to chemical and biological processes in the aqueous environment. Basic aqueous equilibria; the structure, behavior, and fate of major classes of chemicals that dissolve in water; redox reactions; the biochemistry of aquatic microbial life; and biogeochemical processes that govern the fate of nutrients and metals in the environment and in engineered systems. Prerequisite: CHEM 31. GER:DB-EngrAppSci

4 units, Aut (Criddle, C), Sum (Criddle, C)

CEE 177P. Sustainability in Theory and Practice
The multidimensional concept of sustainable development. Students evaluate engineered systems using tools such as cost-benefit analysis, trade-off analysis, and lifecycle analysis. How to make judgments about sustainable and unsustainable courses of action. Case studies dealing with contemporary environmental and economic challenges.

3 units, not given this year

CEE 177S. Design for a Sustainable World
(Same as CEE 277S) Technology-based problems faced by developing communities worldwide. Student groups partner with organizations abroad to work on concept, feasibility, design, implementation, and evaluation phases of various projects. Past projects include a water and health initiative, a green school design, seismic safety, and medical device. Admission based on written application and interview. See http://esw.stanford.edu for application. (Staff)

1-5 units, Win (Staff), Spr (Staff)

CEE 178. Introduction to Human Exposure Analysis
(Same as CEE 276) (Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51. GER:DB-EngrAppSci

3 units, Spr (Kopperud, R), Sum (Kopperud, R)

CEE 179A. Water Chemistry Laboratory
(Same as CEE 273A) (Graduate students register for 273A.) Laboratory application of techniques for the analysis of natural and contaminated waters, emphasizing instrumental techniques.

3 units, Win (Robertson, A)

CEE 179C. Environmental Engineering Design
Application of engineering fundamentals including environmental engineering, hydrology, and engineering economy to a design problem. Enrollment limited; preference to seniors in Civil and Environmental Engineering.

5 units, Spr (Robertson, A; Leckie, J)

CEE 180. Structural Analysis
Analysis of beams, trusses, frames; method of indeterminate analysis by consistent displacement, least work, superposition equations, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisite: 101A and ENGR 14. GER:DB-EngrAppSci

4 units, Aut (Kiremidjian, A)

CEE 181. Design of Steel Structures
Concepts of the design of steel structures with a load and resistance factor design (LRFD) approach; types of loading; structural systems; design of tension members, compression members, beams, beam-columns, and connections; and design of trusses and frames. Prerequisite: 180. GER:DB-EngrAppSci

4 units, Aut (Law, K)

CEE 182. Design of Reinforced Concrete Structures
Properties of concrete and reinforcing steel; behavior of structural elements subject to bending moments, shear forces, torsion, axial loads, and combined actions; design of beams, slabs, columns and footings; strength design and serviceability requirements; design of simple structural systems for buildings. Prerequisite: 180. GER:DB-EngrAppSci

4 units, Win (Lepech, M)

CEE 183. Integrated Civil Engineering Design Project
Studio format. Design concepts for civil engineering facilities from schematic design through construction, taking into account sustainable engineering issues. Design exercises culminating in the design of a civil engineering facility, emphasizing structural systems and materials and integration with construction and other project requirements. Prerequisites: CEE 180, 181, 182; civil engineering major; architectural design major with instructor consent.

4 units, Spr (Deierlein, G)

CEE 195A. Fundamentals of Structural Geology
(Same as GES 111A) Techniques for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; measurement and analysis of stress. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisites: GES 1, MATH 51, 52. GER:DB-NatSci

3 units, Aut (Pollard, D)

CEE 195B. Fundamentals of Structural Geology
(Same as GES 111B) Continuation of GES 111A/CEE 195A. Conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding and magma dynamics; model development and methodology. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisite: GES 111A/CEE 195B.

3 units, Win (Pollard, D)

CEE 196. Engineering Geology Practice
(Same as GES 115) The application of geology and global change to the planning, design, and operation of engineering projects. Case histories taught in a seminar setting and field trips emphasize the impact of geology and global change on both individual engineering works and the built environment by considering Quaternary history and tectonics, anthropogenic sea level rise, active geologic processes, engineering properties of geologic deposits, site exploration, and professional ethics. Prerequisite: GES 1 or consent of instructor. GER:DB-NatSci

3 units, alternate years, not given this year

CEE 198. Directed Reading or Special Studies in Civil Engineering
Written report or oral presentation required. Students must obtain a faculty sponsor.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 199. Undergraduate Research in Civil and Environmental Engineering
Written report or oral presentation required. Students must obtain a faculty sponsor.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 199A. Special Projects in Architecture
Faculty-directed study or internship. May be repeated for credit. Prerequisite: consent of instructor.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

CEE 199B. Directed Studies in Architecture
Projects may include studio-mentoring activities, directed reading and writing on topics in the history and theory of architectural design, or investigations into design methodologies.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

CEE 199H. Undergraduate Honors Thesis
For students who have declared the Civil Engineering B.S. honors major and have obtained approval of a topic for research under the guidance of a CEE faculty adviser. Letter grade only. Written thesis or oral presentation required. (Staff)

2-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CEE 274S. Hopkins Microbiology Course
(Same as BIO 274S, BIOHOPK 274, EESS 253S) (Formerly GES 274S.) Four-week, intensive. The interplay between molecular,

physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

9-12 units, Sum (Spormann, A; Francis, C)

CEE 200A. Teaching of Civil and Environmental Engineering
Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. 200A. Aut, 200B. Win, 200C. Spr

1 unit, Aut (Staff)

CEE 200B. Teaching of Civil and Environmental Engineering
Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. May be repeated for credit. 200A. Aut, 200B. Win, 200C. Spr

1 unit, Win (Chui, T)

CEE 200C. Teaching of Civil and Environmental Engineering
Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. May be repeated for credit. 200A. Aut, 200B. Win, 200C. Spr

1 unit, Spr (Chui, T)

CEE 201D. Computations in Civil and Environmental Engineering
(Same as CEE 101D) Computational and visualization methods in the design and analysis of civil and environmental engineering systems. Focus is on applications of MATLAB. How to develop a more lucid and better organized programming style.

3 units, Aut (Kitanidis, P)

CEE 202. Construction Claims Analysis and Resolution
Concepts include cost overrun and schedule delay analysis, contracts and other legal topics, and resolution of construction disputes. Introduction to construction law. Requires attendance of the first five weeks of CEE 102 for basic legal background.

3-4 units, Win (Groves, R; Tucker, A; London, M)

CEE 203. Probabilistic Models in Civil Engineering
Introduction to probability modeling and statistical analysis in civil engineering. Emphasis is on the practical issues of model selection, interpretation, and calibration. Application of common probability models used in civil engineering including Poisson processes and extreme value distributions. Parameter estimation. Linear regression.

3-4 units, Aut (Baker, J)

CEE 204. Structural Reliability
Procedures for evaluating the safety of structural components and systems. First-and second-order estimates of failure probabilities of engineered systems. Sensitivity of failure probabilities to assumed parameter values. Measures of the relative importance of random variables. Reliability of systems with multiple failure modes. Reliability updating. Simulation methods and variance reduction techniques. Prerequisite: 203 or equivalent.

3-4 units, alternate years, not given this year

CEE 205A. Structural Materials Testing and Simulation
Hands-on laboratory experience with fabrication, computer simulation, and experimental testing of material and small-scale structural components. Comparison of innovative and traditional structural materials. Behavior and application of high-performance fiber reinforced concrete materials for new design, fiber-reinforced polymeric materials for structural retrofits and introduction to sustainable, bio-based composites. Prerequisites: basic course in reinforced concrete design CEE 182 or equivalent.

3-4 units, alternate years, not given this year

CEE 205B. Advanced Topics in Structural Concrete
Concepts and application of strut and tie modeling including deep beams, design for torsion resistance, beam-column joints, bridge components, and post-tensioned anchor zones. Course project integrating computer simulation and physical experimentation of a structural concrete component. Prerequisites: CEE 285A or equivalent.

3 units, Spr (Billington, S)

CEE 206. Decision Analysis for Civil and Environmental Engineers
Current challenges in selecting an appropriate site, alternate design, or retrofit strategy based on environmental, economic, and social factors can be best addressed through applications of decision science. Basics of decision theory, including development of decision trees with discrete and continuous random variables, expected value decision making, utility theory value of information, and elementary multi-attribute decision making will be covered in the class. Examples will cover many areas of civil and environmental engineering problems. Prerequisite: CEE 203 or equivalent.

3 units, Spr (Kiremidjian, A)

CEE 206A. Decision Models in Civil Engineering
For advanced graduate students in CEE. Applications of decision science to address current challenges in selecting an appropriate site and appropriate design or retrofit strategy based on environmental, economic, and social factors. Examples from everyday civil and environmental engineering problems. Prerequisite: CEE 203 or equivalent.

2 units, not given this year

CEE 207A. Energy Resources
(Same as CEE 173A, EARTHSYS 103) Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit.

4-5 units, Aut (Woodward, J; Knapp, K)

CEE 210. Building Information Modeling
(Same as CEE 110) (Graduate students register for 210.) Creation, management, and application of building information models. Process and tools available for creating 2D and 3D computer representations of building components and geometries. Organizing and operating on models to produce architectural views and construction documents, renderings and animations, and interface with analysis tools. Lab exercises, class projects. Limited enrollment.

4 units, Aut (Katz, G)

CEE 211. Multidisciplinary Modeling and Analysis
(Same as CEE 111) (Graduate students register for 211.) Computer modeling, visualization, analysis, and graphical communication of building projects. Use of 3D models in laser scanning, rendering, animation, daylight, energy, cost, structural, lighting analysis, and computer controlled fabrication. Underlying 3D computer representations, and analysis tools and their applications. Guest lectures, lab exercises, class project. Prerequisite: 110 or CAD experience.

4 units, Win (Kunz, J)

CEE 214. Introduction to Modeling and Analysis in CEE
Introduces students to modeling of products, processes and organizations in the AEC industry. Modeling and analysis purposes include support of technical, social, psychological and ethical decision making for different stakeholders. Different purposes and levels of detail for different models. CEM/DCI integrated approach to building using physical, mathematical, graphical and computer models of products, organizations and processes.

3 units, not given this year

CEE 215. Goals and Methods of Sustainable Building Projects
(Same as CEE 115) (Graduate students register for 215.) Goals related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and economic and social sustainability. Methods to integrate these goals and enhance the economic, ecological, and equitable value of

building projects. Industry and academic rating systems, project case studies, guest lecturers, and group project.

3 units, Spr (Staff)

CEE 217. Renewable Energy Infrastructure

coming later

3 units, Win (Fischer, M; Jacobson, M)

CEE 222A. Computer Integrated Architecture/Engineering/Construction (AEC) Global Teamwork

AEC students engage in a crossdisciplinary, collaborative, geographically distributed, and multicultural project-based teamwork. AEC teams exercise their domain knowledge and information technologies in a multidisciplinary context focusing on the design and construction concept development phase of a comprehensive building project. Prerequisite: interview with Instructor in Autumn Quarter.

3 units, Win (Fruchter, R)

CEE 222B. Computer Integrated Architecture/Engineering/Construction (AEC) Global Teamwork

Global AEC student teams continue their project activity focusing on the most challenging concept developed in 222A and chosen jointly with their client. Comprehensive team project focusing on design and construction, including: project development and documentation; detailing, 3D and 4D modeling, simulation, sustainable concepts, cost benefit analysis, and life-cycle cost analysis; and final project presentation of product and process. Prerequisite: CEE 222A.

2 units, Spr (Fruchter, R)

CEE 224A. Sustainable Development Studio

(Undergraduates, see 124.) Project-based. Sustainable design, development, use and evolution of buildings; connections of building systems to broader resource systems. Areas include architecture, structure, materials, energy, water, air, landscape, and food. Projects use a cradle-to-cradle approach focusing on technical and biological nutrient cycles and information and knowledge generation and organization. May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 225. Field Surveying Laboratory

(Same as CEE 140) Graduate students register for 225. Friday afternoon laboratory provides practical surveying experience. Additional morning classes to prepare for the afternoon sessions. Hands-on operation of common traditional field survey tools ; introduction to the newest generation of digital measuring, positioning, and mapping tools. Emphasis is on the concept of using the data collected in the field as the basis for subsequent engineering and economic decisions.

3 units, not given this year

CEE 226. Life Cycle Assessment for Complex Systems

Life cycle modeling of products, industrial processes, and infrastructure/building systems; material and energy balances for large interdependent systems; environmental accounting; and life cycle costing. These methods, based on ISO 14000 standards, are used to examine emerging technologies, such as biobased products, building materials, building integrated photovoltaics, and alternative design strategies, such as remanufacturing, dematerialization, LEED, and Design for Environment: DfE. Student teams complete a life cycle assessment of a product or system chosen from industry.

3-4 units, Aut (Lepech, M)

CEE 226E. Advanced Topics in Integrated, Energy-Efficient Building Design

Innovative methods and systems for the integrated design and evaluation of energy efficient buildings. Guest practitioners and researchers in energy efficient buildings. Student initiated final project.

2 units, Spr (Rumsey, P)

CEE 227. Global Project Finance

Public and private sources of finance for large, complex, capital-intensive projects in developed and developing countries. Benefits and disadvantages, major participants, risk sharing, and challenges of project finance in emerging markets. Financial, economic, political, cultural, and technological elements that affect project structures, processes, and outcomes. Case studies. Limited enrollment.

3-5 units, Win (Orr, R)

CEE 228. Innovative Global Construction Technology

(Formerly 245T.) Five-week class. How innovative companies invent new construction processes based on relative local labor, and materials and equipment cost, availability, and capabilities, and developed from experience and knowledge of construction technology in bridge, tunnel, and high-rise building. The process of generating new ideas. Industry guest speakers address the link between product/process innovation and construction technology.

2 units, Win (Brockmann, C)

CEE 229. Engineering and Policy responses to Climate Change Impacts on Seaports

(Same as CEE 129) Interdisciplinary. Exploration of impacts of climate change on major coastal seaports around the world. Assessment of the minimum necessary response to protect ports from a significant sea-levels rise in terms of costs, material, labor, and time. Consideration of economic and policy implications. Class projects, case studies, guest speakers. May be credited for credit.

2-4 units, Aut (Fischer, M; Becker, A; Schwegler, B), Win (Fischer, M; Schwegler, B; Becker, A), Spr (Fischer, M; Becker, A; Schwegler, B), Sum (Staff)

CEE 232. Interplay of Architecture and Engineering

(Same as CEE 132) The range of requirements that drive a building's design including architecture, engineering, constructability, building codes, and budget. Case studies illustrate how structural and mechanical systems are integrated into building types including residential, office, commercial, and retail. In-class studio work.

4 units, not given this year

CEE 235A. Parametrics: Applications in Architecture and Product Design

(Same as CEE 135A) Precedents in architecture and product design; methods for modeling, prototyping, and fabrication. How to combine design intentions and digital logics with physical and material constraints. Students develop a case study and small design projects using a parametric approach at the scales of architecture and product.

4 units, not given this year

CEE 236. Green Architecture

(Same as CEE 136) Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring green design and green design processes. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Enrollment limited to 14. Prerequisites: 31 or 31Q, and 110 and 130.

4 units, Aut (Sperry, R)

CEE 241. Managing Fabrication and Construction

Methods to manage the physical production of construction projects; design, analysis, and optimization of the fabricate-assemble process including performance metrics. Project management techniques and production system design including: push versus pull methods; master scheduling and look-ahead scheduling; scope, cost, and schedule control; earned value analysis; critical path method; location-based scheduling; 4D modeling; workflow; trade coordination; methods to understand uncertainty and reduce process variability; and supply chain systems including made-to-stock, engineered-to-order, and made-to-order. Prerequisite: 100 or consent of instructor. Recommended corequisite: 240.

4 units, Aut (Fischer, M)

CEE 241A. Infrastructure Project Development

(Same as CEE 141A) Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of the condition of the nation's infrastructure and how projects are planned and financed. Focus is on public works projects in the U.S.. The role of public and private sectors through a step-by-step study of the project development process. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project development.

3 units, Aut (Griggs, G)

CEE 241B. Infrastructure Project Delivery

(Same as CEE 141B) Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities ,and communications sectors. Analysis of how projects are designed, constructed, operated, and maintained. Focus is on public works projects in the U.S. Al-

ternative project delivery approaches and organizational strategies. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project delivery.

3 units, Win (Griggs, G)

CEE 241C. Global Infrastructure Projects Seminar
(Same as CEE 141C) Infrastructure is critical to the economy, global competitiveness, and quality of life. Course analyzes and compares the development and delivery of mega-projects around the world. Alternative project delivery methods, the role of public and private sector, different project management strategies, and lessons learned. Case studies of real infrastructure projects. Industry guest speakers. Field trips to local projects.

1-2 units, Spr (Griggs, G)

CEE 242. Organization Design for Projects and Companies
Introduction to organizational behavior and organizational design for construction projects and companies. Class incorporates readings, individual, small group and large group case study assignments. Students use computer simulation to design real-world project organizations.

3-4 units, Aut (Levitt, R)

CEE 242A. Negotiating Sustainable Development
(Same as CEE 142A, ENVRES 242) How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.

3 units, Win (Christensen, S)

CEE 243. Predicting and Measuring Building Energy Use
Energy modeling has entered commercial use and can help evaluate the impact of potential energy-saving interventions in commercial building design. Methods to create building information models to enable energy analysis, use energy analysis tools and interpret their results for commercial buildings, analyze measured building performance and relate prediction to measurement, and develop guidance for owners on how to use these methods in practice. May be repeated for credit. Prerequisites: Revit or Digital Project competence or CEE 210, CEE 211, or CEE 135 with equivalent experience. Recommended: energy modeling experience, CEE 176A, CEE 226E, or CEE 256.

2-3 units, Spr (Kunz, J)

CEE 244. Fundamentals of Construction Accounting and Finance
Concepts of financial accounting and economics emphasizing the construction industry. Financial statements, accounting concepts, project accounting methods, and the nature of project costs. Case study of major construction contractor. Ownership structure, working capital, and the sources and uses of funds.

2 units, Aut (Tucker, A; Meyer, P)

CEE 245A. Global Project Seminar
Issues related to large, complex, global development projects including infrastructure development, urban and rural development, and the development of new cities. Guest presentations by industry practitioners and academics, including: Sabeer Bhatia, founder of Hotmail and architect of NanoCity; Ian Bremmer, CEO of the Eurasia Group, and Greg Huger, managing director of AirliePartners. May be repeated for credit.

3 units, not given this year

CEE 246. Managing Engineering and Construction Companies
Management of design and construction companies in the architecture-engineering-construction industry. Focus is on management of risks inherent in the A/E/C industry: developing business strategies and organizations to cope with cyclical demand, alternative contracting approaches, managing receivables and cash flow, administration of human resources, safety, quality, insurance, and bonding. Students play different management roles in a computer simulation of a construction company. Prerequisites: introductory accounting course such as ENGR 60, CEE 244A, or MS&E 140.

3 units, Spr (Levitt, R)

CEE 246A. Engineering Economy Primer
Satisfies the engineering economy prerequisite for 246 or 253. Application of engineering economy concepts and principles to the construction industry. Equivalence concept; interest formulas; value of money across time; present value, annual cash flow, internal rate of return and benefit-cost methods; retirement and replacement; depreciation; capital budgeting; and sensitivity and risk analysis. Construction finance concepts, loans, mortgages, and construction pro formas.

2 units, Aut (Koen Cohen, N)

CEE 246B. Real Estate Finance Seminar
Real estate principles and process. Financial modeling. Feasibility analysis. Sources and uses of funds. Cash flow projections. Profit and loss reports. Financing issues for different types of real estate projects. Redevelopment projects. Financing green projects and technologies. Current challenges in financial markets. Group project and presentation. Limited enrollment with priority to CEM, DCI, and SDC students not enrolled in CEE 248. Prerequisites: CEE 246A or equivalent, ENGR 60. Recommended: knowledge of spreadsheets.

1 unit, Spr (Koen Cohen, N)

CEE 247. Cases in Personality, Leadership, and Negotiation
(Same as CEE 147) Case studies target personality issues, risk willingness, and life skills essential for real world success. Failures, successes, and risk willingness in individual and group tasks based on the professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Application downloaded from coursework must be submitted before first class; mandatory first class attendance. No auditors.

3 units, Spr (Griggs, G)

CEE 248. Real Estate Development
Critical activities and key participants. Topics: conceptual and feasibility studies, market perspectives, the public roles, steps for project approval, project finance, contracting and construction, property management, and sales. Group projects focus on actual developments now in the planning stage. Enrollment limited to 24; priority to graduate majors in the department's CEM and GSB programs. Prerequisites: 241, 244A or equivalent, ENGR 60.

3 units, Spr (Kroll, M)

CEE 248G. Certifying Green Buildings
Open to all disciplines. Goal is prepare students for the United States Green Building Council's professional accreditation exam. Basic metrics for project certification via USGBC's LEED rating system. Recommended: familiarity with design and construction terminology .

1 unit, not given this year

CEE 249. Labor and Industrial Relations: Negotiations, Strikes, and Dispute Resolution
Labor/management negotiations, content of a labor agreement, strikes, dispute resolution, contemporary issues affecting labor and management, and union versus open shop competitiveness in the marketplace. Case studies; presentations by union leaders, legal experts, and contractor principals. Simulated negotiation session with union officials and role play in an arbitration hearing.

2 units, Win (Walton, M)

CEE 251. Negotiation
(Same as CEE 151) Students learn to prepare for and conduct negotiations in a variety of arenas including getting a job, managing workplace conflict, negotiating transactions, and managing personal relationships. Interactive class. The internationally travelled instructor who has mediated cases in over 75 countries will require students to negotiate real life case studies and discuss their results in class. Application required before first day of class; see Coursework.

3 units, Aut (Christensen, S), Spr (Christensen, S)

CEE 252. Construction Methods for Concrete and Steel Structures
Providing technical support for concrete and steel construction operations on buildings or infrastructure projects. Concrete materials, construction properties of fresh concrete. Resources and operations for batching, transporting, placing, finishing, and curing concrete. Design, fabrication, and use of formwork. Special operations and formwork systems. Detailing, fabricating, erecting, and connecting structural steel. Lifting equipment and lift planning. Weld-

ing processes, operations, and quality control. Readings, exercises and course projects.

3 units, not given this year

CEE 252P. Construction Engineering Practicum
Discussion and group exercises related to technical fundamentals, resources, and field construction operations for earthwork, concrete and steel construction. Introduces construction engineering and prepares students for courses related to CEM and SDC degrees. Required: advance queries related to reading, class sessions, group exercises, summary paper. Time: prior to start of Autumn quarter

1 unit, Aut (Tatum, C)

CEE 253A. Earthwork Construction

1 unit, not given this year

CEE 254. Cases in Estimating Costs
(Same as CEE 154) Students participate in bidding contests requiring cost determination in competitive markets. Monetary forces driving the construction industry as general principles applicable to any competitive business. Cases based on field trips and professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Limited enrollment; no auditors. Prerequisites: consent or intructor and application downloaded from CourseWork prior to start of class.

3 units, not given this year

CEE 256. Building Systems
(Same as CEE 156) HVAC, lighting, and envelope systems for commercial and institutional buildings, with a focus on energy efficient design. Knowledge and skills required in the development of low-energy buildings that provide high quality environment for occupants.

4 units, Spr (Kolderup, E)

CEE 257. Building Systems Practice
Technical fundamentals, major components, connecting elements, field operations for active building systems: HVAC, electric power, water and waste, fire protection, control and instrumentation and vertical transportation. Integration, coordination and commissioning of systems. Field trip to HVAC specialty contractor.

1 unit, Spr (Tatum, C)

CEE 258. Donald R. Watson Seminar in Construction Engineering and Management
Panel discussions with speakers from various segments of industry and government who clarify career options. Students interact with panelists in group discussions at dinner after class.

1 unit, Aut (Fischer, M)

CEE 258B. Donald R. Watson Seminar in Construction Engineering and Management
Weekly seminars and field trips focusing on technical aspects of concrete and steel construction. Submission of abstract and paper required.

1 unit, not given this year

CEE 259A. Construction Problems
Group-selected problems in construction techniques, equipment, or management; preparation of oral and written reports. Guest specialists from the construction industry. See 299 for individual studies. Prerequisites: graduate standing in CEM program and consent of instructor.

1-3 units, Aut (Staff)

CEE 259B. Construction Problems
Group-selected problems in construction techniques, equipment, or management; preparation of oral and written reports. Guest specialists from the construction industry. See 299 for individual studies. Prerequisites: graduate standing in CEM program and consent of instructor.

1-3 units, Win (Staff)

CEE 259C. Industry Applications of VDC
(Same as CEE 159C) In the context of design and construction projects in industry, students will develop VDC/BIM models using off-the-shelf authoring tools for project analysis, collaboration, and communication. Students will develop essential skills for industry practice and/or academic research in VDC. Remote web-participation is possible. Class content changes every quarter.

2-4 units, Win (Kam, C; Fischer, M)

CEE 259D. Advanced Industry Applications of VDC
(Same as CEE 159D) In the context of design and construction projects in industry, students will develop advanced VDC/BIM models using off-the-shelf and newly created tools for project analysis, collaboration, and communication. Students will develop advanced skills for industry practice and/or cutting edge academic research in VDC. Remote web-participation is possible. Class content changes every quarter. Pre-requisites: CEE 159C/259C

2-4 units, Spr (Kam, C; Fischer, M)

CEE 260A. Physical Hydrogeology
(Same as EESS 220) (Formerly GES 230.) Theory of underground water occurrence and flow, analysis of field data and aquifer tests, geologic groundwater environments, solution of field problems, and groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus.

4 units, Aut (Gorelick, S)

CEE 260B. Surface and Near-Surface Hydrologic Response
(Same as GES 237) Quantitative review of process-based hydrology and geomorphology. Introduction to finite-difference and finite-element methods of numerical analysis. Topics: biometeorology, unsaturated and saturated subsurface fluid flow, overland and open channel flow, and physically-based simulation of coupled surface and near-surface hydrologic response. Links hydrogeology, soil physics, and surface water hydrology.

3 units, alternate years, not given this year

CEE 260C. Contaminant Hydrogeology
(Same as EESS 221) (Formerly GES 231.) For earth scientists and engineers. Environmental and water resource problems involving contaminated groundwater. The processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Prerequisite: GES 230 or CEE 260A or equivalent.

4 units, Spr (Gorelick, S)

CEE 262A. Hydrodynamics
The flow of incompressible viscous fluid; emphasis is on developing an understanding of fluid dynamics that can be applied to environmental flows. Topics: kinematics of fluid flow; equations of mass and momentum conservation (including density variations); some exact solutions to the Navier-Stokes equations; appropriate analysis of fluid flows including Stokes flows, potential flows, and laminar boundary layers; and an introduction to the effects of rotation and stratification through scaling analysis of fluid flows. Prerequisites: 101B or consent of instructor; and some knowledge of vector calculus and differential equations.

3-4 units, Aut (Fringer, O)

CEE 262B. Transport and Mixing in Surface Water Flows
Application of fluid mechanics to problems of pollutant transport and mixing in the water environment. Mathematical models of advection, diffusion, and dispersion. Application of theory to problems of transport and mixing in rivers, estuaries, and lakes and reservoirs. Recommended: 262A and CME 102 (formerly ENGR 155A), or equivalents.

3-4 units, Win (Fong, D)

CEE 262C. Modeling and Simulation for Civil and Environmental Engineers
Mathematical and computational methods for modeling and simulation. The use of Matlab for topics including predator-prey problems, buckling, transport and mixing, wave modeling, and flow reactors. Prerequisites: CME 102 and 104, or equivalent.

3 units, Spr (Fringer, O)

CEE 262D. Introduction to Physical Oceanography
(Same as CEE 164, EARTHSYS 164) The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53).

4 units, Win (Fong, D)

CEE 262E. Lakes and Reservoirs
Physics and water quality dynamics in lakes and reservoirs. Implementation of physical and biogeochemical processes in 1-D models. Recommended: 262B.
2-3 units, not given this year

CEE 262F. Ocean Waves
The fluid mechanics of surface gravity waves in the ocean of relevance to engineers and oceanographers. Topics include irrotational waves, wave dispersion, wave spectra, effects of bathymetry (shoaling), mass transport, effects of viscosity, and mean currents driven by radiation stresses. Prerequisite: CEE 262A or a graduate class in fluid mechanics.
3 units, alternate years, not given this year

CEE 263A. Air Pollution Modeling
The numerical modeling of urban, regional, and global air pollution focusing on gas chemistry and radiative transfer. Stratospheric, free-tropospheric, and urban chemistry. Methods for solving stiff systems of chemical ordinary differential, including the multistep implicit-explicit method, Gear's method with sparse-matrix techniques, and the family method. Numerical methods of solving radiative transfer, coagulation, condensation, and chemical equilibrium problems. Project involves developing a basic chemical ordinary differential equation solver. Prerequisite: CS 106A or equivalent.
3-4 units, alternate years, not given this year

CEE 263B. Numerical Weather Prediction
Numerical weather prediction. Continuity equations for air and water vapor, the thermodynamic energy equation, and momentum equations derived for the atmosphere. Numerical methods of solving partial differential equations, including finite-difference, finite-element, semi-Lagrangian, and pseudospectral methods. Time-stepping schemes: the forward-Euler, backward-Euler, Crank-Nicolson, Heun, Matsuno, leapfrog, and Adams-Bashforth schemes. Boundary-layer turbulence parameterizations, soil moisture, and cloud modeling. Project developing a basic weather prediction model. Prerequisite: CS 106A or equivalent.
3-4 units, Spr (Jacobson, M)

CEE 263C. Weather and Storms
(Same as CEE 63) Daily and severe weather and global climate. Topics: structure and composition of the atmosphere, fog and cloud formation, rainfall, local winds, wind energy, global circulation, jet streams, high and low pressure systems, inversions, el Niño, la Niña, atmosphere/ocean interactions, fronts, cyclones, thunderstorms, lightning, tornadoes, hurricanes, pollutant transport, global climate and atmospheric optics.
3 units, Aut (Jacobson, M)

CEE 263D. Air Pollution: From Urban Smog to Global Change
(Same as CEE 64) Survey of urban- through global-scale air pollution. Topics: the evolution of the Earth's atmosphere, indoor air pollution, urban smog formation, history of discovery of atmosphere chemicals, visibility, acid rain, the greenhouse effect, historical climate, global warming, stratospheric ozone reduction, Antarctic ozone destruction, air pollution transport across political boundaries, the effects of air pollution on ultraviolet radiation, and impacts of energy systems on the atmosphere.
3 units, Win (Jacobson, M)

CEE 264A. Rivers, Streams, and Canals
(Same as CEE 161A) The movement of water through natural and engineered channels, streams, and rivers. Equations and theory (mass, momentum, and energy equations) for steady and unsteady descriptions of the flow. Design of flood-control and canal systems. Flow controls such as weirs and sluice gates; gradually varied flow; Saint-Venant equations and flood waves; and method of characteristics. Open channel flow laboratory experiments: controls such as weirs and gates, gradually varied flow, and waves. Students taking lab section register for 4 units. Prerequisites: 101B, 160. (Fong)
3-4 units, Aut (Fong, D), Sum (Fong, D)

CEE 265A. Sustainable Water Resources Development
Alternative criteria for judging the sustainability of projects. Application of criteria to evaluate sustainability of water resources projects in several countries. Case studies illustrate the role of political, social, economic, and environmental factors in decision making. Influence of international aid agencies and NGOs on water projects. Evaluation of benefit-cost analysis and environmental impact assessment as techniques for enhancing the sustainability of future projects. Limited enrollment. Prerequisite: graduate standing in Environmental and Water Studies, or consent of instructor.
3 units, Spr (Ortolano, L)

CEE 265C. Water Resources Management
Principles of surface and ground water resources management in the context of water scarcity and hydrologic uncertainty. Topics include reservoir, river basin, and aquifer management, conjunctive use of surface and ground water, wastewater reuse, and demand management. Technical, economic, social, and political elements of water management.
3 units, Sum (Findikakis, A)

CEE 265D. Water and Sanitation in Developing Countries
Economic, social, political, and technical aspects of sustainable water supply and sanitation service provision in developing countries. Case studies from Asia, Africa, and Latin America. Service pricing, alternative institutional structures including privatization, and the role of consumer demand and community participation in the planning process. Environmental and public health considerations, and strategies for serving low-income households. Limited enrollment. Prerequisite: consent of instructor.
1-3 units, Win (Davis, J)

CEE 266A. Watersheds and Wetlands
(Same as CEE 166A) Introduction to the occurrence and movement of water in the natural environment and its role in creating and maintaining terrestrial, wetland, and aquatic habitat. Hydrologic processes, including precipitation, evaporation, transpiration, snowmelt, infiltration, subsurface flow, runoff, and streamflow. Rivers and lakes, springs and swamps. Emphasis is on observation and measurement, data analysis, modeling, and prediction. Prerequisite: 101B or equivalent. (Freyberg)
3 units, Aut (Freyberg, D)

CEE 266B. Floods and Droughts, Dams and Aqueducts
(Same as CEE 166B) Sociotechnical systems associated with human use of water as a resource and the hazards posed by too much or too little water. Potable and non-potable water use and conservation. Irrigation, hydroelectric power generation, rural and urban water supply systems, storm water management, flood damage mitigation, and water law and institutions. Emphasis is on engineering design. Prerequisite: 166A or equivalent. (Freyberg)
3 units, Win (Freyberg, D)

CEE 266C. Advanced Topics in Hydrology and Water Resources
Graduate seminar. Focus is on one or more hydrologic processes or water resources systems. Topics vary based on student and instructor interest. Examples include freshwater wetland hydrology, watershed-scale hydrologic modeling, renaturalization of stream channels, reservoir sediment management, and dam removal. Enrollment limited. Prerequisites: 266A,B, or equivalents. Recommended: 260A or equivalent.
3 units, Spr (Freyberg, D)

CEE 266D. Water Resources and Water Hazards Field Trips
(Same as CEE 166D) Introduction to water use and water hazards via weekly field trips to local and regional water resources facilities (dams, reservoirs, fish ladders and hatcheries, pumping plants, aqueducts, hydropower plants, and irrigation systems) and flood damage mitigation facilities (storm water detention ponds, channel modifications, flood control dams, and reservoirs). Each trip preceded by an orientation lecture.
2 units, Win (Freyberg, D)

CEE 268. Groundwater Flow
Flow and mass transport in porous media. Applications of potential flow theory and numerical modeling methods to practical groundwater problems: flow to and from wells, rivers, lakes, drainage ditches; flow through and under dams; streamline tracing; capture zones of wells; and mixing schemes for in-situ remediation. Prerequisites: calculus and introductory fluid mechanics.
3-4 units, Win (Staff)

CEE 269. Environmental Fluid Mechanics and Hydrology Seminar
Problems in all branches of water resources. Talks by visitors, faculty, and students. May be repeated for credit.
1 unit, Spr (Kitanidis, P)

CEE 270. Movement and Fate of Organic Contaminants in Waters
Transport of chemical constituents in surface and groundwater including advection, dispersion, sorption, interphase mass transfer, and transformation; impacts on water quality. Emphasis is on physicochemical processes and the behavior of hazardous waste contaminants. Prerequisites: undergraduate chemistry and calculus. Recommended: 101B.
3 units, Aut (Luthy, R), Sum (Robertson, A)

CEE 271A. Physical and Chemical Treatment Processes
Physical and chemical unit operations for water treatment, emphasizing process combinations for drinking water supply. Application of the principles of chemistry, rate processes, fluid dynamics, and process engineering to define and solve water treatment problems by flocculation, sedimentation, filtration, disinfection, oxidation, aeration, and adsorption. Investigative paper on water supply and treatment. Prerequisites: 101B, 270. Recommended: 273.
3 units, Win (Luthy, R)

CEE 271B. Environmental Biotechnology
Stoichiometry, kinetics, and thermodynamics of microbial processes for the transformation of environmental contaminants. Design of dispersed growth and biofilm-based processes. Applications include treatment of municipal and industrial waste waters, detoxification of hazardous chemicals, and groundwater remediation. Prerequisites: 270; 177 or 274A or equivalents.
4 units, Win (Criddle, C)

CEE 271M. Transport Phenomena: Momentum, heat and mass transport
(Same as CEE 371M) Heat, mass and momentum transfer theory from the viewpoint of basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory. Prerequisites: fluid mechanics, ordinary differential equations.
3 units, not given this year

CEE 272. Coastal Contaminants
Coastal pollution and its effects on ecosystems and human health. The sources, fate, and transport of human pathogens and nutrients. Background on coastal ecosystems and coastal transport phenomena including tides, waves, and cross shelf transport. Introduction to time series analysis with MATLAB. Undergraduates require consent of instructor.
3-4 units, Aut (Boehm, A)

CEE 272P. Distributed Generation and Grid Integration of Renewables
(Same as CEE 172P) Renewable generation technologies and their use in the electric power system. Conventional electricity generation systems and the historical development of renewables. Development and operation of the electric power system for high penetrations of renewables and demand side participation. Wind energy and wind farms. Design of wind turbines. Photovoltaic systems (grid connected), micro-hydro and marine renewables (wave and tidal stream devices). Analysis of the electric power system and the integration of renewable energy generators.
3-4 units, Win (Jenkins, N)

CEE 272R. Power Systems
coming later
3 units, Spr (Staff)

CEE 272S. Technology and business strategies to reduce greenhouse gas emissions
(Same as CEE 172S) This course will introduce the main concepts of greenhouse gas (GHG) emissions measurement and management, and it will explore the main mitigation options for reducing emissions or sequestering carbon dioxide. It will address technical aspects of GHG mitigation via energy efficiency and demand-side management, energy in high-technology industry, distributed power and co-generation, the role of renewable energy in GHG management, carbon sequestration in forestry, agriculture, and geological formations. The course explores policy options, carbon trading and business strategies for GHG mitigation.
3 units, Spr (Swisher, J)

CEE 272W. Wind Power project Development
Introduction to wind power resource assessment and project development. Topics include the dynamics of large-scale and small-scale wind systems, vertical scaling of winds in the boundary layer, measurement instruments used for resource assessments, wind turbine technology, and wind farm siting, planning and economics. Analysis methods of wind data, use of industry-standard software for optimizing turbine siting and project feasibility studies. Project work using existing resource assessment from local areas. Prerequisite: Math41/42 or equivalent. Limited enrollment.
1 unit, Aut (Ten Hoeve, J)

CEE 273. Aquatic Chemistry
Chemical principles and their application to the analysis and solution of problems in aqueous geochemistry (temperatures near 25° C and atmospheric pressure). Emphasis is on natural water systems and the solution of specific chemical problems in water purification technology and water pollution control. Prerequisites: CHEM 31 and 33, or equivalents.
3 units, Aut (Leckie, J)

CEE 273A. Water Chemistry Laboratory
(Same as CEE 179A) (Graduate students register for 273A.) Laboratory application of techniques for the analysis of natural and contaminated waters, emphasizing instrumental techniques.
3 units, Win (Robertson, A)

CEE 273C. Introduction to Membrane Technology for Water/Wastewater Treatment
Membrane separation processes focusing on their use for water and wastewater purification. Topics will include membrane types and materials; transport across and rejection by membranes; membrane fouling, cleaning and degradation; and design and operation of membrane systems.
1 unit, not given this year

CEE 274A. Environmental Microbiology I
(Same as CHEMENG 174, CHEMENG 274) Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents.
3 units, Aut (Spormann, A), Sum (Krieger, C)

CEE 274B. Metabolic Biochemistry of Microorganisms
(Same as CHEMENG 456) Microbial metabolism, biochemical and metabolic principles, unity and diversity of metabolic pathways, evolution of enzymes and metabolic pathways, microbial degradation of natural and anthropogenic organic compounds, predicting biodegradation, and metabolic origin of life.
3 units, Win (Spormann, A)

CEE 274C. Microbial Ecology and Evolution
(Same as CHEMENG 457) Structure/function relationship of microbial communities; metabolic and ecological basis of interactions in microbial communities; microbial ecology and population biology in natural and human host systems; and evolution of microbial life. Prerequisite: CEE 274A, CHEMENG 281 (formerly 288), or equivalent.
3 units, not given this year

CEE 274D. Pathogens and Disinfection
Introduction to epidemiology, major pathogens and infectious diseases, the immune system, movement and survival of pathogens in the environment, transfer of virulence and antibiotic resistance genes, and pathogen control, with an emphasis on public health engineering measures (disinfection). Prerequisite: 274A.
3 units, alternate years, not given this year

CEE 274E. Pathogens in the Environment
Sources, fates, movement, and ecology of waterborne pathogens in the natural environment and disinfection systems; epidemiology and microbial risk assessment. No microbiology background required; undergraduates may enroll with consent of instructor.
3 units, not given this year

CEE 274P. Environmental Health Microbiology Lab
3-4 units, not given this year

CEE 275A. California Coast: Science, Policy, and Law
(Same as CEE 175A, EARTHSYS 175, EARTHSYS 275) Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean,

and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

3-4 units, Spr (Caldwell, M; Boehm, A; Sivas, D)

CEE 275B. Process Design for Environmental Biotechnology
Use of microbial bioreactors for degradation of contaminants and recovery of clean water, clean energy and/or green materials. Student teams design, operate, and analyze bioreactors and learn to write consulting style reports. Limited enrollment. Prerequisites: 271B

3 units, Spr (Criddle, C)

CEE 276. Introduction to Human Exposure Analysis
(Same as CEE 178) (Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51.

3 units, Spr (Kopperud, R), Sum (Kopperud, R)

CEE 276E. Environmental Toxicants
Chemicals in the environment that pose toxicity risk. Introduction to environmental toxicology principles for identifying and characterizing toxicants based on sources, properties, pathways, and toxic action. Past and present environmental toxicant issues.

2-3 units, Spr (Ong, C)

CEE 276F. Energy Systems Field Trips: China Energy Systems
(Same as CEE 176F) Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2012. One unit for seminar and readings; one unit for field trip. Prerequisite: consent of instructor for field trip.

1-2 units, alternate years, not given this year

CEE 277. Aquatic Chemistry and Biology
(Same as CEE 177) Introduction to chemical and biological processes in the aqueous environment. Basic aqueous equilibria; the structure, behavior, and fate of major classes of chemicals that dissolve in water; redox reactions; the biochemistry of aquatic microbial life; and biogeochemical processes that govern the fate of nutrients and metals in the environment and in engineered systems. Prerequisite: CHEM 31.

4 units, Aut (Criddle, C), Sum (Criddle, C)

CEE 277A. Teaching Science Literacy for a Sustainable Society
Teaching science to nontechnical audiences emphasizing technologies and science for the sustainable use of water. Guest lecturers. Learning styles, and the role of engineers and scientists in K-12 and media communication. Students develop teaching modules to be used in educational settings involving nontechnical audiences.

2-4 units, not given this year

CEE 277C. Environmental Governance
Interaction between private, public and civil sectors in decision making that effects environmental sustainability. Governance on global to local scales, US and international case studies. Theoretical concepts of environmental policy design and implementation: common property and collective action, social movements and locally unwanted land uses, sustainable cities, ecological modernization, shifts in corporate environmental norms, ISO 14001 and green supply chains, and global institutions for constraining carbon emissions. Limited enrollment.

3 units, alternate years, not given this year

CEE 277D. Water, Sanitation and Health in Developing Countries
Graduate seminar focused on emerging research in the areas of water supply, sanitation, hygiene and health in developing countries. Limited enrollment; instructor permission required.

1-3 units, not given this year

CEE 277E. Environmental Informatics
The storage, processing and flow of information collected from or modeled after environmental systems. Scope of environmental informatics, and survey of frameworks and emerging developments. Discussions on the form and function of environmental datasets, and related issues of compatibility, interoperability, interpretation and usability. Optional computational laboratory/individual project for extra unit.

2-3 units, Sum (Ong, C; Wang, J)

CEE 277F. Advanced Field Methods in Water, Health and Development
Field methods for assessing household stored water quality, hand contamination, behaviors, and knowledge related to water, sanitation and health. Limited enrollment. Instructor consent required.

10-15 units, not given this year

CEE 277S. Design for a Sustainable World
(Same as CEE 177S) Technology-based problems faced by developing communities worldwide. Student groups partner with organizations abroad to work on concept, feasibility, design, implementation, and evaluation phases of various projects. Past projects include a water and health initiative, a green school design, seismic safety, and medical device. Admission based on written application and interview. See http://esw.stanford.edu for application. (Staff)

1-5 units, Win (Staff), Spr (Staff)

CEE 278A. Air Pollution Physics and Chemistry
The sources and health effects of pollutants. The influence of meteorology on pollution: atmospheric energy balance, temperature profiles, stability classes, inversion layers, turbulence. Atmospheric diffusion equations, downwind dispersion of emissions from point and line sources. Tropospheric chemistry: mechanisms for ozone formation, photochemical reactions, radical chain mechanisms, heterogeneous chemical reactions. Prerequisites: MATH 51, CHEM 31, or equivalents. Recommended: 101B, 273 or CHEM 135, or equivalents.

3 units, Aut (Hildemann, L)

CEE 278B. Atmospheric Aerosols
The characterization of atmospheric particulate matter: size distributions, chemical composition, health effects. Atmospheric diffusion and transport of particles: removal by convection, impaction, gravitational settling. Effect of aerosols on visibility: light scattering and absorption, reduction of visual range. Mechanics influencing ambient size distributions: Brownian coagulation, laminar shear flow, homogeneous nucleation, heterogeneous condensation. Prerequisite: MATH 51, or equivalent. Recommended: 101B or equivalent.

3 units, alternate years, not given this year

CEE 278C. Indoor Air Quality
(Same as CEE 172A) Factors affecting the levels of air pollutants in the built indoor environment. The influence of ventilation, office equipment, floor coverings, furnishings, cleaning practices, and human activities on air quality including carbon dioxide, VOCs, resuspended dust, and airborne molds and fungi. Recommended: 172 or 278A.

2-3 units, Spr (Hildemann, L)

CEE 279. Environmental Engineering Seminar
Current research, practice, and thinking in environmental engineering and science. Attendance at seminars is self-directed, and may be accrued throughout the school year.

1 unit, Aut (Hildemann, L; Boehm, A), Win (Hildemann, L), Spr (Hildemann, L)

CEE 280. Advanced Structural Analysis
Theoretical development and computer implementation of direct stiffness method of structural analysis; virtual work principles; computation of element stiffness matrices and load vectors; direct assembly procedures; equation solution techniques. Analysis of two- and three-dimensional truss and frame structures, thermal loads, and substructuring and condensation techniques for large systems. Practical modeling techniques and programming assignments. Introduction to nonlinear analysis concepts. Prerequisites: elementary structural analysis and matrix algebra.

3-4 units, Aut (Deierlein, G)

CEE 281. Mechanics and Finite Elements
Fluid conduction and solid deformation; conservation laws: balance of mass and balance of momentum; generalized Darcy's law and Hooke's law in 3D; the use of tensors in mechanics; finite element formulation of boundary-value problems; variational equations and Galerkin approximations; basic shape functions, numerical integration, and assembly operations.

3 units, Win (Borja, R)

CEE 282. Nonlinear Structural Analysis
Introduction to methods of geometric and material nonlinear analysis, emphasizing modeling approaches for framed structures. Large-displacement analysis, concentrated and distributed plasticity models, and nonlinear solution methods. Applications to frame stability and performance-based seismic design. Assignments emphasize computer implementation and applications. Prerequisites: 280, 286 or equivalent.

3-4 units, Win (Deierlein, G)

CEE 283. Structural Dynamics
Vibrations and dynamic response of simple structures under time dependent loads; dynamic analysis of single and multiple degrees of freedom systems; support motion; response spectra.

3-4 units, Win (Law, K)

CEE 284. Finite Element and Computational Methods in Structural Dynamics
Computational methods for structural dynamics analysis of discrete and continuous systems in free and forced vibration; finite element formulation; modal analysis; numerical methods; introduction to nonlinear dynamics; advanced topics. Prerequisites: 280, 283.

3-4 units, Spr (Law, K)

CEE 285. Behavior of Structural Systems for Buildings
Basic design concepts, performance criteria, loading, methods of design, types of structural systems, behavior under gravity and lateral loads, approximate methods of analysis, preliminary conceptual design, performance assessment, behavior of structural elements. Prerequisites: basic courses in design of steel and reinforced concrete structures.

3-4 units, not given this year

CEE 285A. Advanced Structural Concrete Behavior and Design
Behavior and design of reinforced and prestressed concrete for building and bridge design. Emphasis on flexural behavior, prestressed concrete design, slender columns, and two-way slab design & analysis.

3-4 units, Aut (Billington, S; Michel, A)

CEE 285B. Advanced Structural Steel Behavior and Design
Advanced topics in structural steel design. Topics include composite floor systems; bolted and welded connections; beam-column connections; innovative lateral load resisting systems. As part of this course students design a 15-story steel building. Prerequisite: basic course in structural steel design CEE181 or equivalent.

3-4 units, Aut (Miranda, E)

CEE 286. Behavior and Design of Structural Systems
Basic design concepts, performance criteria, loading, methods of design, behavior of various types of structural systems under gravity and lateral loads, approximate methods of analysis, preliminary conceptual design of structural elements. Prerequisites: CEE 280. Recommended: CEE 285A and/or CEE 285B.

3-4 units, Win (Miranda, E)

CEE 287. Earthquake Resistant Design and Construction
Evaluation, design, and construction of structures in seismic regions. Factors influencing earthquake ground motions, design spectra, design of linear and nonlinear single- and multiple-degree-of-freedom-system structures, force-based and displacement-based design methods, capacity design, detailing and construction of steel and reinforced concrete structures, introduction to performance-based design, seismic isolation, and energy dissipation. Prerequisites: 283, 285. Recommended: 282, 288.

3-4 units, Spr (Miranda, E)

CEE 288. Earthquake Hazard and Risk Analysis
Earthquake phenomena, faulting, ground motion, earthquake hazard formulation, effects of earthquakes on manmade structures, response spectra, Fourier spectra, soil effects on ground motion and structural damage, methods for structural damage evaluation, and formulation of the performance-based earthquake engineering problems. Prerequisites: 203, 283.

3-4 units, Win (Kiremidjian, A)

CEE 289. Random Vibrations
Introduction to random processes. Correlation and power spectral density functions. Stochastic dynamic analysis of multi-degree-of-freedom structures subjected to stationary and non-stationary random excitations. Crossing rates, first-excursion probability, and distributions of peaks and extremes. Applications in earthquake, wind, and ocean engineering. Prerequisite: 203 or equivalent.

3-4 units, Spr (Baker, J)

CEE 290. Structural Performance and Failures
Basic concepts in the definition of satisfactory structural performance; key elements in structural performance; types of failures, ranging from reduced serviceability to total collapse; failure sources and their root cause allocation, emphasizing design/construction process failures; failure prevention mechanisms; illustration with real life examples.

2 units, Spr (Moncarz, P)

CEE 293. Foundation Engineering
Types, characteristics, analysis, and design of shallow and deep foundations; rigid and flexible retaining walls; braced excavations; settlement of footings in sands and clays; slope stability analysis by method of slices including search algorithms for the critical slip surface. Special seminars by guest speakers; computing assignment. Prerequisite: 101C or equivalent.

3 units, Win (Staff)

CEE 294. Computational Poromechanics
Continuum and finite element formulations of steady-state and transient fluid conduction problems on geomechanics; elliptic, parabolic, and hyperbolic systems; variational inequality and free-boundary problems; three-dimensional consolidation theory; undrained condition, mesh locking, B-bar and strain projection methods; finite element formulations of multiphase dynamic problems. Computing assignments. Prerequisite: CEE 281 or equivalent.

3 units, alternate years, not given this year

CEE 295. Plasticity Modeling and Computation
Theory of plasticity; micromechanical basis; classical yield models; return-mapping algorithm; multi-surface and bounding surface models; material instabilities; localization and bifurcation. Prerequisite: CEE 281 or equivalent.

3 units, Spr (Borja, R)

CEE 296. Special Topics in Fluid-Solid Interactions
Civil, mechanical, and biomedical engineering. Topics include surge and wave impact on structures, tsunami induced sediment transport and scour, wave-soil interactions, dam-reservoir-foundation interactions, shock and blast loads on composite structures, hydroelastic tailoring of composite structures, and blood-vessel interactions. Term project.

2 units, not given this year

CEE 297. Issues in Geotechnical and Environmental Failures
Causes and consequences of the failure of buildings, earth structures, waste storage, and high hazard facilities in contact with the environment; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management. Case histories including earthquake, flood, and hazardous waste facilities. Student observation, participation in active lawsuits where possible.

3 units, not given this year

CEE 297G. Structural Geology and Rock Mechanics
(Same as GES 215A, GEOPHYS 251A) Quantitative field and laboratory data integrated with solutions to initial and boundary-value problems of continuum mechanics introduce tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent.

3-5 units, Aut (Pollard, D)

CEE 297H. Structural Geology and Rock Mechanics
(Same as GES 215B, GEOPHYS 251B) Field equations for elastic solids and viscous fluids derived from conservation laws to develop mechanical models for tectonic processes and their structural products. Topics include: conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding, model development, and methodology. Models constructed and solutions visualized using MATLAB. Prerequisite: GES 215A.

3-5 units, Win (Staff)

CEE 297M. Managing Critical Infrastructure Seminar
Safe and effective performance of infrastructure systems is critical to our economy, quality of life and safety. The seminar will present and discuss topics associated with risk analysis and management of critical civil infrastructure systems, including notions of acceptable risk. Discuss lessons learned from Hurricane Katrina and elsewhere which dictate the need for changes to how infrastructure systems are analyzed, designed and operated. Guest speakers. Student presentations.
1 unit, Spr (McCann, M)

CEE 298. Structural Engineering and Geomechanics Seminar
Recommended for all graduate students. Lectures on topics of current interest in professional practice and research.
1 unit, Win (Miranda, E)

CEE 299. Independent Study in Civil Engineering
Directed study for graduate students on subjects of mutual interest to students and faculty. Student must obtain faculty sponsor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 299S. Independent Project in Civil and Environmental Engineering
Prerequisite: consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 300. Thesis (Engineer Degree)
Research by Engineer candidates.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 301. The Energy Seminar
(Same as ENERGY 301) Interdisciplinary exploration of current energy challenges and opportunities, with talks by faculty, visitors, and students. May be repeated for credit.
1 unit, Aut (Benson, S), Win (Benson, S), Spr (Benson, S)

CEE 305. Damage and Failure Mechanics of Structural Systems
Examine the mechanics and failure mechanisms of structural deterioration mechanisms and hazards. Overview of fracture mechanics concepts as a general basis for analyzing brittle failure modes in steel and concrete structures. Analysis and design theory for corrosion, fatigue, fire and other damage mechanisms in steel and concrete structures. New methods for mitigation of these failure modes and hazards will be introduced, including new construction materials, structural designs and protection methods.
3-4 units, Spr (Lepech, M)

CEE 316. Sustainable Built Environment Research
Covers Ph.D. candidacy requirements of industry problem analysis and critical literature review for post-MS students conducting research on sustainable planning, design, management, and operation of buildings and infrastructure. Identify industry problems and related research questions. Design experiments and research methods for: ethnographies, case studies, surveys, classical experiments mathematical and computational simulations. Overview of statistical methods for data analysis. Publication strategies.
3-4 units, not given this year

CEE 320. Integrated Facility Engineering
Individual and group presentations on goals, research, and state-of-practice of virtual design and construction in support of integrated facility engineering, including objectives for the application and further development of virtual design and construction technologies. May be repeated for credit.
1 unit, Aut (Kunz, J; Fischer, M), Win (Fischer, M), Spr (Kunz, J)

CEE 321. Formal Models for Design
Theories, methods, and formal systems to support the design of buildings. Academic and industrial frameworks to represent and manage the products, organizations, and processes of building projects. May be repeated for credit.
3 units, not given this year

CEE 342. Computational Modeling of Organizations
For post-M.S. students interested in formal techniques for organization design. Computer simulations of organizations are used to conduct virtual experiments for developing organization theory or to analyze the performance of virtual organizations with different structures and decision support and communication technologies. Research on computational modeling and design of real-world organizations. Paper serves as a research proposal. Prerequisite: 242 or equivalent introductory organization design class.
4 units, not given this year

CEE 345. Game Theory Modeling in Engineering
Game theory involves the analysis of conflict, cooperation and communication, and is a novel and powerful tool for analyzing important issues in engineering management and engineering policy. Class will develop students¿ game theory skills in an applied context. Learn how to set up and solve fundamental game models and apply these skills to building new theories in engineering management through game theory modeling. Class illustrates the arts of game modeling by applying game theory in: (1) contracting and opportunistic bidding; (2) renegotiation in public-private partnerships; (3) partner selection strategies in global projects; and (4) knowledge management and sharing. Students are encouraged to apply game theory to their own research issues or disciplines, and extend their term projects into research papers or theses. Limited class size. Priority for CEE, IPER and MS&E students.
2-3 units, Aut (Ho, S)

CEE 362. Numerical Modeling of Subsurface Processes
Numerical modeling including: problem formulation, PDEs and weak formulations, and choice of boundary conditions; solution using the finite-element code COMSOL Multiphysics with a variety of solvers and pre- and postprocessing of data; and interpretation of results. Problems include: flow in saturated porous media with complex boundaries and heterogeneities; solute transport with common reaction models; effects of heterogeneity on dispersion, dilution, and mixing of solutes; variable-density flow and seawater intrusion; upscaling or coarsening of scale; and biofilm modeling. Enrollment limited to 5.
3-4 units, alternate years, not given this year

CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods
Stochastic methods for the solution of inverse problems that are algebraically underdetermined or have solutions that are sensitive to data. Emphasis is on geostatistical methods that, in addition to using data, incorporate information about structure such as spatial continuity and smoothness. Methods for real-time processing of new data. Prerequisite: consent of instructor.
3-4 units, alternate years, not given this year

CEE 363A. Mechanics of Stratified Flows
The effects of density stratification on flows in the natural environment. Basic properties of linear internal waves in layered and continuous stratification. Flows established by internal waves. Internal hydraulics and gravity currents. Turbulence in stratified fluids. Prerequisites: 262A,B, CME 204.
3 units, alternate years, not given this year

CEE 363C. Ocean and Estuarine Modeling
Advanced topics in modeling for ocean and estuarine environments, including methods for shallow water, primitive, and nonhydrostatic equations on Cartesian, curvilinear, and unstructured finite-volume grid systems. Topics include free-surface methods, nonhydrostatic solvers, and advanced Eulerian and Lagrangian advection techniques. Focus is on existing techniques and code packages, and their methodologies, including POM, ROMS, TRIM, ELCOM, and SUNTANS. Prerequisites: CME 200, 206, or equivalents.
3 units, Win (Fringer, O)

CEE 363F. Oceanic Fluid Dynamics
(Same as EESS 363F) Dynamics of rotating stratified fluids with application to oceanic flows. Topics include: inertia-gravity waves; geostrophic and cyclogeostrophic balance; vorticity and potential vorticity dynamics; quasi-geostrophic motions; planetary and topographic Rossby waves; inertial, symmetric, barotropic and baroclinic instability; Ekman layers; and the frictional spin-down of geostrophic flows. Prerequisite: CEE 262A or a graduate class in fluid mechanics.
3 units, Spr (Thomas, L)

CEE 363G. Field Techniques in Coastal Oceanography
This course focuses on the design and implementation of coastal oceanographic field studies from implementation through analysis. A wide range of field instrumentation and techniques, including AUVs and scientific diving is covered. Field studies. Data collection and analysis under instructor guidance.
3 units, Spr (Woodson, C)

CEE 364Y. Advanced Topics in Coastal Oceanography
The dynamics and transport implications of features in estuaries and coastal oceans characterized by sharp gradients: fronts, interfaces, and layers. Analytic framework to describe the formation, maintenance, and dissipation of such features. Examples include tidal mixing fronts, buoyant plume fronts and tidal intrusions, biological thin layers, and axial convergent fronts. Second unit for students who give a presentation.
1-2 units, not given this year

CEE 365A. Advanced Topics in Environmental Fluid Mechanics and Hydrology
Students must obtain a faculty sponsor.
2-6 units, Aut (Staff)

CEE 365B. Advanced Topics in Environmental Fluid Mechanics and Hydrology
Students must obtain a faculty sponsor.
2-6 units, Win (Staff)

CEE 365C. Advanced Topics in Environmental Fluid Mechanics and Hydrology
Students must obtain a faculty sponsor.
2-6 units, Spr (Staff)

CEE 365D. Advanced Topics in Environmental Fluid Mechanics and Hydrology
Students must obtain a faculty sponsor.
2-6 units, Sum (Staff)

CEE 370A. Environmental Research
Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.
5-6 units, Aut (Staff)

CEE 370B. Environmental Research
Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.
5-6 units, Win (Staff)

CEE 370C. Environmental Research
Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.
5-6 units, Spr (Staff)

CEE 370D. Environmental Research
Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.
3-6 units, Sum (Staff)

CEE 371. Frontiers in Environmental Research
How to evaluate environmental research.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

CEE 371M. Transport Phenomena: Momentum, heat and mass transport
(Same as CEE 271M) Heat, mass and momentum transfer theory from the viewpoint of basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory. Prerequisites: fluid mechanics, ordinary differential equations.
3 units, not given this year

CEE 374A. Introduction to Physiology of Microbes in Biofilms
Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.
1-6 units, Aut (Spormann, A)

CEE 374B. Introduction to Physiology of Microbes in Biofilms
Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.
1-6 units, Win (Staff)

CEE 374C. Introduction to Physiology of Microbes in Biofilms
Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.
1-6 units, Spr (Staff)

CEE 374D. Introduction to Physiology of Microbes in Biofilms
Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.
1-6 units, Sum (Staff)

CEE 374S. Advanced Topics in Microbial Pollution
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Boehm, A), Win (Boehm, A), Spr (Boehm, A), Sum (Boehm, A)

CEE 374T. Advanced Topics in Coastal Pollution
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Boehm, A), Win (Boehm, A), Spr (Boehm, A), Sum (Boehm, A)

CEE 374U. Advanced Topics in Submarine Groundwater Discharge
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Boehm, A), Win (Boehm, A), Spr (Boehm, A), Sum (Boehm, A)

CEE 374V. Advanced Topics in Microbial Source Tracking
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Boehm, A), Win (Boehm, A), Spr (Boehm, A), Sum (Boehm, A)

CEE 375. Advanced Methods in Pathogen Detection
Molecular and culture-based techniques for pathogen detection in water.
2 units, not given this year

CEE 376. Investigating the Fate of Organic Contaminants in the Environment
Theory and practice of instrumental methods used in environmental engineering and sciences, emphasizing chromatographic separation and mass spectrometric detection. Study of instrument performance, design an investigation, case studies and written proposal.
3 units, Sum (Reinhard, M)

CEE 377. Research Proposal Writing in Environmental Engineering and Science
For first- and second-year post-master's students preparing for thesis defense. Students develop progress reports and agency-style research proposals, and present a proposal in oral form. Prerequisite: consent of thesis adviser.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 378. Statistical Analysis of Environmental Data: Tools and Applications
Preference to Environmental Engineering and Science Ph.D. students. Practical data analysis techniques applicable to environmental engineering. The role of statistics in data collection, experimental design, data exploration, and effective communication of results. Use of statistical packages such as Excel, Matlab, and R. Discussions partially based on student interest and available datasets. Topics may include summarizing data, hypothesis testing, nonparametric statistics, regression analysis, classification and

regression trees, cluster analysis, and computationally intensive methods. Limited enrollment.

2-3 units, not given this year

CEE 378D. Seminar of Statistical Analysis of Multidisciplinary Primary Data

Practical management and analysis techniques for primary data collected in multidisciplinary projects. Selection of appropriate statistical tests, interpretation of results, and effective communication of findings to lay audiences. Univariate, bivariate and multivariate techniques, including hypothesis testing, nonparametric statistics, regression analysis and matching. Use of SPSS statistical package. Limited enrollment. Prerequisite: consent of instructor.

1-3 units, not given this year

CEE 381. Advanced Engineering Informatics

1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 385. Performance-Based Earthquake Engineering

Synthesis and application of approaches to performance-based design and assessment that recently have been developed or are under development. Emphasis is on quantitative decision making based on life-cycle considerations that incorporate direct losses, downtime losses, and collapse, and the associated uncertainties. Hazard analysis, response simulation, damage and loss estimation, collapse prediction. Case studies. Prerequisites: 282, 287, and 288.

2-3 units, Aut (Krawinkler, H)

CEE 398. Report on Civil Engineering Training

On-the-job training under the guidance of experienced, on-site supervisors; meets the requirements for Curricular Practical Training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. Prerequisite: qualified offer of employment and consent of adviser as per I-Center procedures.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 399. Advanced Engineering Problems

Individual graduate work under the direction of a faculty member on a subject of mutual interest. Student obtain faculty sponsor. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 400. Thesis (Ph.D. Degree)

For students who have successfully completed the department general qualifying examination. Research and dissertation for the Ph.D. degree.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 801. TGR Project (Engineer Degree)

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CEE 802. TGR Dissertation (PhD degree)

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSICS ART/ARCHAEOLOGY (CLASSART) COURSES

UNDERGRADUATE COURSES IN CLASSICS ART/ARCHAEOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CLASSART 21Q. Eight Great Archaeological Sites in Europe

(Stanford Introductory Seminar) Preference to sophomores. Focus is on excavation, features and finds, arguments over interpretation, and the place of each site in understanding the archaeological history of Europe. Goal is to introduce the latest archaeological and anthropological thought, and raise key questions about ancient society. The archaeological perspective foregrounds interdisciplinary study: geophysics articulated with art history, source criticism with analytic modeling, statistics interpretation. A web site with resources about each site, including plans, photographs, video, and publications, is the basis for exploring. GER:DB-Hum

3-5 units, Aut (Shanks, M)

CLASSART 101. Archaic Greek Art

(Same as ARTHIST 101, ARTHIST 301, CLASSART 201) The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientalizing phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E. GER:DB-Hum

4 units, Aut (Maxmin, J)

CLASSART 102. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles

(Same as ARTHIST 102, ARTHIST 302) The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries. GER:DB-Hum

4 units, Win (Maxmin, J)

CLASSART 109. Greek Art In and Out of Context

(Same as ARTHIST 203) The cultural contexts in which art served religious, political, commercial, athletic, sympotic, and erotic needs of Greek life.

4-5 units, Aut (Maxmin, J)

CLASSART 110. Appropriations of Greek Art

(Same as ARTHIST 204A) Upper division seminar. The history of the appropriation of Greek art by Rome, the Renaissance, Lord Elgin, and Manet. Enrollment limited to 6. Prerequisite: ARTHIST 102 or consent of instructor.

4-5 units, Spr (Maxmin, J)

CLASSART 113. Ten Things: An Archaeology of Design

(Same as CLASSART 213, STS 112) Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology. GER:DB-SocSci

3-5 units, Aut (Shanks, M)

CLASSART 114. Ceramics: Art and Science

(Same as ARCHLGY 117) From clay to culture. Design, technology, manufacture, and consumption of ceramics. Guest lecturers, site visits, and hands-on studio work.

3-5 units, Spr (Shanks, M)

CLASSART 142. Archaeology of Roman Slavery

(Same as CLASSART 242) The archaeology of Roman slavery embodies a paradox: slavery was ubiquitous in Roman society but did not leave distinct material traces that archaeologists can easily identify. Explore that paradox by examining ancient writings on Roman slavery in conjunction with built spaces, visual images, and artifacts. Discuss more recent slave societies for purposes of comparison and contrast. Learn to analyze different kinds of historical and archaeological evidence, how to reconstruct social and spatial dynamics, and how ancient Roman slavery and society worked.

4-5 units, Win (Trimble, J)

GRADUATE COURSES IN CLASSICS ART/ARCHAEOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSART 201. Archaic Greek Art

(Same as ARTHIST 101, ARTHIST 301, CLASSART 101) The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientalizing phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.

4 units, Aut (Maxmin, J)

CLASSART 213. Ten Things: An Archaeology of Design

(Same as CLASSART 113, STS 112) Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology.

3-5 units, Aut (Shanks, M)

CLASSART 242. Archaeology of Roman Slavery

(Same as CLASSART 142) The archaeology of Roman slavery embodies a paradox: slavery was ubiquitous in Roman society but

did not leave distinct material traces that archaeologists can easily identify. Explore that paradox by examining ancient writings on Roman slavery in conjunction with built spaces, visual images, and artifacts. Discuss more recent slave societies for purposes of comparison and contrast. Learn to analyze different kinds of historical and archaeological evidence, how to reconstruct social and spatial dynamics, and how ancient Roman slavery and society worked.

4-5 units, Win (Trimble, J)

CLASSART 315. Mapping Rome

Spatial analysis of the city of Rome in the late republic and early empire, including work with the Severan marble plan. Themes include the nature and urban impact of religious, commercial and residential space; interactions of different kinds of space; movement through the city; organization of neighborhoods and their implications for social relations. May be repeated for credit.

5 units, Spr (Trimble, J)

CLASSICS GENERAL (CLASSGEN) COURSES

UNDERGRADUATE COURSES IN CLASSICS GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CLASSGEN 5N. The Nile and its Life-cycles

(Stanford Introductory Seminar) Studying the Nile River, in all its aspects involving antiquity. Particular focus on the period between 500 BC and AD 500, with limited materials before and after said period. Is it useful or misleading to think of the river itself as ancient? What happens when we consider the Nile spatially as a whole? Since only a part of the river flows through Egypt we will also focus on Ethiopia, the Sudan and equatorial Africa, which were also objects of ancient Greek and Roman fascination.

3-5 units, Aut (Parker, G)

CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent

(Stanford Introductory Seminar) (Same as DRAMA 12N) Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of Antigone by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. GER:DB-Hum, EC-Gender

3-5 units, Aut (Rehm, R)

CLASSGEN 9. Greek and Latin Roots of English

Goal is to improve vocabulary, comprehension of written English, and standardized test scores through learning the Greek and Latin components of English. Focus is on patterns and processes in the formation of the lexicon. Terminology used in medicine, business, education, law, and humanities; introduction to principles of language history and etymology. Greek or Latin not required.

3 units, Sum (Porta, F)

CLASSGEN 16N. New Worlds from Homer to Columbus

(Stanford Introductory Seminar) Preference to sophomores. What did the ancient Greeks and Romans imagine far away places and peoples to be like? What did they think the world looked like? What was the modern afterlife of these ancient travel experiences? Focus on Greek and Roman travels and encounters with alien peoples and exotic places (from Homer's Odyssey to the Roman historian Tacitus' descriptions of Britain and German), accounts of the New World and its peoples by both explorers and missionaries (from Columbus to Las Casas) and visual representations.

3-5 units, Spr (Ceserani, G)

CLASSGEN 18. Greek Mythology

The heroic and divine in the literature, mythology, and culture of archaic Greece. Interdisciplinary approach to the study of individuals and society. Illustrated lectures. Readings in translation of Homer, Hesiod, Herodotus, and the poets of lyric and tragedy. GER:DB-Hum

3-5 units, Aut (Martin, R)

CLASSGEN 24N. Sappho: Erotic Poetess of Lesbos

(Stanford Introductory Seminar) Preference to freshmen. Sappho's surviving fragments in English; traditions referring to or fantasizing about her disputed life. How her poetry and legend inspired women authors and male poets such as Swinburne, Baudelaire, and Pound. Paintings inspired by Sappho in ancient and modern times, and composers who put her poetry to music. GER:DB-Hum, EC-Gender

4-5 units, Win (Peponi, A)

CLASSGEN 81. Philosophy and Literature

(Same as COMPLIT 181, ENGLISH 81, FRENGEN 181, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum

4-5 units, Win (Anderson, L; Landy, J)

CLASSGEN 107. The Black Mediterranean: Greece, Rome and Antiquity

(Same as AFRICAAM 107C, CSRE 107) Explore problems of race and ethnicity as viable criteria in studying ancient societies and consider the question, What is the Mediterranean?, in relation to premodern evidence. Investigate the role of blackness as a marker of ethnicity; the demography of slavery and its roles in forming social identities; and environmental determinism as a factor in ethnic and racial thinking. Consider Greek and Roman perspectives and behavior, and their impact on later theories of race and ethnicity as well as the Mediterranean as a whole. GER:EC-GlobalCom

4-5 units, Aut (Parker, G)

CLASSGEN 119. Gender and Power in Ancient Rome

Ideals, norms, and transgressions of behavior. Masculinity and femininity in founding legends and public rituals; the ambiguous status of vestal virgins; the masculinity of the Roman Forum; the spatial logic of Roman prostitution; gendered accounts of good and bad emperors in ancient texts. Practices of gender and power in life and death, public and private space, religion, spectacles, and sex in the urban landscape of ancient Rome GER:DB-Hum, EC-Gender

3-5 units, Spr (Trimble, J)

CLASSGEN 123. Urban Sustainability: Long-Term Archaeological Perspectives

(Same as CLASSGEN 223, URBANST 115) Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas.

3-5 units, Spr (Shanks, M)

CLASSGEN 125. Socrates: The Legend and the Man

Socrates has been one of the most enigmatic, controversial and influential figures in history. Explore the major ancient sources about his private and public life, his legendary death, his provocative views on ethics, politics and erotics, his distinctive self-presentation, and his various modes of communicating ideas. We will also discuss the way modern philosophers, such as Kierkegaard and Nietzsche, struggled over Socrates' heritage.

3-5 units, Win (Peponi, A)

CLASSGEN 126. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict
(Same as CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 226B, RELIGST 326B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world. GER:DB-Hum

5 units, Aut (Fonrobert, C)

CLASSGEN 132. Early Christian Gospels
(Same as RELIGST 132D) An exploration of Christian gospels of the first and second century. Emphasis on the variety of images and interpretations of Jesus and the good news, the broader Hellenistic and Jewish contexts of the gospels, the processes of developing and transmitting gospels, and the creation of the canon. Readings include the Gospel of John, the Gospel of Mark, the Gospel of Thomas, the Gospel of Mary and other canonical and non-canonical gospels. GER:DB-Hum

4 units, Spr (Copeland, K)

CLASSGEN 138. Modern Journeys in Ancient Lands: Building a Spatial History of the Grand Tour
Touring the ancient sites of Italy was an educational rite of passage for 18th-century British elites. Where did Grand Tourists travel? How did the places visited and people encountered affect them, and shape our own vision of the ancient world? Analysis of the literary, geographic, and ideological landscapes of the Grand Tour through focus on primary sources (archival and published) and modern geoanalytical tools (from Google Earth to GIS) to create dynamic visualizations reflecting current theoretical and historical approaches.

3-5 units, Win (Ceserani, G)

CLASSGEN 151. Greek Tragedy
(Same as DRAMA 151, DRAMA 251) Greek Tragedy explores the plays of Aeschylus, Sophocles, and Euripides and the theatrical genre that developed along with the radical democracy of ancient Athens. Plays include the Oresteia, Prometheus Bound, Persians, Antigone, Electra, Oedipus Tyrannus, Philoctetes, Medea, Heracles, Trojan Women, Helen, Ion, and the Bacchae. We will focus on the dramatic challenges posed by these plays, their political and historical context, and what they can teach us about today¿s theater.

3-5 units, Aut (Rehm, R)

CLASSGEN 160. Directed Readings (Undergraduate)
May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 164. The Homeric Muse: Iliad, Odyssey, and Their Epic Influence
(Same as DRAMA 164R) The great Homeric epics, the Iliad and Odyssey, and Derek Walcott's re-working of Homer's poems, his Nobel-prize winning Omeros. Students attend the theatrical and cinematic adaptations that Stanford Summer Theater (SST) presents, featuring a production of The Wanderings of Odysseus, a staged reading of Walcott's Omeros, and films such as Oh Brother, Where Art Thou? Students attend the SST symposium, featuring scholars from Oxford University and Stanford, who discuss the Homeric epics and their influence.

3-5 units, Sum (Rehm, R)

CLASSGEN 174. Martyrdom in the Ancient World
(Same as RELIGST 174) Jewish, pagan and Christian groups under Roman rule all told tales of persecution and resistance. How did they use these stories, and the historical experiences behind them, to form group identity? Emphasis is on ancient documents in translation, and modern scholarly interpretations, to examine the competing agendas of parties involved, group dynamics, individual motivation, symbolic violence, and the body as a locus of power and control. GER:DB-Hum

4 units, not given this year

CLASSGEN 176. Majors Seminar: The Iliad, the Aeneid, and the Ancient Art of Persuasion
Required of Classics majors and minors in junior or senior year; students contemplating honors should take this course in junior year. Advanced skills course involving close reading, critical thinking, editing, and writing. Students read the Iliad and the Aeneid, along with a selection of articles reflecting various critical approaches. We also study the system of rhetorical training that was the cornerstone of ancient education. In-class and take-home writing and revising exercises. Final paper topic may be on any subject related to Classics. WIM

4-5 units, Win (Gleason, M)

CLASSGEN 199. Undergraduate Thesis: Senior Research

2-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN CLASSICS GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSGEN 205A. The Semantics of Grammar
Supplements CLASSLAT/CLASSGRK 275. Introduction to the grammatical encoding of semantic and pragmatic meaning. 205A: morphology-semantics interface (gender, tense, aspect, case). 205B: syntax-pragmatics interface (Latin word order). Begins in Autumn Quarter and continues through 5th week of Winter Quarter.

2 units, Aut (Devine, A)

CLASSGEN 205B. The Semantics of Grammar
Supplements CLASSLAT/CLASSGRK 275. Introduction to the grammatical encoding of semantic and pragmatic meaning. 205A: morphology-semantics interface (gender, tense, aspect, case). 205B: syntax-pragmatics interface (Latin word order). Begins in Autumn Quarter and continues through 5th week of Winter Quarter.

2 units, Win (Devine, A)

CLASSGEN 207A. Survey of Greek and Latin Literature: Literature of the Roman Republic
First course in a required two-year sequence. Focus is on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years. Focus is on translation, textual criticism, genre, the role of Greece in shaping Roman literature, and oral versus written discourse.

3-5 units, Aut (Barchiesi, A)

CLASSGEN 207B. Survey of Greek and Latin Literature: Augustan Age Latin
Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Texts of Augustan literature required by the graduate syllabus, emphasizing poetry and major authors.

3-5 units, Win (Kaesser, C)

CLASSGEN 207C. Survey of Greek and Latin Literature: Imperial Latin
Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years.

4-5 units, Spr (Parker, G)

CLASSGEN 223. Urban Sustainability: Long-Term Archaeological Perspectives
(Same as CLASSGEN 123, URBANST 115) Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas.

3-5 units, Spr (Shanks, M)

CLASSGEN 226. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict
(Same as CLASSGEN 126, JEWISHST 226B, JEWISHST 326B, RELIGST 226B, RELIGST 326B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians,

Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

5 units, Aut (Fonrobert, C)

CLASSGEN 241. Words and Things in the History of Classical Scholarship

How have scholars used ancient texts and objects since the revival of the classical tradition? How did antiquarians study and depict objects and relate them to texts and reconstructions of the past? What changed and what stayed the same as humanist scholarship gave way to professional archaeologists, historians, and philologists? Focus is on key works in the history of classics, such as Erasmus and Winckelmann, in their scholarly, cultural, and political contexts, and recent critical trends in intellectual history and the history of disciplines.

4-5 units, Spr (Ceserani, G)

CLASSGEN 260. Directed Reading in Classics (Graduate Students)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 304. Aristophanes and Athens

Poet, zany sage, satirist, surrealist, Aristophanes seems to anticipate every mode of comic writing and performances found later in Western literary traditions. His blend of social and political comedy, farces, and fantasy saw the end of its own genre in late 5th-century Athens. Lysistrata and other plays in Greek. Topics: the ancient theory of comedy, obscenity, theater and politics as complementary performance modes, genre-crossing and intersexuality within old comedy, and the representation of gender.

4-5 units, Win (Martin, R)

CLASSGEN 308. Lawcourt, Gymnasia, Symposium, Agora: Philosophic Discourse and Exchanging Places in Athens

In democratic Athens, the lawcourts, gymnasium, symposia, and agora were social spaces featuring different modes of exchange: political, pedagogical, erotic, mercantile. The discourses and practices in theseexchanging places reflect the ongoing negotiation and interrogation of democratic ideology. Topics include: Socrates' philosophic performances in these exchanging places in Plato and Xenophon; Plato, Isocrates, and Aristotle's critiques of the anti-philosophical modes of exchange in these places; and their efforts to make a place for philosophic exchange in the city.

4-5 units, Spr (Nightingale, A)

CLASSGEN 325. Mousike: Ancient Music in Theory and Performance

The starting point for this seminar is the difficulty of its definition. Ancient Mousike covered a range from technical mathematical treatises to a culture of public performance. Goal is to bring in as much of the evidence as possible for ancient music, and to understand it as a cultural whole, thereby shedding light on both science and culture.

3-5 units, Aut (Peponi, A; Netz, R)

CLASSGEN 360. Dissertation Research in Classics

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSICS GREEK (CLASSGRK) COURSES

UNDERGRADUATE COURSES IN CLASSICS GREEK

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CLASSGRK 1. Beginning Greek

No knowledge of Greek is assumed. Classics majors and minors must take course for letter grade. Vocabulary and syntax of the classical language.

5 units, Aut (Martin, R)

CLASSGRK 2. Beginning Greek

Continuation of CLASSGRK 1. Classics majors and minors must take course for letter grade.

3-5 units, Win (McCall, M)

CLASSGRK 3. Beginning Greek

Continuation of CLASSGRK 2. Classics majors and minors must take course for letter grade. Vocabulary and syntax of the classical language. Separate section for Biblical Greek. CLASSGRK 3 fulfills University language requirement.

3-5 units, Spr (Stephens, S)

CLASSGRK 101. Intermediate Greek: New Testament and Lysias

Greek Prose: readings from New Testament (Book of Acts) and Lysias. Vocabulary building, ongoing review of forms and constructions. Classics majors and minors must take course for letter grade. May be repeated for credit.

4-5 units, Aut (Gleason, M)

CLASSGRK 102. Intermediate Greek: Aeschylus

A close reading of Aeschylus' Prometheus Bound; the ongoing interpretive and staging problems in the play; and setting the play in the larger context of Aeschylean tragedy. Classics majors and minors must take course for letter grade. May be repeated for credit.

4-5 units, Win (McCall, M)

CLASSGRK 103. Intermediate Greek: Homer

The language and poetry of Homer. Readings in Greek and English. Classics majors and minors must take course for letter grade. May be repeated for credit.

3-5 units, Spr (MacDonald, C)

CLASSGRK 111. Advanced Greek: Poetry and the Senses

(Same as CLASSGRK 211) Invectives, love songs, drinking songs, elegies, and choral odes from 700-500 B.C.E. Readings include Sappho, Alcaeus, Archilochus, Mimnermus, Alcman, Solon, and Pindar. Classics majors and minors must take course for letter grade. May be repeated for credit.

3-5 units, Aut (Peponi, A)

CLASSGRK 113. Advanced Greek: Scientific Writing

Euclid and Archimedes. Reading texts from Greek science. The relationship between form and meaning in the presentation of scientific information, introduction to Greek Paleography. Classics majors and minors must take course for letter grade. May be repeated for credit.

4 units, Spr (Netz, R)

CLASSGRK 175A. Greek Syntax: Prose Composition

(Same as CLASSGRK 275A) (First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.

3-5 units, Win (Stephens, S)

CLASSGRK 175B. Greek Syntax: Prose Composition
(Same as CLASSGRK 275B) (First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.
3-5 units, Spr (Stephens, S)

CLASSGRK 211. Advanced Greek: Poetry and the Senses
(Same as CLASSGRK 111) Invectives, love songs, drinking songs, elegies, and choral odes from 700-500 B.C.E. Readings include Sappho, Alcaeus, Archilochus, Mimnermus, Alcman, Solon, and Pindar. Classics majors and minors must take course for letter grade. May be repeated for credit.
3-5 units, Aut (Peponi, A)

GRADUATE COURSES IN CLASSICS GREEK

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSGRK 275A. Greek Syntax: Prose Composition
(Same as CLASSGRK 175A) (First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.
3-5 units, Win (Stephens, S)

CLASSGRK 275B. Greek Syntax: Prose Composition
(Same as CLASSGRK 175B) (First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.
3-5 units, Spr (Stephens, S)

CLASSICS HISTORY (CLASSHIS) COURSES

UNDERGRADUATE COURSES IN CLASSICS HISTORY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CLASSHIS 24N. The Roman Empire: Its Grandeur and Fall
(Stanford Introductory Seminar) (Same as HISTORY 11N) Preference to Freshmen. Prerequisite: IHUM 69A. Explore themes on the Roman Empire and its decline from the 1st through the 5th centuries C.E.. What was the political and military glue that held this diverse, multi-ethnic empire together? What were the bases of wealth and how was it distributed? What were the possibilities and limits of economic growth? How integrated was it in culture and religion? What were the causes and consequences of the conversion to Christianity? Why did the Empire fall in the West? How suitable is the analogy of the U.S. in the 21st century?
3 units, Spr (Saller, R)

CLASSHIS 60. The Romans
How did Rome grow from a loose gang of shepherds, exiles, and criminals to an empire of 65 million people stretching from Britain to Egypt? How and why did it then fall into ruins? Topics include Roman history, society, culture, economics, religions, and impact on Western civilization. We also discuss the origins of the republican form of government, explorations of military strategy, imperialism, slavery, and public entertainment. Focus is on original primary sources, including visual and archaeological evidence. This course also teaches general historical methodologies and techniques. GER:DB-Hum
3-5 units, Spr (Strong, A)

CLASSHIS 101. The Greeks
Greek history from the rise of the city state through Alexander the Great's conquest of Persia. Economics, society, culture, and technology. Competition and cooperation within and between states; the emergence of strong forms of citizenship along with chattel slavery and gender inequality; the origins and practices of democracy; and relations with non-Greek peoples. Focus is on ancient sources and archaeological remains. GER:DB-Hum
4-5 units, Win (Morris, I)

CLASSHIS 133. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 230A, POLISCI 330A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. GER:DB-Hum
4-5 units, Win (Ober, J)

GRADUATE COURSES IN CLASSICS HISTORY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSHIS 330A. Wealthy Hellas
(Same as POLISCI 430A) Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, however (much of it conducted here at Stanford), suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. We will develop and test hypotheses to explain the rate and pace of economic change in the Greek world.
4-5 units, Win (Ober, J; Morris, I)

CLASSHIS 330B. Wealthy Hellas
(Same as POLISCI 430B) Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, much of it conducted at Stanford, suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. Students develop and test hypotheses to explain the rate and pace of economic change in the Greek world.
1-5 units, Spr (Ober, J; Morris, I)

CLASSHIS 333. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, PHIL 176A, PHIL 276A, POLISCI 230A, POLISCI 330A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.
4-5 units, Win (Ober, J)

CLASSICS LATIN (CLASSLAT) COURSES

UNDERGRADUATE COURSES IN CLASSICS LATIN

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CLASSLAT 1. Beginning Latin: Vocabulary and Syntax
Vocabulary and syntax of the classical language. No previous knowledge of Latin is assumed. Classics majors and minors must take course for letter grade.
3-5 units, Aut (Staff)

CLASSLAT 2. Beginning Latin
Continuation of CLASSLAT 1. Classics majors and minors must take course for letter grade.
3-5 units, Win (Staff)

CLASSLAT 3. Beginning Latin
Continuation of CLASSLAT 2. Classics majors and minors must take course for letter grade. CLASSLAT 3 fulfills the University language requirement.
3-5 units, Spr (Staff)

CLASSLAT 10. Intensive Beginning Latin
Equivalent to CLASSLAT 1, 2, 3; or 51 and 52. Goal is to read easy Latin prose and poetry by the end of the quarter. Classics majors and minors must take course for letter grade. CLASSLAT 10 fulfills the University language requirement.
9-15 units, Sum (Duncan, A)

CLASSLAT 101. Intermediate Latin: Introduction to Literature
Phonology, morphology, semantics, and syntax. Readings in prose and poetry. Analysis of literary language, including rhythm, meter, word order, narrative, and figures of speech.
3-5 units, Aut (Staff)

CLASSLAT 102. Intermediate Latin: Nepos and Catullus
Classics majors and minors must take this course for a letter grade. Translation of selections from Nepos' Life of Atticus and poems of Catullus. Emphasis is on syntax and grammar; questions concerning place and function of Catullus' erotic poetry and Nepos' biography in the late Roman Republic.
3-5 units, Win (Kaesser, C)

CLASSLAT 103. Intermediate Latin
Classics majors and minors must take course for a letter grade. May be repeated for credit.
3-5 units, Spr (Staff)

CLASSLAT 111. Advanced Latin: Mental Health in Roman Philosophy
In the ancient world, philosophers sought to improve the happiness of their students and satisfaction with their lives by addressing emotional upheaval. Study will include the writings of Cicero, Seneca, and St. Augustine. Classic majors and minors must take course for a letter grade. May be repeated for credit.
3-5 units, Aut (Kaesser, C)

CLASSLAT 112. Advanced Latin: Tacitus
Classics majors and minors must take course for letter grade. May be repeated for credit. Close readings of selections from Tacitus' Germania and Agricola. Attention to style and vocabulary. How does Tacitus describe previously unknown places and peoples? What do his descriptions in turn tell us about Rome in his own time and place?
3-5 units, Win (Ceserani, G)

CLASSLAT 113. Advanced Latin: Writing Rome
With its distinctive combination grandeur and filth, of elegance and congestion, the City of Rome has inspired a wide range of responses since antiquity. We will sample those responses with special attention to Latin verse (Virgil, Propertius, Ovid, Juvenal); prose texts (Livy and Ammianus); and inscriptions - many anthologized in P.J. Aicher's Rome Alive. This course will complement `Mapping Rome' (J. Trimble), but can be taken separately. Readings in Latin. May be repeated for credit.
3-5 units, Spr (Parker, G)

CLASSLAT 175A. Latin Syntax
(Same as CLASSLAT 275A) (First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.
3-5 units, Aut (Devine, A)

CLASSLAT 175B. Latin Syntax
(Same as CLASSLAT 275B) (First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.
2 units, Win (Devine, A)

GRADUATE COURSES IN CLASSICS LATIN

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSLAT 275A. Latin Syntax
(Same as CLASSLAT 175A) (First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.
3-5 units, Aut (Devine, A)

CLASSLAT 275B. Latin Syntax
(Same as CLASSLAT 175B) (First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.
2 units, Win (Devine, A)

CLASSLAT 401. Virgil's Aeneid
Research seminar on the text of the Aeneid in Latin: requires advanced knowledge of Classical Latin. This poem is central both in the classical tradition and in professional Classics. A combination of close reading of selected passages and exploration of critical issues (space; time; ethnicity; political ideology; art, knowledge, empire) with research papers.
3-5 units, Aut (Barchiesi, A)

COMMUNICATION (COMM) COURSES

UNDERGRADUATE COURSES IN COMMUNICATION

Primarily for undergraduates; graduate students may enroll with consent of adviser.

COMM 1A. Media Technologies, People, and Society
(Same as COMM 211) (Graduate students register for COMM 211.) Open to non-majors. Introduction to the concepts and contexts of communication. A topics-structured orientation emphasizing the field and the scholarly endeavors represented in the department. GER:DB-SocSci
4-5 units, not given this year

COMM 1B. Media, Culture, and Society
(Same as AMSTUD 1B) The institutions and practices of mass media, including television, film, radio, and digital media, and their role in shaping culture and social life. The media's shifting relationships to politics, commerce, and identity. GER:DB-SocSci
5 units, Win (Turner, F)

COMM 104. Reporting, Writing, and Understanding the News
Techniques of news reporting and writing. The value and role of news in democratic societies. Gateway class to journalism. Prerequisite for all COMM 177/277 classes. Limited enrollment. Preference to sophomores and juniors. GER:DB-SocSci
5 units, Aut (Staff), Win (Staff), Spr (Staff)

COMM 106. Communication Research Methods
(Same as COMM 206) (Graduate students register for COMM 206.) Conceptual and practical concerns underlying commonly used quantitative approaches, including experimental, survey, content analysis, and field research in communication. Pre- or corequisite: STATS 60 or consent of instructor. GER:DB-SocSci
4-5 units, Win (Voelker, D)

COMM 108. Media Processes and Effects
(Same as COMM 208) (Graduate students register for COMM 208.) The process of communication theory construction including a survey of social science paradigms and major theories of communication. Recommended: 1 or PSYCH 1. GER:DB-SocSci
4-5 units, Aut (Bailenson, J)

COMM 116. Journalism Law
(Same as COMM 216) (Graduate students register for 216.) Laws and regulation impacting journalists. Topics include libel, privacy, news gathering, protection sources, fair trial and free press, theories of the First Amendment, and broadcast regulation. Prerequisite: Journalism M.A. student or advanced Communication major.
4-5 units, Win (Wheaton, J)

COMM 117. Digital Journalism
(Same as COMM 217) (Graduate students register for COMM 217.) Seminar and practicum. The implications of new media for journalists. Professional and social issues related to the web as a case of new media deployment, as a story, as a research and reporting tool, and as a publishing channel. Prerequisite: Journalism M.A. student or consent of instructor.
4-5 units, Win (Staff)

COMM 118Q. Theories of Film Practice
(Stanford Introductory Seminar) Preference to sophomores. How theory connects with practice in the production of film and television. Film and television from the perspectives of practitioners who have theorized about their work in directing, editing, screenwriting, cinematography, and sound, and social scientists whose research has explored similar issues empirically.
4 units, Win (Breitrose, H)

COMM 120. Digital Media in Society
(Same as AMSTUD 120, COMM 220) (Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors. GER:DB-SocSci, WIM
4-5 units, Spr (Turner, F)

COMM 125. Perspectives on American Journalism
(Same as COMM 225) (Graduate students register for COMM 225.) An interrogation of the practice of American journalism, focusing on the political, social, cultural, and economic forces that have shaped the U. S. press since the early 1800s. Aimed at producers as well as consumers of news, the objective of this course is to provide a vocabulary and framework for judging the quality of everyday journalism. Prerequisite: 1 or junior standing. GER:DB-SocSci
4-5 units, Aut (Glasser, T)

COMM 131. Media Ethics and Responsibility
(Same as COMM 231) (Graduate students register for COMM 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and the epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism. GER:DB-SocSci
4-5 units, Win (Glasser, T)

COMM 134. Public Participation and Public Policy
(Same as COMM 234) Examines the role of public participation in public policy making. Around the world, policymakers seek to engage their publics. But, even though public participation is important, it is also problematic. Public meetings can become dysfunctional and turn into media spectacles instead of actually gathering the opinions of the public. The question becomes, when and how should the public be consulted in order to effectively impact public policies? There are consequences of engaging the public, and this seminar explores the methods used to engage publics around the world.
4-5 units, Spr (Siu, A)

COMM 136. Democracy and the Communication of Consent
(Same as COMM 236, POLISCI 134) (Graduate students register for COMM 236.) Focus is on competing theories of democracy and the forms of communication they presuppose, combining normative and empirical issues, and historical and contemporary sources. Topics include representation, public opinion, mass media, small group processes, direct democracy, the role of information, and the prospects for deliberative democracy. GER:DB-SocSci
4-5 units, not given this year

COMM 137. The Dialogue of Democracy
(Same as AMSTUD 137, COMM 237, POLISCI 232T, POLISCI 332T) All forms of democracy require some kind of communication so people are aware of issues and make decisions. Competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small-scale discussions or sound bites on television? Or social media? What is the role of technology in changing democratic practices, to mobilize, to persuade, to solve public problems? Readings from political theory about democratic ideals from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. Contemporary examinations of the media and the Internet to see how those practices are changing and how the ideals can or cannot be realized. GER:EC-EthicReas
4-5 units, Win (Fishkin, J)

COMM 140. Digital Media Entrepreneurship
(Same as COMM 240) (Graduate students register for COMM 240.) Primarily for graduate journalism and computer science students. Silicon Valley's new media culture, digital storytelling skills and techniques, web-based skills, and entrepreneurial ventures. Guest speakers.
3-5 units, Spr (Grimes, A)

COMM 147. Modern History and Future of Journalism
(Same as COMM 247) (Graduate students register for COMM 247.) The birth and evolution of local and national television news. The modern history of newspapers. Can they survive in the era of online journalism?
4-5 units, Spr (Brinkley, J)

COMM 160. The Press and the Political Process
(Same as COMM 260, POLISCI 323R) (Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes. GER:DB-SocSci
4-5 units, alternate years, not given next year

COMM 162. Campaigns, Voting, Media, and Elections
(Same as COMM 262, POLISCI 120B) The theory and practice of American campaigns and elections. The behavior of the key players, candidates, parties, journalists, and voters, in terms of the institutional arrangements and political incentives that confront them. Current and recent election campaigns used as laboratories for testing generalizations about campaign strategy and voter behavior. Readings from the academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. Issues of electoral reform and their more long-term consequences for governance and the political process. GER:DB-SocSci
4-5 units, Aut (Iyengar, S)

COMM 166. Virtual People
(Same as COMM 266) (Graduate students register for COMM 266.) The concept of virtual people or digital human representations; methods of constructing and using virtual people; methodological approaches to interactions with and among virtual people; and current applications. Viewpoints including popular culture, literature, film, engineering, behavioral science, computer science, and communication.
4-5 units, Spr (Bailenson, J)

COMM 167. Advanced Seminar in Virtual Reality Research
Restricted to students with previous research experience in virtual reality. Experimental methods and other issues.
1-3 units, Win (Bailenson, J)

COMM 168. Experimental Research in Advanced User Interfaces
(Same as COMM 268, COMM 368, ME 468) Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.
1-5 units, Aut (Nass, C), Win (Nass, C), Spr (Nass, C)

COMM 169. Computers and Interfaces
(Same as COMM 269) (Graduate students register for COMM 269.) Interdisciplinary. User responses to interfaces and design

implications of those responses. Theories from different disciplines illustrate responses to textual, voice-based, pictorial, metaphoric, conversational, adaptive, agent-based, intelligent, and anthropomorphic interfaces. Group design project applying theory to the design of products or services for developing countries. GER:DB-SocSci

4-5 units, Spr (Nass, C)

COMM 171. Multimedia Reporting and Production for Public Issues

(Same as COMM 271) (Graduate students register for 271.) Production of multimedia assignments for traditional news beats using audio, still photography, graphics and video. 2-hour lab class for creative, conceptual and technical skills for production of multimedia stories. Prerequesite: Journalism MA student or instructor's consent.

3-5 units, Win (Staff)

COMM 172. Media Psychology

(Same as COMM 272) (Graduate students register for COMM 272.) The literature related to psychological processing and the effects of media. Topics: unconscious processing; picture perception; attention and memory; emotion; the physiology of processing media; person perception; pornography; consumer behavior; advanced film and television systems; and differences among reading, watching, and listening. GER:DB-SocSci

4-5 units, Spr (Reeves, B)

COMM 176. Advanced Digital Media Production

(Same as COMM 276) In-depth reporting and production using audio, images and video. Focus on an in-depth journalism project with appropriate uses of digital media: audio, photography, graphics, and video. Topics include advanced field techniques and approaches (audio, video, still) and emphasis on creating a nonfiction narrative arc in a multimedia piece of 10-12 minutes. Prerequisite: COMM 275 or consent of instructor

4-5 units, Spr (Staff)

COMM 177C. Specialized Writing and Reporting: Environmental Journalism

(Same as COMM 277C, ENVRES 277C) (Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: 104 or consent of instructor.

4-5 units, Spr (Hayden, T)

COMM 177D. Specialized Writing and Reporting: Magazine Journalism

(Same as COMM 277D) (Graduate students register for COMM 277D.) How to report, write, edit, and read magazine articles, emphasizing long-form narrative. Tools and templates of story telling such as scenes, characters, dialogue, and narrative arc. How the best magazine stories defy or subvert conventional wisdom and bring fresh light to the human experience through reporting, writing, and moral passion. Prerequisite: 104 or consent of instructor.

4-5 units, Aut (Staff)

COMM 177G. Specialized Writing and Reporting: Covering Silicon Valley

(Same as COMM 277G) (Graduate students register for COMM 277G.) Business reporting basics in the context of Silicon Valley's technology scene. Prerequisite: 104 or consent of instructor.

4-5 units, Win (Grimes, A)

COMM 177I. Specialized Writing and Reporting: Investigative Reporting

(Same as COMM 277I) Graduate students register for COMM 277I.) Under the supervision of editors from the Center for Investigative Reporting, students will work on a group investigative project with the end-goal of publication and distribution through CIR's California Watch project. The class will emphasize the history and role of investigative reporting as well as skills and techniques needed to do it.

4-5 units, Win (Staff)

COMM 177K. Specialized Writing and Reporting: Human Rights Journalism

(Same as COMM 277K) (Graduate students register for COMM 277K.) The evolution of human rights law and enforcement, and the role of journalists in uncovering, pursuing, and publicizing political violence, detention, and torture. Case studies from S. Africa, Latin America, Israel and Palestine, N. Ireland, Bosnia, Rwanda, and Sudan and Darfur. Human rights issues in the U.S. in the aftermath of 9/11. Students conduct research and write journalistic reports on foreign and domestic issues. Prerequisite: 104 or consent of instructor.

4-5 units, not given this year

COMM 177S. Specialized Writing and Reporting: Sports Journalism

(Same as COMM 277S) (Graduate students register for COMM 277S.) Workshop. The history of sports writing from the 20s to present. Reporting, interviewing, deadline writing, and how to conceptualize and develop stories. Students write features and news stories for publication in a new sports section in 'The Cardinal Inquirer', an online publication of the graduate program in journalism. Prerequisite: 104 or consent of instructor.

4-5 units, not given this year

COMM 177Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East

(Same as COMM 277Y) (Graduate students register for COMM 277Y.) What's involved in working as a journalist in one of the most important and dangerous parts of the world.

4-5 units, Aut (Brinkley, J)

COMM 182. Virtual Communities and Social Media

(Same as COMM 282) (Graduate students register for CMM 282.) Taught by the originator of the terms virtual community and smart mobs. How the concept of community has changed from agricultural to industrial to networked societies. Much class discussion takes place in social cyberspaces.

4-5 units, Aut (Rheingold, H)

COMM 190. Senior Project

Research project. Prerequisite: senior standing.

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 195. Honors Thesis

Qualifies students to conduct communication research. Student must apply for department honors thesis program during Spring Quarter of junior year.

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 199. Individual Work

For students with high academic standing. May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 212. Models of Democracy

(Same as COMM 312, POLISCI 237, POLISCI 337) Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments.

3-5 units, not given this year

COMM 236G. Democracy, Justice, and Deliberation

(Same as COMM 336G) Decision processes that make a normative claim to resolve questions of public choice, at any of these levels of choice: first principles, constitutions, public policies, or particular outcomes. Topics include democratic theory, the theory of justice and issues of deliberation in small groups, public consultations, conventions, juries, and thought experiments popular in contemporary political theory. Readings include Madison, de Tocqueville, Mill, Marx, Rawls, Nozick, Ackerman, and Schudson. Preference to graduate students. Prerequisite: consent of instructor.

1-5 units, not given this year

COMM 244. Democracy, Press, and Public Opinion

(Same as COMM 344) The democratic tradition provides conflicting visions of what a democracy is or might be, offering different views of the role of the press and citizens in engaging public is-

sues. Focus is on democratic theory with empirical work on public opinion and the role of the media. Topics include campaigns, the effects of new technology, competing strategies of public consultation, public journalism, and possibilities for citizen deliberation. Prerequisite: consent of instructor.

1-4 units, not given this year

GRADUATE COURSES IN COMMUNICATION

Primarily for graduate students; undergraduates may enroll with consent of instructor.

COMM 206. Communication Research Methods
(Same as COMM 106) (Graduate students register for COMM 206.) Conceptual and practical concerns underlying commonly used quantitative approaches, including experimental, survey, content analysis, and field research in communication. Pre- or corequisite: STATS 60 or consent of instructor.

4-5 units, Win (Voelker, D)

COMM 208. Media Processes and Effects
(Same as COMM 108) (Graduate students register for COMM 208.) The process of communication theory construction including a survey of social science paradigms and major theories of communication. Recommended: 1 or PSYCH 1.

4-5 units, Aut (Bailenson, J)

COMM 211. Media Technologies, People, and Society
(Same as COMM 1A) (Graduate students register for COMM 211.) Open to non-majors. Introduction to the concepts and contexts of communication. A topics-structured orientation emphasizing the field and the scholarly endeavors represented in the department.

4-5 units, not given this year

COMM 216. Journalism Law
(Same as COMM 116) (Graduate students register for 216.) Laws and regulation impacting journalists. Topics include libel, privacy, news gathering, protection sources, fair trial and free press, theories of the First Amendment, and broadcast regulation. Prerequisite: Journalism M.A. student or advanced Communication major.

4-5 units, Win (Wheaton, J)

COMM 217. Digital Journalism
(Same as COMM 117) (Graduate students register for COMM 217.) Seminar and practicum. The implications of new media for journalists. Professional and social issues related to the web as a case of new media deployment, as a story, as a research and reporting tool, and as a publishing channel. Prerequisite: Journalism M.A. student or consent of instructor.

4-5 units, Win (Staff)

COMM 220. Digital Media in Society
(Same as AMSTUD 120, COMM 120) (Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors.

4-5 units, Spr (Turner, F)

COMM 225. Perspectives on American Journalism
(Same as COMM 125) (Graduate students register for COMM 225.) An interrogation of the practice of American journalism, focusing on the political, social, cultural, and economic forces that have shaped the U. S. press since the early 1800s. Aimed at producers as well as consumers of news, the objective of this course is to provide a vocabulary and framework for judging the quality of everyday journalism. Prerequisite: 1 or junior standing.

4-5 units, Aut (Glasser, T)

COMM 231. Media Ethics and Responsibility
(Same as COMM 131) (Graduate students register for COMM 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and the epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism.

4-5 units, Win (Glasser, T)

COMM 234. Public Participation and Public Policy
(Same as COMM 134) Examines the role of public participation in public policy making. Around the world, policymakers seek to engage their publics. But, even though public participation is important, it is also problematic. Public meetings can become dysfunctional and turn into media spectacles instead of actually gathering the opinions of the public. The question becomes, when and how should the public be consulted in order to effectively impact public policies? There are consequences of engaging the public, and this seminar explores the methods used to engage publics around the world.

4-5 units, Spr (Siu, A)

COMM 236. Democracy and the Communication of Consent
(Same as COMM 136, POLISCI 134) (Graduate students register for COMM 236.) Focus is on competing theories of democracy and the forms of communication they presuppose, combining normative and empirical issues, and historical and contemporary sources. Topics include representation, public opinion, mass media, small group processes, direct democracy, the role of information, and the prospects for deliberative democracy.

4-5 units, not given this year

COMM 237. The Dialogue of Democracy
(Same as AMSTUD 137, COMM 137, POLISCI 232T, POLISCI 332T) All forms of democracy require some kind of communication so people are aware of issues and make decisions. Competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small-scale discussions or sound bites on television? Or social media? What is the role of technology in changing democratic practices, to mobilize, to persuade, to solve public problems? Readings from political theory about democratic ideals from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. Contemporary examinations of the media and the Internet to see how those practices are changing and how the ideals can or cannot be realized.

4-5 units, Win (Fishkin, J)

COMM 238. Democratic Theory: Normative and Empirical Issues
(Same as COMM 338) Conflicting visions in terms of normative conflicts and empirical evidence. How citizens communicate with each other and their representatives, and how their representatives deliberate. Topics include theories of deliberation, how democracy is transformed when brought to the mass public, how informed a public is needed, and potential pathologies of small group communication in settings including juries, town meetings, and contemporary public consultations. Readings include Madison, Burke, Mill, Lippmann, Dewey, Schumpeter, Dahl, Sunstein, and Mansbridge.

1-5 units, not given this year

COMM 239. Questionnaire Design for Surveys and Laboratory Experiments: Social and Cognitive Perspectives
The social and psychological processes involved in asking and answering questions via questionnaires for the social sciences; optimizing questionnaire design; open versus closed questions; rating versus ranking; rating scale length and point labeling; acquiescence response bias; don't-know response options; response choice order effects; question order effects; social desirability response bias; attitude and behavior recall; and introspective accounts of the causes of thoughts and actions.

4 units, not given this year

COMM 240. Digital Media Entrepreneurship
(Same as COMM 140) (Graduate students register for COMM 240.) Primarily for graduate journalism and computer science students. Silicon Valley's new media culture, digital storytelling skills and techniques, web-based skills, and entrepreneurial ventures. Guest speakers.

3-5 units, Spr (Grimes, A)

COMM 247. Modern History and Future of Journalism
(Same as COMM 147) (Graduate students register for COMM 247.) The birth and evolution of local and national television news. The modern history of newspapers. Can they survive in the era of online journalism?

4-5 units, Spr (Brinkley, J)

COMM 260. The Press and the Political Process
(Same as COMM 160, POLISCI 323R) (Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes.

4-5 units, alternate years, not given next year

COMM 262. Campaigns, Voting, Media, and Elections
(Same as COMM 162, POLISCI 120B) The theory and practice of American campaigns and elections. The behavior of the key players (candidates, parties, journalists, and voters) in terms of the institutional arrangements and political incentives that confront them. Current and recent election campaigns as laboratories for testing generalizations about campaign strategy and voter behavior. The academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. Issues of electoral reform and their more long-term consequences for governance and the political process.

4-5 units, Aut (Iyengar, S)

COMM 266. Virtual People
(Same as COMM 166) (Graduate students register for COMM 266.) The concept of virtual people or digital human representations; methods of constructing and using virtual people; methodological approaches to interactions with and among virtual people; and current applications. Viewpoints including popular culture, literature, film, engineering, behavioral science, computer science, and communication.

4-5 units, Spr (Bailenson, J)

COMM 268. Experimental Research in Advanced User Interfaces
(Same as COMM 168, COMM 368, ME 468) Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

1-5 units, Aut (Nass, C), Win (Nass, C), Spr (Nass, C)

COMM 269. Computers and Interfaces
(Same as COMM 169) (Graduate students register for COMM 269.) Interdisciplinary. User responses to interfaces and design implications of those responses. Theories from different disciplines illustrate responses to textual, voice-based, pictorial, metaphoric, conversational, adaptive, agent-based, intelligent, and anthropomorphic interfaces. Group design project applying theory to the design of products or services for developing countries.

4-5 units, Spr (Nass, C)

COMM 271. Multimedia Reporting and Production for Public Issues
(Same as COMM 171) (Graduate students register for 271.) Production of multimedia assignments for traditional news beats using audio, still photography, graphics and video. 2-hour lab class for creative, conceptual and technical skills for production of multimedia stories. Prerequesite: Journalism MA student or instructor's consent.

3-5 units, Win (Staff)

COMM 272. Media Psychology
(Same as COMM 172) (Graduate students register for COMM 272.) The literature related to psychological processing and the effects of media. Topics: unconscious processing; picture perception; attention and memory; emotion; the physiology of processing media; person perception; pornography; consumer behavior; advanced film and television systems; and differences among reading, watching, and listening.

4-5 units, Spr (Reeves, B)

COMM 273. Public Issues Reporting I
Reporting and writing on government and public policies and issues; their implications for the people and the press. Required for journalism M.A. students.

3-4 units, Aut (Staff)

COMM 274. Public Issues Reporting II
Student teams study one major public policy issue that has broad societal impact. Students report and write individually, and as a team produce a body of journalism that advances the understanding of a new issue each year, published on a web site and offered for publication to newspapers and other media outlets. Prerequisites: 273, Journalism M.A. student.

3-4 units, Win (Brinkley, J)

COMM 275. Multimedia Storytelling: Reporting and Production Using Audio, Still Images, and Video
Multimedia assignments coordinated with deadline reporting efforts in COMM 273 from traditional news beats using audio, still photography, and video. Use of digital audio recorders and audio production to leverage voice-over narration, interviews, and natural sound; use of digital still cameras and audio to produce audio slideshows; and the combination of these media with video in post-production with Final Cut Pro. Prerequisite: Journalism M.A. student. Corequisite: COMM 273.

4 units, Aut (Migielicz, G)

COMM 276. Advanced Digital Media Production
(Same as COMM 176) In-depth reporting and production using audio, images and video. Focus on an in-depth journalism project with appropriate uses of digital media: audio, photography, graphics, and video. Topics include advanced field techniques and approaches (audio, video, still) and emphasis on creating a non-fiction narrative arc in a multimedia piece of 10-12 minutes. Prerequisite: COMM 275 or consent of instructor

4-5 units, Spr (Staff)

COMM 277C. Specialized Writing and Reporting: Environmental Journalism
(Same as COMM 177C, ENVRES 277C) (Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: 104 or consent of instructor.

4-5 units, Spr (Hayden, T)

COMM 277D. Specialized Writing and Reporting: Magazine Journalism
(Same as COMM 177D) (Graduate students register for COMM 277D.) How to report, write, edit, and read magazine articles, emphasizing long-form narrative. Tools and templates of story telling such as scenes, characters, dialogue, and narrative arc. How the best magazine stories defy or subvert conventional wisdom and bring fresh light to the human experience through reporting, writing, and moral passion. Prerequisite: 104 or consent of instructor.

4-5 units, Aut (Staff)

COMM 277G. Specialized Writing and Reporting: Covering Silicon Valley
(Same as COMM 177G) (Graduate students register for COMM 277G.) Business reporting basics in the context of Silicon Valley's technology scene. Prerequisite: 104 or consent of instructor.

4-5 units, Win (Grimes, A)

COMM 277I. Specialized Writing and Reporting: Investigative Reporting
(Same as COMM 177I) Graduate students register for COMM 277I.) Under the supervision of editors from the Center for Investigative Reporting, students will work on a group investigative project with the end-goal of publication and distribution through CIR's California Watch project. The class will emphasize the history and role of investigative reporting as well as skills and techniques needed to do it.

4-5 units, Win (Staff)

COMM 277K. Specialized Writing and Reporting: Human Rights Journalism
(Same as COMM 177K) (Graduate students register for COMM 277K.) The evolution of human rights law and enforcement, and the role of journalists in uncovering, pursuing, and publicizing political violence, detention, and torture. Case studies from S. Africa, Latin America, Israel and Palestine, N. Ireland, Bosnia, Rwanda, and Sudan and Darfur. Human rights issues in the U.S. in the aftermath of 9/11. Students conduct research and write journalistic reports on foreign and domestic issues. Prerequisite: 104 or consent of instructor.

4-5 units, not given this year

COMM 277S. Specialized Writing and Reporting: Sports Journalism
(Same as COMM 177S) (Graduate students register for COMM 277S.) Workshop. The history of sports writing from the 20s to present. Reporting, interviewing, deadline writing, and how to conceptualize and develop stories. Students write features and news stories for publication in a new sports section in 'The Cardinal Inquirer', an online publication of the graduate program in journalism. Prerequisite: 104 or consent of instructor.
4-5 units, not given this year

COMM 277Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East
(Same as COMM 177Y) (Graduate students register for COMM 277Y.) What's involved in working as a journalist in one of the most important and dangerous parts of the world.
4-5 units, Aut (Brinkley, J)

COMM 278. Journalism and Imaginative Writing in America
(Same as AMSTUD 257, ENGLISH 257) Walt Whitman spent twenty-five years as a journalist before publishing his first book of poems. Mark Twain was a journalist for twenty years before publishing his first novel. Topics include examination of how writers¿ backgrounds in journalism shaped the poetry or fiction for which they are best known; study of recent controversies surrounding writers who blurred the line between journalism and fiction. Writers include Whitman, Fanny Fern, Twain, Pauline Hopkins, Theodore Dreiser, Charlotte Perkins Gilman, Ernest Hemingway, Meridel LeSueur.
5 units, Spr (Fishkin, S)

COMM 282. Virtual Communities and Social Media
(Same as COMM 182) (Graduate students register for CMM 282.) Taught by the originator of the terms virtual community and smart mobs. How the concept of community has changed from agricultural to industrial to networked societies. Much class discussion takes place in social cyberspaces.
4-5 units, Aut (Rheingold, H)

COMM 289. Journalism Master's Project
4 units, Spr (Staff)

COMM 290. Media Studies M.A. Project
Individual research for coterminal Media Studies students.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 291. Graduate Journalism Seminar
Required of students in the graduate program in Journalism. Forum for current issues in the practice and performance of the press. The seminar frequently features Bay Area Journalists as guest speakers. May be repeated for credit.
1 unit, Aut (Grimes, A), Win (Brinkley, J), Spr (Staff)

COMM 299. Individual Work
1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 301. Communication Research, Curriculum Development and Pedagogy
Designed to prepare students for teaching and research in the Department of Communication. Students will be trained in developing curriculum and in pedagogical practices, and will also be exposed to the research programs of various faculty members in the department. Required of all Ph.D. students.
1 unit, Aut (Bailenson, J)

COMM 307. Summer Institute in Political Psychology
Lectures, discussion groups, and workshops addressing many applications of psychology to the analysis of political behavior. Public opinion, international relations, political decision-making, attitudes and beliefs, prejudice, social influence and persuasion, terrorism, news media influence, foreign policy, socialization, social justice.
1-6 units, Sum (Krosnick, J)

COMM 308. Graduate Seminar in Political Psychology
(Same as POLISCI 324) For students interested in research in political science, psychology, or communication. Methodological techniques for studying political attitudes and behaviors. May be repeated for credit.
1-3 units, Aut (Krosnick, J), Win (Krosnick, J), Spr (Krosnick, J)

COMM 310. Method of Analysis Program in the Social Sciences
(Same as ANTHRO 446A) Colloquium series. Creation and application of new methodological techniques for social science research. Presentations on methodologies of use for social scientists across departments at Stanford by guest speakers from Stanford and elsewhere. See http://mapss.stanford.edu.
1 unit, Aut (Jackman, S; Jones, J), Win (Jackman, S; Jones, J), Spr (Jackman, S; Jones, J)

COMM 311. Theory of Communication
Required of Communication doctoral students.
1-5 units, Aut (Reeves, B)

COMM 312. Models of Democracy
(Same as COMM 212, POLISCI 237, POLISCI 337) Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments.
3-5 units, not given this year

COMM 314. Doctoral Research Methods II B
Part of the doctoral research methods sequence. Focus is on the logic of qualitative research methods and modes of inquiry relevant to the study of communication and meaning. Prerequisite: Communication Ph.D. student, or consent of instructor.
1-5 units, Win (Glasser, T)

COMM 317. Doctoral Research Methods I
Approaches to social science research and their theoretical presuppositions. Readings from the philosophy of the social sciences. Research design, the role of experiments, and quantitative and qualitative research. Cases from communication and related social sciences. Prerequisite: consent of instructor.
1-5 units, Spr (Fishkin, J)

COMM 318. Doctoral Research Methods II
Prerequisite: consent of instructor.
1-5 units, Win (Krosnick, J)

COMM 320G. Advanced Topics in New Media and American Culture
Primarily for Ph.D. students. Prerequisite: 220 or consent of instructor.
1-5 units, Spr (Turner, F)

COMM 325G. Comparative Studies of News and Journalism
Focus is on topics such as the roles and responsibilities of journalists, news as a genre of popular literature, the nexus between press and state, and journalism's commitment to political participation.
1-5 units, given occasionally

COMM 326. Advanced Topics in Human Virtual Representation
Topics include the theoretical construct of person identity, the evolution of that construct given the advent of virtual environments, and methodological approaches to understanding virtual human representation. Prerequisite: consent of instructor.
1-5 units, Spr (Bailenson, J)

COMM 331G. Communication and Media Ethics
Limited to Ph.D. students. Advanced topics in press ethics and responsibility. Prerequisite: 231 or consent of instructor.
1-3 units, Spr (Glasser, T)

COMM 336G. Democracy, Justice, and Deliberation
(Same as COMM 236G) Decision processes that make a normative claim to resolve questions of public choice, at any of these levels of choice: first principles, constitutions, public policies, or particular outcomes. Topics include democratic theory, the theory of justice and issues of deliberation in small groups, public consultations, conventions, juries, and thought experiments popular in contemporary political theory. Readings include Madison, de Tocqueville, Mill, Marx, Rawls, Nozick, Ackerman, and Schudson. Preference to graduate students. Prerequisite: consent of instructor.
1-5 units, not given this year

COMM 338. Democratic Theory: Normative and Empirical Issues
(Same as COMM 238) Conflicting visions in terms of normative conflicts and empirical evidence. How citizens communicate with each other and their representatives, and how their representatives deliberate. Topics include theories of deliberation, how democracy

is transformed when brought to the mass public, how informed a public is needed, and potential pathologies of small group communication in settings including juries, town meetings, and contemporary public consultations. Readings include Madison, Burke, Mill, Lippmann, Dewey, Schumpeter, Dahl, Sunstein, and Mansbridge.

1-5 units, not given this year

COMM 344. Democracy, Press, and Public Opinion
(Same as COMM 244) The democratic tradition provides conflicting visions of what a democracy is or might be, offering different views of the role of the press and citizens in engaging public issues. Focus is on democratic theory with empirical work on public opinion and the role of the media. Topics include campaigns, the effects of new technology, competing strategies of public consultation, public journalism, and possibilities for citizen deliberation. Prerequisite: consent of instructor.

1-4 units, not given this year

COMM 360G. Political Communication
Limited to Ph.D. students. Advanced topics. Prerequisite: 260 or consent of instructor.

1-5 units, not given this year

COMM 361. Field Experimentation in Political Communication Research
The design of large-scale field experiments. Recent developments in analysis of experimental data including matching, propensity scores, and other techniques that address the problem of selection bias. Prerequisite: consent of instructor.

4 units, not given this year

COMM 368. Experimental Research in Advanced User Interfaces
(Same as COMM 168, COMM 268, ME 468) Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

1-5 units, Aut (Nass, C), Win (Nass, C), Spr (Nass, C)

COMM 372G. Seminar in Psychological Processing
Limited to Ph.D. students. Advanced topics. Prerequisite: 272 or consent of instructor.

1-5 units, Win (Reeves, B)

COMM 374G. Freedom and Control of Communication
The meaning of freedom of public communication in democratic communities, focusing on the tensions between freedom and control, rights and opportunities, individual liberty and political equality.

1-5 units, not given this year

COMM 379. History of the Study of Communication
The origins of communication/media theory and research emphasizing the rise of communication as a separate field of study. The influence of schools of thought concerning the scope and purpose of the study of communication. Readings include foundational essays and studies. Prerequisite: Ph.D. student or consent of instructor.

1-5 units, not given this year

COMM 380. Curriculum Practical Training
Practical experience in the communication industries. Prerequisites: graduate standing in Communication, consent of instructor. Meets requirements for Curricular Practical Training for students on F-1 visas. 380 May be repeated four times for credit. (Staff)

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 386. Media Cultures of the Cold War
(Same as ARTHIST 475) The intersection of politics, aesthetics, and new media technologies in the U.S. between the end of WW II and the fall of the Berlin Wall. Topics include the aesthetics of thinking the unthinkable in the wake of the atom bomb; abstract expressionism and_modern man_ discourse; game theory, cybernetics, and new models of art making; the rise of television, intermedia, and the counterculture; and the continuing influence of the early cold war on contemporary media aesthetics. Readings from primary and secondary sources in art history, communication, and critical theory.

3-5 units, not given this year

COMM 397. Complementary Project
Individual research for Ph.D. candidates.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 398. Major Research Project
Individual research for Ph.D. candidates.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 399. Advanced Individual Work

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPARATIVE LITERATURE (COMPLIT) COURSES

UNDERGRADUATE COURSES IN COMPARATIVE LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

COMPLIT 10N. Shakespeare and Performance in a Global Context
(Stanford Introductory Seminar) Preference to freshmen. The problem of performance including the performance of gender through the plays of Shakespeare. In-class performances by students of scenes from plays. The history of theatrical performance. Sources include filmed versions of plays, and readings on the history of gender, gender performance, and transvestite theater. GER:DB-Hum, EC-Gender

3 units, Spr (Parker, P)

COMPLIT 11Q. Shakespeare, Playing, Gender
(Stanford Introductory Seminar) Preference to sophomores. Focus is on several of the best and lesser known plays of Shakespeare, on theatrical and other kinds of playing, and on ambiguities of both gender and playing gender. Topics: transvestism inside and outside the theater, medical and other discussions of sex changes from female to male, hermaphrodites, and fascination with the monstrous. GER:DB-Hum, EC-Gender

3 units, Win (Staff)

COMPLIT 40Q. Aesthetics of Dissent: the Case of Islamic Iran
(Stanford Introductory Seminar) Preference to sohpomores. Censorship, Borges states, is the mother of metaphors. The Islamic regime in Iran censors all aethetic production in the country. But Iranian dissident artists, from film makers and fiction writers to composers in a thriving underground musical scene, have found ways to fight these draconian measures. They have developed a body of work that is as sophisticated in style as it is rich in its discourse of democracy and dissent. The purpose of the seminar is to understand the aesthetic tropes of dissent in Iran, and the social and theological roots of rules of censorship. Masterpieces of post-revolutionary film, fiction, and music discussed in the context of tumultuous history of dissent in Islamic Iran.

3 units, Aut (Milani, A)

COMPLIT 41N. Borderlands of Literature and Culture
(Stanford Introductory Seminar) The transnational themes of memory, identity, and U.S.-Mexico border thinking and writing. Transnational poetry, autoethnographies, short stores, novels, and rock is Spanish music and videos by Americo Paredes, Gloria Anzaldua, Sandra Cisneros, Guillermo Gomez-Pena, Alicia Gaspar de Alba, Carlos Fuentes, Elly Guerra, and Cafe Tacuba.

3-4 units, Aut (Saldivar, J)

COMPLIT 41Q. Ethnicity and Literature
(Stanford Introductory Seminar) Preference to sophomores. What is meant by ethnic literature? How is ethnic writing different from non-ethnic writing, or is there such a thing as either? How does ethnicity as an analytic perspective affect the way literature is read by ethnic peoples? Articles and works of fiction; films on ethnic literature and cultural politics. How ethnic literature represents the nexus of social, historical, political, and personal issues. GER:DB-Hum, EC-AmerCul

5 units, Spr (Palumbo-Liu, D)

COMPLIT 49. What is Nobel Literature? Reading, Assessing, and Interpreting the Nobel Novels on the World Stage
Recent Nobel laureates in literature: Gabriel García Márquez, Nadine Gordimer, Toni Morrison, Kenzaburo Oe, and V.S. Naipaul. These writers come from different locations, yet each participates in a global conversation about the human condition. The impact of their identities upon their thought and writing. How the Nobel prize is awarded. The role of literature in the world, and analytical skills for reading literary texts. GER:DB-Hum, EC-GlobalCom
5 units, Sum (Palumbo-Liu, D)

COMPLIT 51N. Comparative Fictions of Ethnicity
(Stanford Introductory Seminar) How does the sense of self interact with those surrounding? How does literature provide a particular medium for not only self expression, but also for meditations on what goes into the construction of the self? After all, don't people tell stories in response to the question,who are you"? Besides a list of nouns and names and attributes, people give their lives flesh and blood in telling how they process the world. Focus is on the question: Does this universal issue (who am I) become skewed differently when a qualifier such as ethnic is added to it?
5 units, Win (Staff)

COMPLIT 101. What is Literature?
How critics and authors from different eras and different parts of the globe have considered how literature, as a traditional cultural form, can or cannot, help to sustain societies faced with concrete historical crises such as war, revolution, and colonization. How the aesthetic work of verbal art has been seen to offer the possibility of continuity in the face of change. What, if anything, can be continued? How does art perhaps aid in accommodating change? GER:DB-Hum
5 units, Win (Palumbo-Liu, D)

COMPLIT 119. Dostoevsky and His Times
(Same as COMPLIT 219, SLAVGEN 151, SLAVGEN 251) Open to juniors, seniors, and graduate students. Major works in English translation with reference to related developments in Russian and European culture, literary criticism, and intellectual history. GER:DB-Hum
4 units, not given this year

COMPLIT 120. Queer Modernisms
Queer modernist literature, dance, film, and visual art from the 1890's to the 1930's; comparative modernist studies, queer and feminist theory. Texts by Wilde, Woolf, Radclyffe Hall, Foster, Gide, Proust, Mann, Isherwood, Barnes, Ballets Russes, Weimar cabaret, Paris Left Bank culture, queer modernist landmark films Salome and Mädchen in Uniform.
3-5 units, Spr (Staff)

COMPLIT 121. Poems, Poetry, Worlds: An Introductory Course
What is poetry? How does it speak in many voices to questions of history, society, and personal experience? Why does it matter? The reading and interpretation of poetry in crosscultural comparison as experience, invention, form, sound, knowledge, and part of the world. Readings include: medieval to modern poetry of western Europe and the Americas; contemporary poetry of Europe, Latin America, Africa, and the U.S.; and present-day experimental digital, sound, and visual poetry. GER:DB-Hum
5 units, Aut (Gumbrecht, H)

COMPLIT 122. Literature as Performance
Theater as performance and as literature. The historical tension between performance and sexuality in the Western tradition since Greek antiquity. Non-European forms and conventions of performance and theatricality. The modern competition between theater and other forms of performance and media such as sports, film, and television. Sources include: classical Japanese theater; ancient Greek tragedy and comedy; medieval theater in interaction with Christian rituals and its countercultural horizons; the classical age of European theater including Shakespeare, Lope de Vega, and Molière. GER:DB-Hum
5 units, Win (Greenleaf, M)

COMPLIT 123. The Novel, The World
Combining perspectives of the novels of the world as anthropological force with the sense of reality, and as protean form that has reshaped the literary universe. Readings from: ancient Greece; medieval Japan and Britain; and early modern Spain, China, and Britain; romantic theories of the novel; 19th-century realism and popular fiction; modernist experiments; and postmodern pastiches. GER:DB-Hum
5 units, Spr (Cohen, M)

COMPLIT 125A. The Gothic Novel
(Same as ENGLISH 125A) The Gothic novel and its relatives from its invention by Walpole in The Castle of Otranto of 1764. Readings include: Northanger Abbey, The Italian, The Monk, Frankenstein, Jane Eyre, Great Expectations, and Dracula. What defines the Gothic as it evolves from one specific novel to a mode that makes its way into a range of fictional types? GER:DB-Hum
5 units, not given this year

COMPLIT 127. Film and Literature
Comparative analysis of film adaptations of major literary works to different cultural contexts, times, or geographies. Close reading of primary literary and filmic texts in cultural and historical context, introduction to basic film terminology and adaptation theory. No prior film studies knowledge needed; readings in English.
3-5 units, Win (Staff)

COMPLIT 129A. Contemporary Persian Poetry: Encounter of a Thousand-Year-Old Classical Tradition with Modernity
The primacy of poetic expression in Persian culture in the transition from tradition to modernity. Major 20th-century poets in relation to historical events and social change. Authors include: Nima Yushij, Ahmad Shamloo, Sohrab Sepehri, Mehdi Akhavan Sales, Forough Farrokhzad, Nader Naderpour, Fereydoun Moshiri, Esma'il Kho'i, and Afghan and Tajik poets.
5 units, not given this year

COMPLIT 130. Fin-de-siècle Literature and Culture
Literature and culture of the 1860's to 1900's in Paris, London, Berlin, and Vienna. Aestheticism, Symbolism, Decadence; the new social drama; art nouveau; the dandy and the New Woman; sexology; degeneration. Works by Mallarmé, Baudelaire, Wilde, Huysmans, Hofmannsthal, Ibsen, Shaw, and various New Woman writers; historical and social contexts.
3-5 units, Aut (Dierkes-Thrun, P)

COMPLIT 131. Renaissance Poetry: Pursuing the Beloved from the Mediterranean to England
The course begins with Italian lyric poetry, particularly the sonnet, tracing its various developments in Renaissance Italian, Spanish, and English poetry. The poems feature a wide spectrum of ""beloveds,"" representative of amorous love (both heterosexual and homosexual), family, religion, patronage, captivity, and empire.
4 units, Win (Staff)

COMPLIT 135. Chinese Cultural Revolution: Performance, Politics, and Aesthetics
(Same as CHINLIT 190, CHINLIT 290) Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required.
4 units, Win (Wang, B)

COMPLIT 136. Women and Protest Literature in Twentieth Century Germany and China
(Same as GERLIT 110) An examination of works of fiction by women writers in German and China, the authors' responses to similar conditions such as the rise of Communism, and their treatment of gender, modernity, tradition, identity, and individual vs. collective interests. Readings are in English translation. Film adaptations are viewed and discussed as well.
3-5 units, Win (Staff)

COMPLIT 138. Women of Modernism
An examination of women's writing 1905-1940, focusing on formal experimentation, literary and oral traditions, war experience, and shifts in women's rights. Discussion of Modernist movements such as the Bloomsbury Group, Imagism, and the Harlem Renaissance. Novels, poems, essays, and newspaper articles by Wharton, Stein, Woolf, H.D., Hurston, and others.
4-5 units, Aut (Tate, B)

COMPLIT 139. On the Road: 20th-Century Travel Literature
Combining readings of both novels and memoirs, such as Jack Kerouac's On the Road, Michel Houellebecq's Platforme, Vesna Maric's Blubirt, as well as Douglas Adams and Mark Carwardine's Last Chance to See, and others, we will examine the personal and political implications of travel narratives in the later 20th century.

Course meetings will be organized around the discussion of specific topics, including: pilgrimage and tourism, utopia and dystopia, as well as exile and homecoming.

3-5 units, Win (Staff)

COMPLIT 140. Introduction to Hebrew Literature

(Same as JEWISHST 140) The influence of biblical poetry, piyut, and medieval Hebrew poetry on the development of Modern Hebrew poetry. With focus on voice, space, lyrical Subjectivity, Intertextuality, and Poetic Forms. Guest Speakers include Tamar Zwei, Susan Einbinder, Berry Saharoff, and Raymond Scheindlin.

3-5 units, Win (Staff)

COMPLIT 141. Literature and Society in Africa and the Caribbean

(Same as FRENLIT 133) Major African and Caribbean writers. Issues raised in literary works which reflect changing aspects of the societies and cultures of Francophone Africa and the French Caribbean. Topics include colonization and change, quest for identity, tradition and modernity, and new roles and status for women. Readings in fiction and poetry. Authors include Laye Camara, Mariama Ba, and Joseph Zobel. In French. Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, EC-GlobalCom

4 units, Win (Boyi, E)

COMPLIT 142. The Literature of the Americas

(Same as ENGLISH 172E) The intellectual and aesthetic problems of inter-American literature conceived as an entirety. Emphasis is on continuities and crises relevant to N., Central, and S. American literatures. Issues such as the encounters between world views, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, 20th-century avant gardes, and distinctive modern episodes such as the Harlem Renaissance, the Beats, magical realism, and Noigandres in comparative perspective. GER:DB-Hum, EC-AmerCul

5 units, Spr (Greene, R; Saldivar, R)

COMPLIT 146. Asian American Culture and Community

(Same as AMSTUD 146, ASNAMST 146S, CSRE 146S) An examination of the history of Asians in America via one case history: the International Hotel in San Francisco. Background history of Asians in America, and the specifics of the I Hotel case as involving the convergence of global and local economies, urban redevelopment, and housing issues for minorities. Focus on the convergence of community and cultural production. Service learning component involving community work at the Manilatown Heritage Foundation in San Francisco. Service Learning Course (certified by Haas Center). GER:DB-Hum

5 units, Aut (Palumbo-Liu, D)

COMPLIT 148. A survey of Iranian Cinema: Past and Present, A film maker¿s perspective

While a historical survey will constitute part of our attention, strictly speaking the survey of Iranian cinema will reflect a personal view rather than a purely historical analysis. Special attention will be paid to the development of Iranian film art and industry in terms of origins, style, genres, and issues of indigenous and national identity; however, the substance of the lectures will not follow a comprehensive historical method but will be tailored to a reading closer to film practice rather than theory.

3-5 units, Aut (Staff)

COMPLIT 149. The Laboring of Diaspora & Border Literary Cultures

Focus is on emergent theories of culture and on comparative literary and cultural studies. How is culture treated as a social force? How does one read the presence of social contexts within cultural texts? How do ethno-racial writers re-imagine the nation as a site with many cognitive maps in which the nation state is not congruent with cultural identity? How do diaspora and border narratives and texts strive for comparative theoretical scope while remaining rooted in specific local histories.

3-5 units, not given this year

COMPLIT 150. Terror and Apocalypse: An Examination of Literature of Fear

An examination of literature of fear: encounters with the supernatural, the aesthetics of psychological terror, the distinction between terror and horror, ghost stories and other popular narrations of life after death. History, retribution and repression. Problems in popular culture between ideology and criticism. Aesthetics of apocalypse in narrations of major catastrophes and the destruction of worlds. Cinematic versions of literary tests and readings from authors such as Auster, Dick, King, McCarthy, Meyrink, and others.

4 units, Spr (Staff)

COMPLIT 153. Literature and Religion in Modernity

Literature that takes a skeptical view of religious belief while criticizing the cultural, social, and political conditions of the religious imagination in post-Enlightenment modernity. Readings from authors such as Blake, Goethe, Büchner, Baudelaire, Mallarmé, Flaubert, Nietzsche, Mew, Eliot, Brecht, Bataille, Sartre, Beckett, Ionesco, Celan, Winterson. Sources include visual artworks and philosophical and critical writings. Literary, ethical, and religious positions concerning central human questions: what is humanity; what is God; how does one avoid evil and adhere to good; how does one live after the death of God? Readings in English.

3-5 units, Spr (Staff)

COMPLIT 155. Literature and Myth

Myths and myth making are an essential part of lives and greatly contribute to everyday worldmaking as they provide timeless images and stories of human knowledge and experiences that have shaped human imagination for centuries. But what exactly is a myth and how does it interact with literature? In addition to discussing theories of myth, the course examines the traveling and transformation of myths and mythical figures across different eras and genres. Texts include Hesiod, Homer, and Seneca, to E.T.H. Hoffman, Keats, Heine, Kafka, Brenton, Camus, Plath, Beckett, Kane, and Calvino.

3-5 units, Win (Staff)

COMPLIT 156. Christianity and Poetry

(Same as RELIGST 132E) The relationship between poetry and Christianity from Dante to T.S. Eliot. Focus on how Christian devotional practices (prayer, meditation), and liturgical forms appear in poetry. Does poetic faith (Coleridge) differ from religious faith? How do poets address God? What poetic devices do they use to pray, repent, or give thanks? Authors include Dante, St. Teresa of Avila, John Donne, Emily Dickinson, and Eliot.

3-5 units, Spr (Staff)

COMPLIT 158. Ecology in Philosophy and Literature

How literary and philosophical writers examine and represent the natural world. Key questions: what is nature, and where do humans fit in the natural world? How do humans differ from other animals? Do these differences make us superior beings? What are human ethical responsibilities towards nonhuman beings? How has the technology of writing, television, and computers affected human relationship to nature? Readings include: deep ecologists, ecofeminists, Descartes, Thoreau, Darwin, Conrad, Heidegger, Edward, Abbey, and Bill McKibben.

3-5 units, Spr (Staff)

COMPLIT 181. Philosophy and Literature

(Same as CLASSGEN 81, ENGLISH 81, FRENGEN 181, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum

4-5 units, Win (Anderson, L; Landy, J)

COMPLIT 189A. Honors Research

Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.

5 units, Win (Staff)

COMPLIT 189B. Honors Research
Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.
2 units, Spr (Staff)

COMPLIT 194. Independent Research
(Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPLIT 199. Senior Seminar: Pleasures of Reading
Required of Comparative Literature seniors; others by consent of instructor. Different paradigms for the kind of enjoyment readers get from literature: entertainment, instruction; ideological comfort, critical distance; inspiration and incitation to their own creativity. Works read may include Aristotle, Hegel, and Brecht on tragedy; Longinus and Burke on the sublime; Roland Barthes S/Z; sonnets by Mallarmé and Eliot's Wasteland; Cixous on écriture féminine; Bakthin's book on Rabelais and carnival, and Rabelais and the French fabliaux; Adorno on kitsch and literature of entertainment; Benjamin's essay on The Storyteller; Janice Radway's Reading the Romance. GER:DB-Hum
5 units, Win (Cohen, M)

COMPLIT 217. Hölderlin's Poetry
(Same as GERLIT 217) A discussion of key poems by Friedrich Hölderlin with regard to themes including the utopian fatherland as mythological landscape; the idea of the Greek gods; the concept of poetry as event; and the emphatic now. The seminar also explores the relationship between the philosophy of history and poetic metaphor.
3-5 units, not given this year

COMPLIT 218. The work of Luis Martín Santos in Mid-Twentieth Century Spain
(Same as ILAC 229) First published in 1962, Tiempo de Silencio is the only book that the young psychiatrist Luis Martin Santos finished during his lifetime, and, although largely overlooked (even in Spain) until the present day, one of the great European novels of the 20th century. It brings to a complex convergence the evocation of Spain's decadent and run-down post-Civil War society with high-modernist literary procedures and (an implicit parody of) phenomenological analysis.
3-5 units, Win (Gumbrecht, H)

COMPLIT 223. Literary Diaries of Classic Modernity
(Same as GERLIT 223) Focus is on self-analysis in works of key modern writers. Since Montaigne's Essais and Rousseau's Confessions, analysis of the self has been a central topic for modern literature. Texts include Baudelaire's Intimate Journals, Kafka's Diaries, Gide's Journals, Woolf's Moments of Being, Benjamin's Berlin Childhood, and Pavese's Diaries. Analysis of the self as polarizing between the imagination of a utopian childhood and self-deprivation.
3-5 units, not given this year

COMPLIT 226. Narrative and Ethics
(Same as GERLIT 242) Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. GER:EC-EthicReas
3-5 units, Win (Eshel, A)

COMPLIT 233. Baroque and Neobaroque
(Same as ENGLISH 233, SPANLIT 293E) The literary, cultural, and political implications of the 17th-century phenomenon formed in response to the conditions of the 16th century including humanism, absolutism, and early capitalism, and dispersed through Europe, the Americas, and Asia. If the Baroque is a universal code of this period, how do its vehicles, such as tragic drama, Ciceronian prose, and metaphysical poetry, converse with one another? The neobaroque as a complex reaction to the remains of the baroque in Latin American cultures, with attention to the mode in recent Brazilian literary theory and Mexican poetry.
5 units, not given this year

COMPLIT 234. Conservative Revolution
(Same as GERGEN 201) An examination of conservative critiques of modernity in the early 20th century, including topics such as German nationalism, the war experience, responses to democracy, anti-liberalism, cultural pessimism in the decline of the West, crises of authority, technology, geopolitics, existentialism, and tradition. Readings from authors such as Oswald Spengler, Thomas Mann, Carl Schmitt, Ernst Jünger, Hugo von Hofmannsthal, Rudolf Borchardt, Karl Haushofer, Konrad Weiss. Readings in either English or German. GER:DB-Hum
3-5 units, not given this year

COMPLIT 246A. Literature and Film of Modern Iran
Iran's social structures, political system, cultural tendencies, and modern artistic culture.
3-5 units, not given this year

COMPLIT 247. Modernism and the Jewish Voice in Europe
(Same as GERGEN 221A, SLAVGEN 221) Some of the most haunting literary voices of the 20th century emerged from the Jewish communities of Eastern and Central Europe. The Jewishness of the modernists is thematized, asking whether it contributed to shared attitudes toward text, history, or identity. Their works are situated in specific linguistic traditions: Yiddish, Hebrew, Russian, Polish, or German. Primary readings from Ansky, Bialik, Mandelstam, Babel, Schulz, Kafka, Celan; secondary readings in history, E. European literature, and theory, including Marx, Freud, Benjamin, and Arendt. GER:DB-Hum
3-4 units, not given this year

GRADUATE COURSES IN COMPARATIVE LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

COMPLIT 216. Petrarch and Petrarchism
(Same as ITALGEN 264E) The works of Petrarch (1304-1374), acknowledged as the founder of Renaissance humanism, and a bibliophile, collector of manuscripts, and devotee of erudition. How he dedicated his life to harmonizing the Christian faith with classical learning. Sources include his Latin moral works, epistles, epics, and treatises on illustrious men, and the Triumphs and Canzoniere .
5 units, not given this year

COMPLIT 219. Dostoevsky and His Times
(Same as COMPLIT 119, SLAVGEN 151, SLAVGEN 251) Open to juniors, seniors, and graduate students. Major works in English translation with reference to related developments in Russian and European culture, literary criticism, and intellectual history.
4 units, not given this year

COMPLIT 221. Memory, History, and the Contemporary Novel
(Same as GERLIT 246) How the watershed events of the 20th century, the philosophic linguistic turn, and the debate regarding the end of history left their mark on the novel. How does the contemporary novel engage with the past? How does its interest in memory and history relate to late- or postmodern culture of time or to political and ethical concerns? Novels by Toni Morrison, W. G. Sebald, J. M. Coetzee, Kazuo Ishiguro, and A. B. Yehoshua; theoretical works by Nietzsche, Freud, Heidegger, Hannah Arendt, Walter Benjamin, Fredric Jameson, Paul Ricoeur Awishai Margalit, and Walter Benn Michaels.
3-5 units, Aut (Staff)

COMPLIT 230A. The Novel in Europe: The Age of Compromise, 1800-1848
(Same as ENGLISH 230A) The novel after the French revolution and the industrial take-off. Novelistic form and historical processes including nation building and the marriage market, political conservatism and the advent of fashion, aristocracy and bourgeoisie and proletariatFocus is on how stylistic choices and plot structures offer imaginary resolutions to social and ideological conflicts. Authors include Austen, Scott, Shelley, Stendhal, Puskin, Balzac, Bronte.
5 units, not given this year

COMPLIT 239. Realistic Fictions
(Same as GERLIT 232) Realistic narratives in nineteenth-century literature. Structures of representation, temporality, and closure. Realism, history and political economy. Realism, modernism, and twentieth-century revisions. Texts by authors such as Keller, Stifter, Fontane, Seghers, Lukacs, and Adorno.
3-5 units, Aut (Berman, R)

COMPLIT 242. The Global South - Faulkner, García Márquez, Morrison, and Cisneros
A detailed study of Faulkner, García Márquez, Morrison, and Cisneros¿s major imaginative writings in the aesthetic and geopolitical contexts of the South and the Global South. What does it mean to read South by South? South by North? We will be considering the idea of the South as a real and imaginary territory, a rich ideological geography, and a geo-culture, where regional mythology, ethnic and racial formations and divisions, national and transnational contestations, and the new imperialism together produce extraordinary narratives.
3-5 units, Spr (Saldivar, J)

COMPLIT 245D. Modern Hebrew Literature: Prose
(Same as COMPLIT 345) The class will discuss major works of Hebrew prose from the nineteenth through the twenty first century, introduce major trends in the study of Modern Hebrew prose and will ask what new paradigms may be developed for the study of Hebrew narrative prose in the future. Readings will include Avraham Mapu, Mendele Mokher Sfarim, Y.H.Brenner, S.J. Agnon, S. Yizhar, Amos Os, Aharon Appelfeld, Amilia Kahana Carmon, A.B. Yehoshua, Yehudit Katzir, and Zeruya Shalev amon others. Readings in Hebrew. Discussion in English.
3-5 units, Spr (Staff)

COMPLIT 250. Literature, History, and Representation
(Same as FRENLIT 248) Literary works as historical narratives; texts which envision ways of reconstructing or representing an ancient or immediate past through collective or individual narratives. Narration and narrator; relation between individual and collective history; historical events and how they have shaped the narratives; master narratives; and alternative histories. Reading include Glissant, Césaire, Dadié, Cixous, Pérec, Le Clézio, Mokkedem, Benjamin, de Certeau, and White.
3-5 units, not given this year

COMPLIT 252. Mood, Clima, Stimmung as an Aesthetic Dimension: About the Ontology of Literature Today
A perspective on the question of the ontology of literature, a perspective that abandons the paradigm of representation, that language can or cannot refer to, and thereby represent, the material world. How literary texts provide for their readers the impression that they are surrounded by and wrapped in a material world that touches them in the lightest possible ways. Like a voice (German, Stimme), literary texts can make people feel that they are part of the world, of its objects and of its bodies.
3-5 units, Aut (Gumbrecht, H)

COMPLIT 254. Modern Chinese Novel: Theory, Aesthetics, History
(Same as CHINLIT 174, CHINLIT 274) From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese.
4 units, Aut (Wang, B)

COMPLIT 267. National Literatures, Littérature-monde: A New Comparatism
(Same as FRENLIT 267) The implications of a global francophonie, through discussion of texts produced in different francophone times and spaces. Topics include: confrontation of inward/outward territories and the questions of otherness, identity, and minority status; the relation between history and literature; transnationality; métissage of languages and transnationality. Readings include Montaigne and Calvin, Tzetan Todorov, Lise Gauvin, Aimé Césaire, Bernard Dadié, Edouard Glissant, Leila Sebbar.
3-5 units, Win (Boyi, E)

COMPLIT 278. Special Topics (Francophone Literature): From Exoticism to a Discourse of Auto-Representation
(Same as AFRICAST 278, FRENLIT 278) Critical analysis of major issues relating to literatures in French language in and outside France. Focus is on exoticism and and self-representation, with an emphasis on the evolution of mentalities, new sensitivities and the role of literature in developing individual or collective identity. Readings include Le Clézio, Memmi, Malouf, Lopes, Schwarz-Bart, Delaygue, Glissant, Todorov, Kane and others. Primary sources, secondary sources and film. Taught in French.
3-5 units, not given this year

COMPLIT 303D. Thinking in Fiction
(Same as ENGLISH 303D) Narrative and cognition in 18th-century fictional, philosophical, scientific, and cultural texts. Probable readings: Hobbes, Locke, Newton, Swift, Defoe, Hume, Lennox, Sterne, Adam Smith, Wollstonecraft, and Bentham.
5 units, not given this year

COMPLIT 311. Shakespeare, Islam, and Others
(Same as ENGLISH 373D) Shakespeare and other early modern writers in relation to new work on Islam and the Ottoman Turk in early modern studies. Othello, Twelfth Night, Titus Andronicus, The Merchant of Venice, and other Shakespeare plays. Kyd's Solyman and Perseda, Daborne's A Christian Turned Turk, Massinger's The Renegado, Marlowe's The Jew of Malta, and literary and historical materials.
5 units, not given this year

COMPLIT 320A. Epic and Empire
(Same as ENGLISH 314) Focus is on Virgil's Aeneid and its influence, tracing the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) to New World discovery and mercantile expansion in the early modern period.
5 units, Spr (Staff)

COMPLIT 322A. Theories of the Novel
(Same as FRENGEN 356) The novel as the literary genre most closely identified with the development of cultural modernity by literary historians and theorists. Critical models for defining the novel's poetics and cultural work. Critical readings such as texts by Lukacs, Bakhtin, Auerbach, Barthes, Armstrong, Gallagher, Bourdieu, Macherey, Jameson, Said and Spivak. Tutor texts such as Defoe's Robinson Crusoe,Flaubert's Madame Bovary, and Woolf's To the Lighthouse.
3-5 units, not given this year

COMPLIT 327. Genres of the Novel
This course introduces students to the poetics of formative literary genres in the history of the novel, studied through representative examples and theories of the respective genres. These genres include canonized genres and forgotten literature. Genres considered may include picaresque and adventure fiction, domestic fiction, realist fiction, historical fiction, Gothic fiction, sentimental fiction, city mysteries fiction, science fiction, and magical realism.
5 units, Spr (Staff)

COMPLIT 330. The Bourgeois
(Same as ENGLISH 363) Goal is to define the ruling class of modern times. Social history (Weber, Hirschmann, Marx); literary texts (Defoe, Goethe, Gaskell); and Henrik Ibsen who produced an intransigent criticism of the bourgeois ethos.
5 units, Spr (Moretti, F)

COMPLIT 332. The Transatlantic Renaissance
(Same as ENGLISH 310) The emergence of early modern transatlantic culture, emphasizing how canonical works of the Renaissance may be reimagined in a colonial context and how the productions of the colonial Americas make sense as Renaissance works. Topics: mestizaje and creole identity, gender and sexuality, law, religion and the church, mining, commerce, and government. European and American authors: Thomas More, Philip Sidney, Thomas Lodge, William Shakespeare, the Inca Garcilaso de la Vega, and lesser known figures.
5 units, not given this year

COMPLIT 345. Modern Hebrew Literature: Prose
(Same as COMPLIT 245D) Major works of Hebrew prose from the 19th through the 21st centuries, major trends in the study of modern Hebrew prose, and new paradigms that may be developed for the study of Hebrew narrative prose. Readings include Avraham Mapu, Mendele Mokher Sfarim, Y.H.Brenner, S.J. Agnon, S. Yizhar, Amos Os, Aharon Appelfeld, Amilia Kahana Carmon, A.B. Yehoshua, Yehudit Katzir, and Zeruya Shalev. Readings in Hebrew. Discussion in English.
3-5 units, Spr (Staff)

COMPLIT 358. Reading, Otherness, Language
Empathy is considered useful as a key element in fostering moral sentiment and social equilibrium. The opposite is true with regard to literature, when dissimilarity rather than similarity becomes privileged and established as a key way of regarding fiction and its social and ethical role. Texts include: Badiou, Ethics; Cavarero, Relating Narratives; Miller, Others; Barthes, The Pleasure of the Text; James, The Jolly Corner; Shammas, Arabesques; Coetzee,

Foe; Gordimer, My Son's Story; Calvino, If on a Winter's Night a Traveler.

5 units, not given this year

COMPLIT 359A. Philosophical Reading Group
(Same as FRENGEN 395, ITALGEN 395) Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit.

1 unit, Aut (Gumbrecht, H), Win (Gumbrecht, H)

COMPLIT 364. Style
(Same as ENGLISH 364) The return of a term that was central in 20th-century criticism, and has all but disappeared in recent decades. Focus ison looking at concepts of style from various branches of linguistic and literary theory, and examination of some revealing examples in novels and films. Team taught with D.A. Miller from U.C. Berkeley.

5 units, not given this year

COMPLIT 369. Introduction to Graduate Studies: Criticism as Profession
(Same as FRENGEN 369, ITALGEN 369, GERLIT 369) Major texts of modern literary criticism in the context of professional scholarship today. Readings of critics such as Lukács, Auerbach, Frye, Ong, Benjamin, Adorno, Szondi, de Man, Abrams, Bourdieu, Vendler, and Said. Contemporary professional issues including scholarly associations, journals, national and comparative literatures, university structures, and career paths.

5 units, Aut (Berman, R)

COMPLIT 371. Seminar in Chinese Literary Criticism
(Same as CHINLIT 371) How aesthetics and politics intertwine and break apart in Western and Eastern traditions. Aesthetics for understanding culture, morality, and power in crosscultural contexts. Readings include Hegel, Kant, Marcuse, Lukacs, and Adorno; and Chinese thinkers Wang Guowei, Lu Xun, Li Zehou, and Mao. Prerequisite: CHINLIT 127/207 or consent of instructor.

2-5 units, not given this year

COMPLIT 395. Research
(Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPLIT 396L. Pedagogy Seminar I
(Same as ENGLISH 396L) Required for first-year Ph.D students in English, Modern Thought and Literature, and Comparative Literature. Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers.

2 units, Aut (Bender, J)

COMPLIT 399. Dissertation
(Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPLIT 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPARATIVE MEDICINE (COMPMED) COURSES

UNDERGRADUATE COURSES IN COMPARATIVE MEDICINE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

COMPMED 81N. Comparative Anatomy and Physiology of Mammals
(Stanford Introductory Seminar) Preference to freshmen. Emphasis is on a comparative approach to anatomy and physiology of a wide range of mammals, the unique adaptations of each species in terms of its anatomical, and behavioral characteristics, and how these species interact with human beings and other animals. Dissection required. Class size is limited to 16. GER:DB-NatSci

3 units, Win (Bouley, D)

COMPMED 83N. Horse Medicine
(Stanford Introductory Seminar) Preference to freshmen. The most common equine diseases, ranging from colic to lameness are reviewed using problem-oriented approach. Topics include: equine infectious diseases, care of the newborn foal, medical emergencies, and neurological disorders. A lab on the physical and neurological examination of the horse at the Red Barn.

1-2 units, Spr (Staff)

COMPMED 84Q. Globally Emerging Zoonotic Diseases
(Stanford Introductory Seminar) Preference to sophomores. Infectious diseases impacting veterinary and human health around the world today. Mechanisms of disease, epidemiology, and underlying diagnostic, treatment and control principles associated with these pathogens.

3 units, Spr (Felt, S)

COMPMED 87Q. Introduction to the Mouse in Biomedical Research
(Stanford Introductory Seminar) Preference to sophomores. Focus is on the laboratory mouse, one of the most widely used models for biomedical research. Topics include the natural history and origin of the laboratory mouse; characteristics of commonly used strains; mouse anatomy, physiology, and husbandry; common mouse diseases and their effects on research; coat color genetics; and genetically engineered mouse technology. Demonstrations and hands-on experience with necropsy, mouse handling, and research techniques.

3 units, Aut (Nagamine, C)

COMPMED 103. Horse Medicine
The most common equine diseases, ranging from colic to lameness. Equine anatomy and physiology relevant to topics in equine medicine. Equine infectious diseases, care of the newborn foal, medical emergencies, and neurological disorders. Laboratory sessions involve physical examination of the horse and review the basics of the neurological and lameness exam.

2 units, not given this year

COMPMED 107. Comparative Neuroanatomy
(Same as COMPMED 207) Functional organization and evolution of the vertebrate nervous system. Topics include paleoneurology, cladistic analysis, allometry, mosaic versus concerted evolution, and evolution of brain region structure, connectivity, and neurons. Comparisons between structure and function of vertebrate forebrains including hippocampi. Evolution of the primate visual and sensorimotor central nervous system as related to vocalization, socialization, and intelligence.

4 units, Aut (Buckmaster, P; Darian-Smith, C)

COMPMED 110. Pre-Vet Advisory
For students interested in a career in veterinary medicine. Guest speakers present career options in veterinary medicine. Networking with other pre-vet students. How to meet the academic and practical experience prerequisites for admission to veterinary school. Prerequisite: consent of instructor.

1 unit, Aut (Albertelli, M), Win (Bouley, D), Spr (Bouley, D)

COMPMED 120. Rodent Biomethodology
Preference to bioengineering and other biological sciences undergraduates. Techniques and surgery using mice and rats in biomedical research.Laboratory sessions include handling, dosing, and samplinig techniques; basic understanding of anesthesia and analgesia; aseptic surgery techniques, suturing, and surgical approaches. Prequisite: instructor consent.

3 units, Aut (Heath, L; Pacharinsak, C; Green, S)

COMPMED 198. Undergraduate Directed Reading in Comparative Medicine
May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPMED 199. Undergraduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN COMPARATIVE MEDICINE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

COMPMED 207. Comparative Neuroanatomy
(Same as COMPMED 107) Functional organization and evolution of the vertebrate nervous system. Topics include paleoneurology, cladistic analysis, allometry, mosaic versus concerted evolution, and evolution of brain region structure, connectivity, and neurons. Comparisons between structure and function of vertebrate forebrains including hippocampi. Evolution of the primate visual and sensorimotor central nervous system as related to vocalization, socialization, and intelligence.

4 units, Aut (Buckmaster, P; Darian-Smith, C)

COMPMED 299. Directed Reading in Comparative Medicine
Prerequisite: consent of instructor. (Staff)

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPMED 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPMED 399. Graduate Research
Investigations sponsored by individual faculty members.Opportunities are available in comparative medicine and pathology, immuno-histochemistry, electron microscopy, molecular genetics, quantitative morphometry, neuroanatomy and neurophysiology of the hippocampus, pathogenesis of intestinal infections, immunopathology, biology of laboratory rodents, anesthesiology of laboratory animals, gene therapy of animal models of neurodegenerative diseases, and development and characterization of transgenic animal models. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPARATIVE STUDIES IN RACE AND ETHNICITY (CSRE) COURSES

UNDERGRADUATE COURSES IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CSRE 28N. The Cultural Shaping of Mental Health and Illness
(Stanford Introductory Seminar) (Same as PSYCH 28N) This seminar examines how our cultural ideas and practices shape our conceptions, perceptions, experiences, and treatment of emotional wellness and distress. We will read and discuss empirical research and case studies from psychology, anthropology, sociology, and medicine. Course requirements include weekly reading and thought papers, weekly discussion, and a final research project and presentation.

3 units, Win (Tsai, J)

CSRE 107. The Black Mediterranean: Greece, Rome and Antiquity
(Same as AFRICAAM 107C, CLASSGEN 107) Explore problems of race and ethnicity as viable criteria in studying ancient societies and consider the question, What is the Mediterranean?, in relation to premodern evidence. Investigate the role of blackness as a marker of ethnicity; the demography of slavery and its roles in forming social identities; and environmental determinism as a factor in ethnic and racial thinking. Consider Greek and Roman perspectives and behavior, and their impact on later theories of race and ethnicity as well as the Mediterranean as a whole. GER:EC-GlobalCom

4-5 units, Aut (Parker, G)

CSRE 108. Introduction to Feminist Studies
(Same as FEMST 101, HISTORY 107) Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analysis of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.

5 units, Aut (Freedman, E)

CSRE 109A. Federal Indian Law
(Same as NATIVEAM 109A) Cases, legislation, comparative justice models, and historical and cultural material. The interlocking relationships of tribal, federal, and state governments. Emphasis is on economic development, religious freedom, and environmental justice issues in Indian country.

5 units, Aut (Biestman, K)

CSRE 117N. Film, Nation, Latinidad
(Stanford Introductory Seminar) (Same as CHICANST 117N, ILAC 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

3-4 units, Spr (Yarbro-Bejarano, Y)

CSRE 117S. History of California Indians
(Same as NATIVEAM 117S, HISTORY 250A) Demographic, political, and economic history of California Indians, 1700s-1950s. Processes and events leading to the destruction of California tribes, and their effects on the groups who survived. Geographic and cultural diversity. Spanish, Mexican, and Anglo-American periods. The mission system. GER:EC-AmerCul

5 units, Win (Shively, J)

CSRE 120. Native American Writers, 1880-1920
(Same as NATIVEAM 120) Hoxie's historical work provides a framework for analyzing what effects policies had on American Indian people. His work does not provide an American Indian perspective; he stated at the onset, that this was not an objective in this study. His main objective was to present a study that shows Indians' relations with whites as a clash of two complex cultures from a white point of view. Three American Indians writing during this time period provide the needed Indian perspective lacking in Hoxie's work.

5 units, Aut (Shaw, D)

CSRE 121X. Hip Hop, Youth Identities, and the Politics of Language
(Same as AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, EDUC 121X, LINGUIST 155) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

3-4 units, Spr (Alim, H)

CSRE 125. Race, Crowds, and Gender
On January 19, 2009, over one million people gathered in the Washington Mall to watch the inauguration of President Barack Obaama. The press called it this generation's Woodstock, but it was three times larger than the crowd at Woodstock: the largest crowd gathered on U.S. soil since the 1964 March on Washington. Using political movements including marches around immigration, rallies for and against Obama, and others, this course looks at crowds in America and the mobilization of race as a political tactic in order to question why the centrality of race is so often absent in crowds.

5 units, Spr (Arnold, R)

CSRE 126. The Psychology of Race and Gender in Popular Culture
Current American popular culture including movies, television shows, commercials, and music: to highlight representations that create and maintainnotions of race and gender. Course taught from the point of view of social psychology and focuses on empirical

research but material from other fields including sociology, anthropology, drama/performance and communications also included.

5 units, Spr (Marshall, S)

CSRE 132. Friends, Enemies, and Lovers: Interracial Encounters in American Cultures

Representations of interracial encounters in American novels, films, and plays. How these works reflect, question, and reimagine relationships not only amongst minorities, but also between race and nation, individual and community, and art and politics. Topics: cultural appropriations; alternative histories of contact; cross-racial performances and social conflicts. Texts by Sherman Alexie, Luis Valdez, Anna Deveare Smith and Karen Tei Yamashita, and the films Do the Right Thing and Crash.

5 units, Aut (Kim, J)

CSRE 135H. CSRE House Seminar: Race and Ethnicity at Stanford

(Same as ANTHRO 135H) Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.

1-2 units, Aut (Wilcox, M)

CSRE 135I. CSRE House Seminar: Race and Ethnicity at Stanford

(Same as ANTHRO 135I) Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.

1-2 units, Win (Wilcox, M)

CSRE 145A. Poetics and Politics of Caribbean Women's Literature

(Same as AFRICAAM 145A) Mid 20th-century to the present. How historical, economic, and political conditions in Haiti, Cuba, Jamaica, Antigua, and Guadeloupe affected women. How Francophone, Anglophone, and Hispanophone women novelists, poets, and short story writers respond to similar issues and pose related questions. Caribbean literary identity within a multicultural and diasporic context; the place of the oral in the written feminine text; family and sexuality; translation of European master texts; history, memory, and myth; and responses to slave history, colonialism, neocolonialism, and globalization. GER:DB-SocSci, DB-SocSci, EC-Gender

5 units, Win (Duffey, C)

CSRE 146. Community Matters: Research and Service with Community Organizations

Methods and principles for academic research in community settings for students preparing to enter summer experiences with community organizations. Case studies and tools to help students conceptualize a research strateg. Students develop a memorandum of understanding in collaboration with the community agency to define the work, relationship, and mutual benefit of the research partnership.

2 units, Spr (Mitchell, T)

CSRE 146S. Asian American Culture and Community

(Same as AMSTUD 146, COMPLIT 146, ASNAMST 146S) An examination of the history of Asians in America via one case history: the International Hotel in San Francisco. Background history of Asians in America, and the specifics of the I Hotel case as involving the convergence of global and local economies, urban redevelopment, and housing issues for minorities. Focus on the convergence of community and cultural production. Service learning component involving community work at the Manilatown Heritage Foundation in San Francisco. Service Learning Course (certified by Haas Center). GER:DB-Hum

5 units, Aut (Palumbo-Liu, D)

CSRE 160N. Latino/Latina Performance in the United States

(Stanford Introductory Seminar) (Same as DRAMA 17N) Preference to freshmen. Works by U.S. Latino and Latina performance artists producing from the margins of the mainstream Euro American theater world. How performance art serves as a kind of dramatized political forum for Latino/a artists, producing some of the most transgressive explorations of queer and national/ethnic identities in the U.S. today. Students create and perform in a staged reading of an original performance piece. GER:DB-Hum, EC-AmerCul

3 units, Win (Moraga, C)

CSRE 162. WOMEN IN MODERN AMERICA

(Same as AMSTUD 161, HISTORY 161) The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements. GER:DB-SocSci, EC-Gender

4-5 units, Spr (Freedman, E)

CSRE 167. Chicana and Chicano Representation in Cinema

(Same as CHICANST 167) This introductory course surveys representations of Chicana/os, as well as Latinas/os, in independent and Hollywood film and video across a variety of genres (narrative, documentary, experimental). We will consider how film and video are social and artistic phenomenon where cultural and political debates about cultural identity and community are narrated and imag(in)ed. Work screened in class will be historically situated in relation to the Chicano civil rights movement, the emergence of Chicano film and television, international film movements, the struggle for access to the means for self-representation, as well as the challenges involved in the areas of distribution, exhibition and reception. Course content seeks to underscore the vital role of visual media in struggles for social change and political enfranchisement. We will consider how visual media are a vehicle for creative and personal expression. Throughout this course, we will explore issues of film/video and

5 units, Spr (Staff)

CSRE 168. New Citizenship: Grassroots Movements for Social Justice in the U.S.

(Same as CHICANST 168) The contributions of immigrants and communities of color to the meaning of citizenship in the U.S. Citizenship, more than only a legal status, is a dynamic cultural field in which people claim equal rights while demanding respect for differences. Academic studies of citizenship examined in dialogue with the theory and practice of activists and movements. Engagement with immigrant organizing and community-based research.

5 units, Win (Staff)

CSRE 169A. Cultural Traffic: Race, Performance, and Globalization

(Same as AFRICAAM 169A, AMSTUD 169, DRAMA 169A, DRAMA 303A) This course will examine the transnational intersections of race and performance. It will consider the question of s race understood internationally and how do such definitions travel. We examine critical race theory and study constructions of race through the lens of performance. The course will interrogate the transnational meanings of such performances. Students in this course will read, study, analyze and potentially even stage theoretical and performance texts from both inside and outside of the United States. Course also satisfies Drama 302/303 requirement.

3-5 units, Aut (George, N)

CSRE 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges

(Same as AFRICAAM 173S, ASNAMST 173S) Lived experience of people who dwell in the border world of race and nation where they negotiate transcultural and multiethnic identities and politics. Comparative, historical, and global contexts such as family and class. Controversies, such as representations of mixed race people in media and multicultural communities. What the lives of people like Tiger Woods and Barack Obama reveal about how the marginal is becoming mainstream.

5 units, Spr (Murphy-Shigematsu, S)

CSRE 177. Writing for Performance: The Fundamentals

(Same as DRAMA 177, DRAMA 277) The elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis. Table readings of one-act length work. GER:DB-Hum

5 units, Win (Moraga, C)

CSRE 179. Asian American Experiences and Documentary Practice
(Same as FILMSTUD 279, ASNAMST 179) Focus is on documentary cinema as a technology for understanding Asian Americans in the U.S. The social and historical context of the formation of the Asian American filmmaker, an authorial position that emerges in the 60s and 70s as part of the civil rights movement. Works include films by Loni Ding, Bob Nakamura and Curtis Choy; readings about the establishment of Asian American media industries and Asian American film criticism as a multi-genre. Social issue documentaries that represent new ethnographies of social experience including transnational adoption (Daughter From Danang), refugee experience (AKA Don Bonus), and sex tourism (The Women Outside). Readings include analyses of the implications of these works for cinema studies, ethnic studies, and the politics of film in everyday life. Experimental documentaries and their interrogation of the limits of the documentary form in representing identities and social problems. How does representation matter within and for Asian America in framing the complexities of race and racial identity? Screenings include works by Marlon Fuentes, Rea Tajiri and Trinh T. Minh-ha.
5 units, Spr (Shimizu, C)

CSRE 179C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop
(Same as DRAMA 179C, DRAMA 279C) This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what ¿the facts¿ can offer.
3-5 units, Spr (Moraga, C)

CSRE 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
(Same as CSRE 279G, DRAMA 179G, DRAMA 279G) Gateway core course to the IDA emphasis in CSRE. A 21st-century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity areintegral to this study. Students will produce a final work, integrating critical writing with a creative project.
3-5 units, Spr (Moraga, C)

CSRE 180E. Introduction to Chicana/o Studies
(Same as CHICANST 180E) Historical and contemporary experiences that have defined the status of Mexican-origin people living in the U.S. Topics include the U.S./Mexico border and the borderlands; immigration and anti-immigration sentiment; literary and cultural traditions; music; labor; historical perspectives on Mexicans in the U.S. and the Chicano movement; urban realities; gender relations; political and economic changes; and inter- and intragroup interactions. Sources include social science and humanities scholarship. GER:DB-Hum, EC-AmerCul
5 units, Spr (Gallardo, S)

CSRE 183. Border Crossings and American Identities
(Same as AMSTUD 183) How novelists, filmmakers, and poets perceive racial, ethnic, gender, sexual preference, and class borders in the context of a national discussion about the place of Americans in the world. How Anna Deavere Smith, Sherman Alexie, or Michael Moore consider redrawing such lines so that center and margin, or self and other, do not remain fixed and divided. How linguistic borderlines within multilingual literature by Caribbean, Arab, and Asian Americans function. Can Anzaldúa's conception of borderlands be constructed through the matrix of language, dreams, music, and cultural memories in these American narratives? Course includes examining one's own identity. GER:DB-Hum, EC-AmerCul
5 units, Aut (Duffey, C)

CSRE 189W. Language and Minority Rights
(Same as CHICANST 189W, EDUC 189X) Language as it is implicated in migration and globalization. The effects of globalization processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages. GER:EC-GlobalCom
3 units, not given this year

CSRE 192E. Topics in the History of Sexuality: Sexual Violence
(Same as AMSTUD 258, HISTORY 258, HISTORY 358) Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence. GER:DB-SocSci, EC-Gender
4-5 units, Win (Freedman, E)

CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity
(Same as ENGLISH 172D, PSYCH 155, SOC 146) How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. GER:DB-SocSci, EC-AmerCul
5 units, Win (Markus, H; Moya, P)

CSRE 198. Internship for Public Service
Restricted to CSRE comparative studies majors with a concentration in public service. Students consult with the CSRE undergraduate program director and CSRE affiliated faculty to develop an internship. Group meetings. May be repeated for credit. Service Learning Course (certified by Haas Center).
1-5 units, Aut (Mitchell, T), Win (Mitchell, T), Spr (Mitchell, T)

CSRE 199. Pre-Honors Seminar
For students interested in writing a senior honors thesis. Conceptualizing and defining a manageable honors project, conducting interdisciplinary research, the parameters of a literature review essay, and how to identify a faculty adviser.
1-2 units, Aut (Ku, M)

CSRE 199A. Race, Sex, Gender in Cultural Representations
(Same as CHICANST 199A, ILAC 389E) Critical theory and cultural representations in media that address issues surrounding the representation of race, gender, sexuality, and politics. How is desire racialized? How is racial difference produced through sex as a material practice and what is the function of sex in racial self formation ? How are questions of pleasure, desire, and the structures of power reconciled? How do these texts reinforce or contest stereotypes and the ideal bodies of national identity? Is it desirable to envision a bridging of queer communities of color, or a transnational or global network?
3-5 units, Spr (Yarbro-Bejarano, Y)

CSRE 200. Latina/o Literature
(Same as CHICANST 200, ILAC 280) Examination of a diverse set of literary texts by Latinas/os, bringing history, politics, and cultural theory to bear in order to apprehend the significant intracultural differences amongst Latinas/os (most notably concerning im/migration). Gender and sexuality as critical lenses that reflect and refract themes such as identity, language politics, transnationalism, political turmoil, socioeconomic status, and the notion of home/land and its loss, reinvention, and/or reclamation
3-5 units, Aut (Yarbro-Bejarano, Y)

CSRE 200R. Directed Research
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CSRE 200W. Directed Reading
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CSRE 200X. CSRE Senior Seminar
Required for CSRE-related students, including those who opt to write honors theses in other departments and programs. Research and the writing of the senior honors thesis or senior paper under the supervision of a faculty project adviser. The process of research including conceptualization, development of prospectus, development of theses, research, analysis, and writing.
5 units, Aut (Ku, M)

CSRE 200Y. CSRE Senior Honors Research
1-10 units, Win (Staff)

CSRE 200Z. CSRE Senior Honors Research
(Thompson, Snipp)
1-10 units, Spr (Staff)

CSRE 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era
(Same as CHICANST 201B) How creative projects build and strengthen communities of common concern. Projects focus on cultural reclamation, multiculturalism, cultural equity and contemporary cultural wars, media literacy, independent film, and community-based art. Guest artists and organizers, films, and case studies.
5 units, Aut (Hernandez, G)

CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century
For students with leadership potential who have studied these topics in lecture format. Race discrimination strategies, their relation to education reform initiatives, and the role of media in shaping racial attitudes in the U.S.
5 units, Spr (Steyer, J; Lythcott-Haims, J)

CSRE 226. Race and Racism in American Politics
(Same as POLISCI 226, POLISCI 326) Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.
5 units, Aut (Segura, G)

GRADUATE COURSES IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CSRE 201C. Critical Concepts in Chicana/o Literature
(Same as CHICANST 201C, ILAC 380E) Interrogation of the critical discourses that have configured and reconfigured the canon of Chicana/o literature over the last thirty years. Close textual readings of primary texts, mainly narrative, within the development of Chicana/o literary and cultural criticism. Construction of narrative genealogies and foundational texts. Impact of the publication of late-nineteenth or pre-movement novels and Chicana feminist/lesbian/queer critiques. Consideration of alternative paradigms such as positioning Chicana/o literature within a U.S. Latina/o literary imaginary, and the shift of critical discourse in the field of visual art from a paradigm of resistance and affirmation to one of post-Chicano.
3-5 units, Aut (Yarbro-Bejarano, Y)

CSRE 216X. Education, Race, and Inequality in African American History, 1880-1990
(Same as EDUC 216X, HISTORY 255E) Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis.
3-5 units, Aut (Gordon, L)

CSRE 279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
(Same as CSRE 179G, DRAMA 179G, DRAMA 279G) This ""gateway"" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.
3-5 units, Spr (Moraga, C)

COMPUTATIONAL AND MATHEMATICAL ENGINEERING (CME) COURSES

UNDERGRADUATE COURSES IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CME 100. Vector Calculus for Engineers
(Same as ENGR 154) Computation and visualization using MATLAB. Differential vector calculus: analytic geometry in space, functions of several variables, partial derivatives, gradient, unconstrained maxima and minima, Lagrange multipliers. Integral vector calculus: multiple integrals in Cartesian, cylindrical, and spherical coordinates, line integrals, scalar potential, surface integrals, Green's, divergence, and Stokes' theorems. Examples and applications drawn from various engineering fields. Prerequisites: MATH 41 and 42, or 10 units AP credit. GER:DB-Math
5 units, Aut (Khayms, V)

CME 100A. Vector Calculus for Engineers, ACE
Students attend CME102/ENGR155A lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Prerequisite: application at:http://soe.stanford.edu/current_students/edp/programs/ace.html
6 units, Aut (Khayms, V; Darve, E)

CME 102. Ordinary Differential Equations for Engineers
(Same as ENGR 155A) Analytical and numerical methods for solving ordinary differential equations arising in engineering applications: Solution of initial and boundary value problems, series solutions, Laplace transforms, and non-linear equations; numerical methods for solving ordinary differential equations, accuracy of numerical methods, linear stability theory, finite differences. Introduction to MATLAB programming as a basic tool kit for computations. Problems from various engineering fields. Prerequisite: CME 100/ENGR 154 or MATH 51. GER:DB-Math
5 units, Win (Darve, E)

CME 102A. Ordinary Dofferential Equations for Engineers, ACE
Students attend CME102/ENGR155A lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Prerequisite: application at: http://soe.stanford.edu/current_students/edp/programs/ace.html
6 units, Win (Osgood, B; Darve, E)

CME 104. Linear Algebra and Partial Differential Equations for Engineers
(Same as ENGR 155B) Linear algebra: matrix operations, systems of algebraic equations, Gaussian elimination, undertermined and overdetermined systems, coupled systems of ordinary differential equations, eigensystem analysis, normal modes. Fourier series with applications, partial differential equations arising in science and engineering, analytical solutions of partial differential equations. Numerical methods for solution of partial differential equations: iterative techniques, stability and convergence, time advancement, implicit methods, von Neumann stability analysis. Examples and applications from various engineering fields. Prerequisite: CME 102/ENGR 155A. GER:DB-Math
5 units, Spr (Khayms, V)

CME 104A. Linear Algebra and Partial Differential Equations for Engineers, ACE
Students attend CME104/ENGR15nB lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Prerequisite: application at:http://soe.stanford.edu/current_students/edp/programs/ace.html
6 units, Spr (Khayms, V)

CME 106. Introduction to Probability and Statistics for Engineers
(Same as ENGR 155C) Probability: random variables, independence, and conditional probability; discrete and continuous distributions, moments, distributions of several random variables. Topics in mathematical statistics: random sampling, point estimation, confidence intervals, hypothesis testing, non-parametric tests, regression and correlation analyses; applications in engineering, industrial manufacturing, medicine, biology, and other fields. Prerequisite: CME 100/ENGR154 or MATH 51. GER:DB-Math
3-4 units, Win (Khayms, V), Sum (Khayms, V)

CME 108. Introduction to Scientific Computing
Numerical computation for mathematical, computational, physical sciences and engineering: error analysis, floating-point arithmetic, nonlinear equations, numerical solution of systems of algebraic equations, banded matrices, least squares, polynomial interpolation, numerical differentiation and integration, numerical solution of ordinary differential equations, truncation error, numerical stability for time dependent problems and stiffness. Prerequisites: CS 106A or familiarity with MATLAB; MATH 51, 52, 53; inappropriate for students who have taken CME 102,104/ENGR 155A,B. GER:DB-EngrAppSci
3-4 units, Spr (Le, H), Sum (Staff)

GRADUATE COURSES IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CME 200. Linear Algebra with Application to Enginering Computations
(Same as ME 300A) Computer based solution of systems of algebraic equations obtained from engineering problems and eigensystem analysis, Gaussian elimination, effect of round-off error, operation counts, banded matrices arising from discretization of differential equations, ill-conditioned matrices, matrix theory, least square solution of unsolvable systems, solution of non-linear algebraic equations, eigenvalues and eigenvectors, similar matrices, unitary and Hermitian matrices, positive definiteness, Cayley-Hamilton theory and function of a matrix and iterative methods. Prerequisite: familiarity with computer programming, and MATH103, 130, or equivalent.
3 units, Aut (Gerritsen, M)

CME 204. Partial Differential Equations in Engineering
(Same as ME 300B) Geometric interpretation of partial differential equation (PDE) characteristics; solution of first order PDEs and classification of second-order PDEs; self-similarity; separation of variables as applied to parabolic, hyperbolic, and elliptic PDEs; special functions; eigenfunction expansions; the method of characteristics. If time permits, Fourier integrals and transforms, Laplace transforms. Prerequisite: CME 200/ME 300A, equivalent, or consent of instructor.
3 units, Win (Shaqfeh, E)

CME 206. Introduction to Numerical Methods for Engineering
(Same as AA 214A, ME 300C) Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B.
3 units, Spr (Iaccarino, G)

CME 211. Computer Programming in C++ for Earth Scientists and Engineers
(Same as ENERGY 211) Computer programming methodology emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and modularity. Fundamental data structures. Time and space complexity analysis. The basic facilities of the programming language C++. Numerical problems from various science and engineering applications.
3 units, Win (Caulfield, E; Aboud, S)

CME 212. Introduction to Large-Scale Computing in Engineering
(Same as ENERGY 212) Advanced programming methodologies for solving fundamental engineering problems using algorithms with pervasive application across disciplines. Overview of computer systems from a programming perspective including processor architectures, memory hierarchies, machine arithmetic, performance tuning techniques. Algorithms include iterative, direct linear solvers, fft, and divide and conquer strategies for n-body problems. Software development; other practical UNIX tools including shell scripting, vi/emacs, gcc, make, gdb, gprof, version control systems and LaTeX. Prerequisites: CME 200/ME 300A, CME 211, and CS 106X or equivalent level of programming in C/C++.
3 units, Spr (Caulfield, E)

CME 215A. Advanced Computational Fluid Dynamics
(Same as AA 215A) High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent.
3 units, Win (Jameson, A)

CME 215B. Advanced Computational Fluid Dynamics
(Same as AA 215B) High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent.
3 units, Spr (Jameson, A)

CME 263. Introduction to Linear Dynamical Systems
(Same as EE 263) Applied linear algebra and linear dynamical systems with application to circuits, signal processing, communications, and control systems. Topics: least-squares approximations of over-determined equations and least-norm solutions of underdetermined equations. Symmetric matrices, matrix norm, and singular value decomposition. Eigenvalues, left and right eigenvectors, with dynamical interpretation. Matrix exponential, stability, and asymptotic behavior. Multi-input/multi-output systems, impulse and step matrices; convolution and transfer matrix descriptions. Control, reachability, and state transfer; observability and least-squares state estimation. Prerequisites: linear algebra and matrices as in MATH 103; differential equations and Laplace transforms as in EE 102A.
3 units, Aut (Boyd, S), Spr (Lall, S)

CME 291. Master's Research
Students require faculty sponsor. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CME 300. Departmental Seminar Series
Required for first-year ICME Ph.D. students; recommended for first-year ICME M.S. students. Presentations about research at Stanford by faculty and researchers from Engineering, H&S, and organizations external to Stanford. May be repeated for credit.
1 unit, Aut (Murray, W), Win (Murray, W)

CME 302. Numerical Linear Algebra
First in a three quarter graduate sequence. Solution of systems of linear equations: direct methods, error analysis, structured matrices; iterative methods and least squares. Parallel techniques. Prerequisites: CME 108, MATH 103 or 113.
3 units, Aut (Gerritsen, M)

CME 303. Partial Differential Equations of Applied Mathematics
(Same as MATH 220) First-order partial differential equations; method of characteristics; weak solutions; elliptic, parabolic, and

hyperbolic equations; Fourier transform; Fourier series; and eigenvalue problems. Prerequisite: foundation in multivariable calculus and ordinary differential equations.

3 units, Aut (Ryzhik, L)

CME 304. Numerical Optimization

(Same as MS&E 315) Solution of nonlinear equations; unconstrained optimization; linear programming; quadratic programming; global optimization; general linearly and nonlinearly constrained optimization. Theory and algorithms to solve these problems. Prerequisite: background in analysis and numerical linear algebra.

3 units, Win (Murray, W)

CME 305. Discrete Mathematics and Algorithms

(Same as MS&E 316) Topics: enumeration such as Cayley's theorem and Prufer codes, SDR, flows and cuts (deterministic and randomized algorithms), probabilistic methods and random graphs, asymptotics (NP-hardness and approximation algorithms). Topics illustrated with EE, CS, and bioinformatics applications. Prerequisites: MATH 51 or 103 or equivalents.

3 units, Win (Saberi, A)

CME 306. Numerical Solution of Partial Differential Equations

(Same as MATH 226) Hyperbolic partial differential equations: stability, convergence and qualitative properties; nonlinear hyperbolic equations and systems; combined solution methods from elliptic, parabolic, and hyperbolic problems. Examples include: Burger's equation, Euler equations for compressible flow, Navier-Stokes equations for incompressible flow. Prerequisites: MATH 220A or CME 302.

3 units, Spr (Garapon, P)

CME 308. Stochastic Methods in Engineering

(Same as MATH 228) Review of basic probability; Monte Carlo simulation; state space models and time series; parameter estimation, prediction, and filtering; Markov chains and processes; stochastic control; and stochastic differential equations. Examples from various engineering disciplines. Prerequisites: exposure to probability; background in real variables and analysis.

3 units, Spr (Papanicolaou, G)

CME 309. Randomized Algorithms

(Same as CS 365) Design and analysis of algorithms that use randomness to guide their computations. Basic tools, from probability theory and probabilistic analysis, that are recurrent in algorithmic applications. Randomized complexity theory and game-theoretic techniques. Algebraic techniques. Probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, similarity search and metric embeddings, online algorithms. Prerequisites: CS 161 and STAT 116, or equivalents.

3 units, Win (Goel, A)

CME 325. Numerical Approximations of Partial Differential Equations in Theory and Practice

Finite volume and finite difference methods for initial boundary value problems in multiple space dimensions. Emphasis is on formulation of boundary conditions for the continuous and the discrete problems. Analysis of numerical methods with respect to stability, accuracy, and error behavior. Techniques of treating non-rectangular domains, and effects of non-regular grids.

1-2 units, not given this year

CME 334. Advanced Methods in Numerical Optimization

(Same as MS&E 312) Topics include interior-point methods, relaxation methods for nonlinear discrete optimization, sequential quadratic programming methods, optimal control and decomposition methods. Topic chosen in first class; different topics for individuals or groups possible. Individual or team projects. May be repeated for credit.

3 units, Aut (Murray, W)

CME 335. Advanced Topics in Numerical Linear Algebra

Possible topics: Eigenvalue problems, including perturbation theory, algorithms, and related problems such as the SVD or generalized eigenvalue problems; iterative methods, including stationary and non-stationary methods; matrix functions, including applications of moments and quadrature; polynomial equations and Parallel implementation of matrix computations. May be repeated for credit.

3 units, given occasionally

CME 336. Linear and Conic Optimization with Applications

(Same as MS&E 314) Linear, semidefinite, conic, and convex nonlinear optimization problems as generalizations of classical linear programming. Algorithms include the interior-point, barrier function, and cutting plane methods. Related convex analysis, including the separating hyperplane theorem, Farkas lemma, dual cones, optimality conditions, and conic inequalities. Complexity and/or computation efficiency analysis. Applications to combinatorial optimization, sensor network localization, support vector machine, and graph realization. Prerequisite: MS&E 211 or equivalent.

3 units, alternate years, not given this year

CME 337. Information Networks

(Same as MS&E 337) Network structure of the Internet and the web. Modeling, scale-free graphs, small-world phenomenon. Algorithmic implications in searching and inter-domain routing; the effect of structure on performance. Game theoretic issues, routing games, and network creation games. Security issues, vulnerability, and robustness. Prerequisite: basic probability and graph theory.

3 units, alternate years, not given this year

CME 338. Large-Scale Numerical Optimization

(Same as MS&E 318) The main algorithms and software for constrained optimization emphasizing the sparse-matrix methods needed for their implementation. Iterative methods for linear equations and least squares. The simplex method. Basic factorization and updates. Interior methods. The reduced-gradient method, augmented Lagrangian methods, and SQP methods. Prerequisites: Basic numerical linear algebra, including LU, QR, and SVD factorizations, and an interest in MATLAB, sparse-matrix methods, and gradient-based algorithms for constrained optimization. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108, 200, 302, 304, 334, or 335.

3 units, Spr (Saunders, M)

CME 340. Large-Scale Data Mining

Focus is on very large scale data mining on the web and on social networks. Topics include network models, ranking algorithms, reputation and collaborative filtering, and supervised and unsupervised learning. Prerequisites: programming at the level of CS 108; statistics at the level of MATH 103 and STATS 116. Recommended: machine learning at the level of CS 229.

1 unit, Win (Kamvar, S)

CME 352. Molecular Algorithms

Recent research in DNA and RNA based nanotechnology, mathematical models of DNA self-assembly, algorithmic techniques and stochastic analyses for efficient and robust DNA self-assembly, experimental advances in molecular motors and machines which use DNA migration/enzymes, and algorithmic issues in the design of molecular motors and machines. Prerequisite: consent of instructor.

3 units, not given this year

CME 356. Engineering Functional Analysis and Finite Elements

(Same as ME 412) Concepts in functional analysis to understand models and methods used in simulation and design. Topology, measure, and integration theory to introduce Sobolev spaces. Convergence analysis of finite elements for the generalized Poisson problem. Extensions to convection-diffusion-reaction equations and elasticity. Upwinding. Mixed methods and LBB conditions. Analysis of nonlinear and evolution problems. Prerequisites: 335A,B, CME 200, CME 204, or consent of instructor. Recommended: 333, MATH 171.

3 units, not given this year

CME 358. Finite Element Method for Fluid Mechanics

Mathematical theory of the finite element method for incompressible flows; related computational algorithms and implementation details. Poisson equation; finite element method for simple elliptic problems; notions of mathematical analysis of non-coercive partial differential equations; the inf-sup or Babushka-Brezzi condition and its applications to the Stokes and Darcy problems; presentation of stable mixed finite element methods and corresponding algebraic solvers; stabilization approaches in the context of advection-diffusion equation; numerical solution of the incompressible Navier-Stokes equations by finite element method. Theoretical, computational, and MATLAB computer programming assignments.

Prerequisites: foundation in multivariate calculus and ME 335A or equivalent.

3 units, not given this year

CME 362. An Introduction to Compressed Sensing

(Same as STATS 330) Compressed sensing is a new data acquisition theory asserting that one can design nonadaptive sampling techniques that condense the information in a compressible signal into a small amount of data. This revelation may change the way engineers think about signal acquisition. Course covers fundamental theoretical ideas, numerical methods in large-scale convex optimization, hardware implementations, connections with statistical estimation in high dimensions, and extensions such as recovery of data matrices from few entries (famous Netflix Prize).

2-3 units, Spr (Staff)

CME 364A. Convex Optimization I

(Same as EE 364A) Convex sets, functions, and optimization problems. The basics of convex analysis and theory of convex programming: optimality conditions, duality theory, theorems of alternative, and applications. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems. Applications to signal processing, communications, control, analog and digital circuit design, computational geometry, statistics, machine learning, and mechanical engineering. Prerequisite: linear algebra such as 263.

3 units, Win (Boyd, S)

CME 364B. Convex Optimization II

(Same as EE 364B) Continuation of 364. Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Exploiting problem structure in implementation. Convex relaxations of hard problems. Global optimization via branch and bound. Robust and stochastic optimization. Applications in areas such as control, circuit design, signal processing, and communications. Substantial project. Prerequisite: 364A.

3 units, Spr (Boyd, S)

CME 390. Curricular Practical Training

May be repeated three times for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CME 400. Ph.D. Research

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CME 444. Computational Consulting

Advice by graduate students under supervision of ICME faculty. Weekly briefings with faculty adviser and associated faculty to discuss ongoing consultancy projects and evaluate solutions. May be repeated for credit.

1-3 units, Aut (Gerritsen, M), Win (Gerritsen, M), Spr (Gerritsen, M)

CME 500. Numerical Analysis and Computational and Mathematical Engineering Seminar

Weekly research lectures by experts from academia, national laboratories, industry, and doctoral students. May be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Staff)

CME 510. Linear Algebra and Optimization Seminar

Recent developments in numerical linear algebra and numerical optimization. Guest speakers from other institutions and local industry. Goal is to bring together scientists from different theoretical and application fields to solve complex scientific computing problems. May be repeated for credit.

1 unit, Aut (Saunders, M), Win (Saunders, M), Spr (Saunders, M)

CME 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CME 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPUTER SCIENCE (CS) COURSES

UNDERGRADUATE COURSES IN COMPUTER SCIENCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

CS 1C. Introduction to Computing at Stanford

For those with limited experience with computers or who want to learn more about Stanford's computing environment. Topics include: computer maintenance and security, computing resources, Internet privacy, and copyright law. One-hour lecture/demonstration in dormitory clusters prepared and administered weekly by the Resident Computer Consultant (RCC). Final project. Not a programming course.

1 unit, Aut (Smith, S)

CS 2C. Multimedia Production

Sound, image and video editing techniques and applications, including understanding file formats and publishing multimedia online. Topics: GarageBand, Photoshop, iMovie, Final Cut Pro, and iDVD. Weekly lecture followed by lab section. Second unit for additional creative production assignments completed out of class time and extensive Final Project. Not a programming course, but will use computer multimedia applications heavily for editing.

1-2 units, Aut (Staff), Win (Staff)

CS 21N. Can Machines Know? Can Machines Feel?

(Stanford Introductory Seminar) Preference to freshmen. Can mental attitudes attributed to people and sometimes to animals, including knowledge, belief, desire, and intention, also be ascribed to machines? Can light sensors have a belief? Can a pool cleaning robot or tax-preparation software have an intention? If not, why not? If yes, what are the rules of such ascription, and do they vary between human beings and machines? Sources include philosophy, neuroscience, computer science, and artificial intelligence. Topics: logic, probability theory, and elements of computation. Students present a paper. GER:DB-EngrAppSci

3 units, Spr (Shoham, Y)

CS 45N. Computers and Photography: From Capture to Sharing

(Stanford Introductory Seminar) Preference to freshmen with exerience in photography and use of computers. How a photographer creates photos, makes them available for computer viewing, reliably stores them, organizes them, tags them, searches them, and distributes them online. Access to a digital SLR camera and to PhotoShop Elements or equivalent software is required; no programming experience required. Digital SLRs and editing software will be provided to those students who do not wish to use their own.

3-4 units, Aut (Garcia-Molina, H)

CS 73N. The Business of the Internet

(Stanford Introductory Seminar) Preference to freshmen. Issues in Internet history, technology, and public policy are discussed as well as the Internet's impact on commerce, education, government, and health care. Writing for the web. Participants develop a substantial website. GER:DB-EngrAppSci

3 units, Spr (Wiederhold, G; Barr, A; Tessler, S)

CS 74N. Digital Dilemmas

(Stanford Introductory Seminar) Preference to freshmen. Issues where policy decision making requires understanding computer and communications technology. Technology basics taught in non-technology terms. Topics include consumer privacy, government surveillance, file sharing and intellectual property, and electronic voting. GER:DB-EngrAppSci

3 units, Aut (Dill, D)

CS 103. Mathematical Foundations of Computing

Mathematical foundations required for computer science, including propositional predicate logic, induction, sets, functions, and relations. Formal language theory, including regular expressions, grammars, finite automata, Turing machines, and NP-completeness. Mathematical rigor, proof techniques, and applica-

tions. May not be taken by students who have completed 103A,B or 103X. Prerequisite: 106A or equivalent. GER:DB-Math

3-5 units, Aut (Plummer, R), Spr (Plummer, R)

CS 105. Introduction to Computers

For non-technical majors. What computers are and how they work. Practical experience in programming. Construction of computer programs and basic design techniques. A survey of Internet technology and the basics of computer hardware. Students in technical fields and students looking to acquire programming skills should take 106A or 106X. Students with prior computer science experience at the level of 106 or above require consent of instructor. Prerequisite: minimal math skills. GER:DB-EngrAppSci

3-5 units, Aut (Staff), Win (Young, P), Spr (Young, P)

CS 106A. Programming Methodology

(Same as ENGR 70A) Introduction to the engineering of computer applications emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and testing. Uses the Java programming language. Emphasis is on good programming style and the built-in facilities of the Java language. No prior programming experience required. GER:DB-EngrAppSci

3-5 units, Aut (Sahami, M), Win (Roberts, E), Spr (Cain, G), Sum (Staff)

CS 106B. Programming Abstractions

(Same as ENGR 70B) Abstraction and its relation to programming. Software engineering principles of data abstraction and modularity. Object-oriented programming, fundamental data structures (such as stacks, queues, sets) and data-directed design. Recursion and recursive data structures (linked lists, trees, graphs). Introduction to time and space complexity analysis. Uses the programming language C++ covering its basic facilities. Prerequisite: 106A or equivalent. GER:DB-EngrAppSci

3-5 units, Aut (Cain, G), Win (Roberts, E), Spr (Cain, G), Sum (Staff)

CS 106L. Standard C++ Programming Laboratory

Supplemental lab to 106B and 106X. Additional features of standard C++ programming practice. Possible topics include advanced C++ language features, standard libraries, STL containers and algorithms, object memory management, operator overloading, and inheritance. Prerequisite: consent of instructor. Corequisite: 106B or 106X.

1 unit, Aut (Cain, G), Win (Cain, G), Spr (Cain, G; Schwarz, K)

CS 106X. Programming Abstractions (Accelerated)

(Same as ENGR 70X) Intensive version of 106B for students with a strong programming background interested in a rigorous treatment of the topics at an accelerated pace. Additional advanced material and more challenging projects. Prerequisite: excellence in 106A or equivalent, or consent of instructor. GER:DB-EngrAppSci

3-5 units, Aut (Cain, G), Win (Cain, G)

CS 107. Computer Organization and Systems

Introduction to the fundamental concepts of computer systems. Explores how computer systems execute programs and manipulate data, working from the C programming language down to the microprocessor. Topics covered include: the C programming language, data representation, machine-level code, computer arithmetic, elements of code compilation, performance evaluation and optimization, memory organization and management, and concurrency and threading. Prerequisites: 106B or X, or consent of instructor. GER:DB-EngrAppSci

3-5 units, Aut (Zelenski, J), Spr (Zelenski, J)

CS 108. Object-Oriented Systems Design

Software design and construction in the context of large OOP libraries. Taught in Java. Topics: OOP design, design patterns, testing, graphical user interface (GUI) OOP libraries, software engineering strategies, approaches to programming in teams. Prerequisite: 107. GER:DB-EngrAppSci

3-4 units, Aut (Young, P), Win (Young, P)

CS 109. Introduction to Probability for Computer Scientists

Topics include: counting and combinatorics, random variables, conditional probability, independence, distributions, expectation, point estimation, and limit theorems. Applications of probability in computer science including machine learning and the use of probability in the analysis of algorithms. Prerequisites: 103, 106B or X, 109 and MATH 51 or equivalent. GER:DB-EngrAppSci

3-5 units, Win (Sahami, M), Spr (Sahami, M)

CS 109L. Statistical Computing with R Laboratory

Supplemental lab to CS109. Introduces the R programming language for statistical computing. Topics include basic facilities of R including mathematical, graphical, and probability functions, building simulations, introductory data fitting and machine learning. Provides exposure to the functional programming paradigm. Corequisite: CS109.

1 unit, Win (Sahami, M; Rothfels, J), Spr (Sahami, M; Rothfels, J)

CS 110. Principles of Computer Systems

Principles and practice of engineering of computer software and hardware systems. Topics include: techniques for controlling complexity; strong modularity using client-server design, virtual memory, and threads; networks; atomicity and coordination of parallel activities; security, and encryption; and performance optimizations. Prerequisite: 107. GER:DB-EngrAppSci

3-5 units, Aut (Rosenblum, M), Win (Rosenblum, M)

CS 121. Introduction to Artificial Intelligence

(Only one of 121 or 221 counts towards any CS degree program.) Concepts, representations, and techniques used in building practical computational systems (agents) that appear to display artificial intelligence (AI), through the use of adaptive information processing algorithms. Topics: history of AI, reactive systems, heuristic search, planning, constraint satisfaction, knowledge representation and uncertain reasoning, machine learning, classification, applications to language, and vision. Prerequisites: 103 or 103B, and facility with differential calculus, vector algebra, and probability theory. GER:DB-EngrAppSci

3 units, Win (Latombe, J), Sum (Staff)

CS 124. From Languages to Information

(Same as LINGUIST 180, LINGUIST 280) Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition. Prerequisite: CS103, CS107, CS109.

3-4 units, Win (Jurafsky, D)

CS 140. Operating Systems and Systems Programming

Operating systems design and implementation. Basic structure; synchronization and communication mechanisms; implementation of processes, process management, scheduling, and protection; memory organization and management, including virtual memory; I/O device management, secondary storage, and file systems. Prerequisite: CS 110. GER:DB-EngrAppSci

3-4 units, Win (Mazieres, D)

CS 142. Web Applications

Concepts and techniques used in constructing interactive web applications. Browser-side web facilities such as HTML, cascading stylesheets, javascript, and the document object model. Server-side technologies such as sessions, templates, relational databases, and object-relational mapping. Issues in web security and application scalability. New models of web application deployment. Prerequisites: CS 107 and CS 108.

3 units, Aut (Ousterhout, J)

CS 143. Compilers

Principles and practices for design and implementation of compilers and interpreters. Topics: lexical analysis; parsing theory; symbol tables; type systems; scope; semantic analysis; intermediate representations; runtime environments; code generation; and basic program analysis and optimization. Students construct a compiler for a simple object-oriented language during course programming projects. Prerequisites: 103 or 103B, and 107. GER:DB-EngrAppSci

3-4 units, Aut (Aiken, A), Sum (Staff)

CS 144. Introduction to Computer Networking

Principles and practice. Structure and components of computer networks, packet switching, layered architectures. Applications: web/http, voice-over-IP, p2p file sharing and socket programming. Reliable transport: TCP/IP, reliable transfer, flow control, and congestion control. The network layer: names and addresses, rout-

ing. Local area networks: ethernet and switches. Wireless networks and network security. Prerequisite: CS 110. GER:DB-EngrAppSci

3-4 units, Aut (Levis, P; Mazieres, D)

CS 145. Introduction to Databases

Database design and use of database management systems for applications. The relational model, relational algebra, and SQL, the standard language for creating, querying, and modifying relational databases. XML data including DTDs and XML Schema for validation, and the query and transformation languages XPath, XQuery and XSLT. UML database design, and relational design principles based on functional dependencies and normal forms. Indexes, views, transactions, authorization, integrity contraints, and triggers. Advanced topics may include data warehousing, data mining, web data management, and data integration. Prerequisites: 103 or 103B, and 107. GER:DB-EngrAppSci

3-4 units, Aut (Widom, J)

CS 147. Introduction to Human-Computer Interaction Design

Introduces fundamental methods and principles for designing, implementing, and evaluating user interfaces. Topics: user-centered design, rapid prototyping, experimentation, direct manipulation, cognitive principles, visual design, social software, software tools. Learn by doing: work with a team on a quarter-long design project, supported by lectures, readings, and studios. Prerequisite: 106B or X or equivalent programming experience.

3-4 units, Aut (Klemmer, S)

CS 147L. Human-Computer Interaction Technology Laboratory

Hands-on introduction to building mobile web applications with html, css, and php. Corequisite: 147. Concurrent enrollment in CS147 required.

1 unit, Aut (Brandt, J)

CS 148. Introduction to Computer Graphics and Imaging

Topics: Image input and output devices such as cameras and displays, graphics hardware and software, input technologies and interactive techniques, typography and page layout, light and color representations, exposure and tone reproduction, image composition and imaging models, digital signal processing, sampling, aliasing and antialiasing, compression, two- and three-dimensional geometry and formations, modeling techniques including curves and surfaces, reflection models and illumination algorithms, and basic methods of animation. Progamming asssignments using C++ and OpenGL. Prerequisites: CS 107, MATH 51. GER:DB-EngrAppSci

3-4 units, Aut (Hanrahan, P), Sum (Staff)

CS 149. Parallel Computing

Course is an introduction to parallelism and parallel programming. Most new computer architectures are parallel; programming these machines requires knowlege of the basic issues of and techniques for writing parallel software. Topics: varieties of parallelism in current hardware (e.g., fast networks, multicore, accelerators such as GPUs, vector instruction sets), importance of locality, implicit vs. explicit parallelism, shared vs. non-shared memory, synchronization mechanisms (locking, atomicity, transactions, barriers), and parallel programming models (threads, data parallel/streaming, futures, SPMD, message passing, SIMT, transactions, and nested parallelism). Significant parallel programming assignments will be given as homework. Course is open to students who have completed the introductory CS course sequence through 110 and have taken at least one of CS 140, 143, 144, or 145. GER:DB-EngrAppSci

3-4 units, Win (Aiken, A; Olukotun, O)

CS 154. Introduction to Automata and Complexity Theory

Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular. Context-free languages: grammars, pushdown automata, normal forms for grammars, proving languages non-context-free. Turing machines: equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook's theorem, reducibilities among problems. Prerequisites: 103 or 103B. GER:DB-EngrAppSci

3-4 units, Win (Dill, D), Spr (Trevisan, L), Sum (Staff)

CS 154N. Introduction to NP Completeness

Turing machines: equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook¿s theorem, reducibilities among problems. Students participate in approximately the last half of 154. Prerequisite: formal languages and automata as in first part of 154.

2 units, Win (Dill, D), Spr (Trevisan, L)

CS 155. Computer and Network Security

For seniors and first-year graduate students. Principles of computer systems security. Attack techniques and how to defend against them. Topics include: network attacks and defenses, operating system holes, application security (web, email, databases), viruses, social engineering attacks, privacy, and digital rights management. Course projects focus on building reliable code. Prerequisite: 140. Recommended: basic Unix. GER:DB-EngrAppSci

3 units, Spr (Boneh, D; Mitchell, J)

CS 156. Calculus of Computation

Decision procedures with applications to analyzing and developing robust software. Logic review. Propositional and first-order logic; induction. Verification: methods for proving correctness of sequential programs using first-order reasoning; need for decision procedures. Decision procedures: algorithms that decide the validity of logical formulas for common theories including SAT, equality, arithmetic, recursive data structures, and arrays. Combination theories and combination of decision procedures. Static analysis: algorithms for deducing program properties. Projects include writing verified programs. Prerequisites: 103, 106, or equivalents. GER:DB-EngrAppSci

3-4 units, not given this year

CS 157. Logic and Automated Reasoning

An elementary exposition from a computational point of view of propositional and predicate logic, axiomatic theories, and theories with equality and induction. Interpretations, models, validity, proof, strategies, and applications. Automated deduction: polarity, skolemization, unification, resolution, equality. Prerequisite: 103 or 103B. GER:DB-EngrAppSci

3 units, Aut (Genesereth, M)

CS 161. Design and Analysis of Algorithms

Worst and average case analysis. Recurrences and asymptotics. Efficient algorithms for sorting, searching, and selection. Data structures: binary search trees, heaps, hash tables. Algorithm design techniques: divide-and-conquer, dynamic programming, greedy algorithms, amortized analysis, randomization. Algorithms for fundamental graph problems: minimum-cost spanning tree, connected components, topological sort, and shortest paths. Possible additional topics: network flow, string searching. Prerequisite: 103 or 103B; 109 or STATS 116. GER:DB-EngrAppSci

3-5 units, Aut (Plotkin, S), Win (Roughgarden, T), Sum (Davydov, E)

CS 164. Computing with Physical Objects: Algorithms for Shape and Motion

Algorithms and data structures dealing with the representation and manipulation of physical objects and entities in the computer. Computational structures for shape and motion, shape fitting and matching, triangulations and other spatial subdivisions, and low-dimensional search and optimization. Examples relevant to computer graphics, computer vision, robotics and geometric computation emphasizing algorithmic paradigms applicable to multidimensional data. Prerequisites: CS 103 or 103B, and CS 109 or STATS 116, and CS 106B/X or consent of instructor. GER:DB-EngrAppSci

3 units, not given this year

CS 170. Stanford Laptop Orchestra: Composition, Coding, and Performance

(Same as MUSIC 128) Classroom instantiation of the Stanford Laptop Orchestra (SLOrk) which includes public performances. An ensemble of more than 20 humans, laptops, controllers, and special speaker arrays designed to provide each computer-mediated instrument with its sonic identity and presence. Topics and activities include issues of composing for laptop orchestras, instrument design, sound synthesis, programming, and live performance. May be repeated four times for credit.

1-5 units, Spr (Wang, G)

CS 178. Digital Photography

Scientific, artistic, and computing aspects of digital photography. Topics: lenses and optics, light and sensors, optical effects in nature, perspective and depth of field, sampling and noise, the camera as a computing platform, image processing and editing, history of photography, computational photography. Counts as a CS elec-

tive in the Graphics track. Prerequisites: introductory calculus; students must have a digital camera with manual control over shutter speed and aperture. Loaner cameras may be available. No programming experience required. GER:DB-EngrAppSci GER:DB-EngrAppSci

3-5 units, Spr (Levoy, M)

CS 181. Computers, Ethics, and Public Policy

(Formerly 201.) Primarily for majors entering computer-related fields. Ethical and social issues related to the development and use of computer technology. Ethical theory, and social, political, and legal considerations. Scenarios in problem areas: privacy, reliability and risks of complex systems, and responsibility of professionals for applications and consequences of their work. Prerequisite: 106B or X. GER:EC-EthicReas

4 units, Spr (Roberts, E)

CS 181W. Computers, Ethics and Public Policy (WIM)

Restricted to Computer Science and Computer Systems Engineering undergraduates. Writing-intensive version of CS181.

4 units, Spr (Roberts, E)

CS 191. Senior Project

Restricted to Computer Science and Computer Systems Engineering students. Group or individual projects under faculty direction. Register using instructor's section number. A project can be either a significant software application or publishable research. Software application projects include substantial programming and modern user-interface technologies and are comparable in scale to shareware programs or commercial applications. Research projects may result in a paper publishable in an academic journal or presentable at a conference. Required public presentation of final application or research results.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 191W. Writing Intensive Senior Project

Restricted to Computer Science and Computer Systems Engineering students. Writing-intensive version of CS191. Register using the section number of an Academic Council member.

3-6 units, Aut (Staff), Win (Staff), Spr (Staff)

CS 192. Programming Service Project

Restricted to Computer Science students. Appropriate academic credit (without financial support) is given for volunteer computer programming work of public benefit and educational value.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 193C. Client-Side Internet Technologies

Client-side technologies used to create web sites such as sophisticated Web 2.0 interfaces similar to Google maps. XHTML, CSS, JavaScript, document object model (DOM), AJAX, and Flash. Prerequisite: programming experience at the level of 106A.

3 units, Sum (Staff)

CS 193D. Professional Software Development with C++

Programming techniques and methodologies. Language concepts including object-oriented design, memory management, and the standard library. Modern software development concepts such as design patterns, test-driven development, extreme programming, and XML. Prerequisites: basic C++ or significant experience in C or Java. GER:DB-EngrAppSci

3 units, not given this year

CS 193G. Programming Massively Parallel Processors

Students will be taught how to effectively program massively parallel processors using the CUDA C programming language. Students will develop familiarity with the language itself, be exposed to the architecture of modern GPUs, and understand how to apply basic parallel patterns to decompose programs for parallel execution. The course is targeted at graduate students and upper-division undergraduates who have a good working experience of programming in C. Prior experience in parallel programming is not required. Open to all majors and graduate disciplines.

3 units, not given this year

CS 193P. iPhone and iPad Application Programming

Tools and APIs required to build applications for the iPhone and iPad platform using the iPhone/iPad SDK. User interface designs for mobile devices and unique user interactions using multitouch technologies. Object-oriented design using model-view-controller pattern, memory management, Objective-C programming language. iPhone/iPad APIs and tools including Xcode, Interface Builder and Instruments on Mac OS X. Other topics include: core animation, mobile device power management and performance considerations. Prerequisites: C language and programming experience at the level of 106B or X. Recommended: UNIX, object-oriented programming, graphical toolkits, databases.

3 units, Aut (Hegarty, P)

CS 193S. Scalable Web 2.0 Programming

Course charts development path for a large scale modern web service. Resource efficiency demands a single developer should be able to build, test and deploy a single codebase using only open source tools and libraries. Difficult to accomplish in practice due to variety of skill sets needed for UI, client, server and database coding. Course framework presented offers solution that does not sacrifice long term scalability and maintenability for rapid development cycles and easy prototyping. Programming projects provide overview of technologies and critical contraints. Prerequisites: CS107, CS108.

3 units, not given this year

CS 194. Software Project

Design, specification, coding, and testing of a significant team programming project under faculty supervision. Documentation includes a detailed proposal. Public demonstration of the project at the end of the quarter. Prerequisites: CS 110 and CS 161.

3 units, Spr (Plummer, R)

CS 194W. Software Project (WIM)

Restricted to Computer Science and Computer Systems Engineering undergraduates. Writing-intensive version of CS194.

3 units, Spr (Plummer, R)

CS 196. Computer Consulting

Focus is on Macintosh and Windows operating system maintenance and troubleshooting through hardware and software foundation and concepts. Topics include operating systems, networking, security, troubleshooting methodology with emphasis on Stanford's computing environment. Not a programming course. Prerequisite: 1C or equivalent.

2 units, Win (Smith, S), Spr (Smith, S)

CS 198. Teaching Computer Science

Students lead a discussion section of 106A while learning how to teach a programming language at the introductory level. Focus is on teaching skills, techniques, and course specifics. Application and interview required; see http://cs198.stanford.edu.

3-4 units, Aut (Sahami, M; Ruth, E), Win (Sahami, M; Wang, L; Ruth, E), Spr (Sahami, M; Ruth, E)

CS 199. Independent Work

Special study under faculty direction, usually leading to a written report. Letter grade; if not appropriate, enroll in 199P.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 199P. Independent Work

(Staff)

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 202. Law for Computer Science Professionals

Intellectual property law as it relates to computer science including copyright registration, patents, and trade secrets; contract issues such as non-disclosure/non-compete agreements, license agreements, and works-made-for-hire; dispute resolution; and principles of business formation and ownership. Emphasis is on topics of current interest such as open source and the free software movement, peer-to-peer sharing, encryption, data mining, and spam.

1 unit, Aut (Hansen, D)

CS 204. Computational Law

Legal informatics based on representation of regulations in computable form. Encoding regulations facilitate creation of legal information systems with significant practical value. Convergence of technological trends, growth of the Internet, advent of semantic web technology, and progress in computational logic make computational law prospects better. Topics: current state of computational law, prospects and problems, philosophical and legal implications. Prerequisite: basic concepts of programming.

3 units, not given this year

CS 210A. Software Project Experience with Corporate Partners

Two quarter project course. Focus is on real world software development. Corporate partners provide loosely defined challenges from their R&D labs for which they are seeking innovative solutions and ideas. Student teams function as small startup companies with a technical advisory board comprised of the instructional

staff. Exposure to: current practices in software engineering; exploration of the design space; significant development experience with creative freedoms; working in groups; real world software engineering challenges; public presentation of technical work; creating written descriptions of technical work. Prerequisite: CS 108 or CS110.

3-4 units, Win (Borenstein, J)

CS 210B. Software Project Experience with Corporate Partners

Continuation of CS210A. Focus is on real world software development. Corporate partners provide loosely defined challenges from their R&D labs for which they are seeking innovative solutions and ideas. Student teams function as a small startup companies with a technical advisory board comprised of the instructional staff. Exposure to: current practices in software engineering; exploration of the design space; significant development experience with creative freedoms; working in groups; real world software engineering challenges; public presentation of technical work; creating written descriptions of technical work. Prerequisite: CS 210A.

3-4 units, Spr (Borenstein, J)

CS 448X. Math and Computer Science behind Special Effects

Course will focus on a number of case studies of special effects work in feature films, with the aim of elucidating the underlying technical challenges from the standpoint of mathematics and computer science. As a project based class, individuals may more deeply focus on the individual aspects of most interest to them be it rendering, computational geometry, computer vision, physical simulation, or character animation. Guests from industry will speak about effects work they and their colleagues have been involved in as well as discuss some current challenges in the industry. Students will be asked to submit some current challenges either alone or in an appropriate group. Since course may be taken multiple times for credit, and will be open to both undergraduate and graduate students with varied backgrounds and interests, grading will be based on individual effort relative to preparation. As such currently there are no prerequisites enforced.

3 units, Spr (Fedkiw, R)

GRADUATE COURSES IN COMPUTER SCIENCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CS 205A. Mathematical Methods for Robotics, Vision, and Graphics

Continuous mathematics background necessary for research in robotics, vision, and graphics. Possible topics: linear algebra; the conjugate gradient method; ordinary and partial differential equations; vector and tensor calculus. Prerequisites: 106B or X; MATH 51 and 113; or equivalents.

3 units, Aut (Fedkiw, R)

CS 207. The Economics of Software

How software products are moved into the marketplace and how the resulting intellectual property is exploited. Concepts that are outside of the common knowledge of computer scientists such as business terms and spreadsheet computations to quantitatively compare alternatives. Goal is to contribute to informed decision making in high-tech product design, acquisition, production, marketing, selection of business structures, outsourcing, and impact of taxation policies. No specific background required.

1 unit, Aut (Wiederhold, G)

CS 208. Canon of Computer Science

Analysis and discussion of seminal works in computer science. Emphasis on works that changed the course of computing and continue to this day to provoke and stimulate. Course will study foundational ideas that are at the core of personal computing, artificial intelligence, computer systems, computer networks, and more. Through immersion in original literature, we can more deeply comprehend the present state of computing, its origins, its underlying assumptions, and its major open questions. In connecting students with the ideas that shaped computer science, course aims to instill lasting inspiration and a deep understanding of major trends in the field.

3-4 units, Spr (Koltun, V)

CS 209. Introduction to Functional Programming

Functional programming offers insights and advanced programming techniques not found in other programming languages. Topics: lambda calculus (an alternative to Turing machines), higher-order functions, lazy evaluation, type-oriented programming, syntactic extension, and advanced control abstractions known as monads and continuations. Functional programming languages to be studied include Scheme, an eagerly evaluated, dynamically typed language, and Haskell, a lazily evaluated, statically typed language with type inferencing. Prerequisites: CS 107 and CS 161.

3 units, not given this year

CS 221. Artificial Intelligence: Principles and Techniques

(Only one of 121 or 221 counts towards any CS degree program.) Topics: search, constraint satisfaction, knowledge representation, probabilistic models, Bayesian networks, machine learning, neural networks, vision, robotics, and natural language processing. Prerequisites: 103 or 103B/X; 106B or 106X; and exposure to probability. Recommended: 107 and facility with basic differential calculus.

3-4 units, Win (Thrun, S)

CS 222. Rational Agency and Intelligent Interaction

(Same as PHIL 358) For advanced undergraduates, and M.S. and beginning Ph.D. students. Logic-based methods for knowledge representation, information change, and games in artificial intelligence and philosophy. Topics: knowledge, certainty, and belief; time and action; belief dynamics; preference and social choice; games; and desire and intention. Prerequisite: propositional and first-order logic.

3 units, Spr (Shoham, Y)

CS 223A. Introduction to Robotics

Robotics foundations in modeling, design, planning, and control. Class covers relevant results from geometry, kinematics, statics, dynamics, motion planning, and control, providing the basic methodologies and tools in robotics research and applications. Concepts and models are illustrated through physical robot platforms, interactive robot simulations, and video segments relevant to historical research developments or to emerging application areas in the field. Recommended: matrix algebra.

3 units, Win (Khatib, O)

CS 223B. Introduction to Computer Vision

Fundamental issues and techniques of computer vision. Image formation, edge detection and image segmentation, stereo, motion, shape representation, recognition.

3 units, Win (Li, F)

CS 224M. Multi-Agent Systems

For advanced undergraduates, and M.S. and beginning Ph.D. students. Topics: logics of knowledge and belief, other logics of mental state, theories of belief change, multi-agent probabilities, essentials of game theory, social choice and mechanism design, multi-agent learning, communication. Applications discussed as appropriate; emphasis is on conceptual matters and theoretical foundations. Prerequisites: basic probability theory and first-order logic.

3 units, Win (Shoham, Y)

CS 224N. Natural Language Processing

(Same as LINGUIST 284) Methods for processing human language information and the underlying computational properties of natural languages. Syntactic and semantic processing from linguistic and algorithmic perspectives. Focus is on modern quantitative techniques in NLP: using large corpora, statistical models for acquisition, translation, and interpretation; and representative systems. Prerequisites: CS124 or CS121/221.

3-4 units, Win (MacCartney, W)

CS 224S. Speech Recognition and Synthesis

(Same as LINGUIST 285) Automatic speech recognition, speech synthesis, and dialogue systems. Focus is on key algorithms including noisy channel model, hidden Markov models (HMMs), Viterbi decoding, N-gram language modeling, unit selection synthesis, and roles of linguistic knowledge. Prerequisite: programming experience. Recommended: CS 221 or 229.

2-4 units, not given this year

CS 224U. Natural Language Understanding

(Same as LINGUIST 188, LINGUIST 288) Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal opera-

tors), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S: and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

3-4 units, not given this year

CS 224W. Social and Information Network Analylsis

Previously numbered CS322. How do rumors and information spread? Who are the influencers? Can one predict friendships on Facebook? Networks are the core of the web, blogs, Twitter, and Facebook. They can be characterized by the interplay between information content, individuals and organizations that create it, and the technology that supports it. Focus is on how to analyze the structure and dynamics of large networks, how to model links, and how to design algorithms that work with such large networks. Topics: statistical properties of large networks, models of social network structure and evolution, link prediction, network community detection, diffusion of innovation, information propagation, six-degrees of separation, finding influential nodes in networks, disease outbreak detection, networks with positive and negative ties, and connections with work in the social sciences and economics.

3 units, Aut (Leskovec, J)

CS 225A. Experimental Robotics

Hands-on laboratory course experience in robotic manipulation. Topics include robot kinematics, dynamics, control, compliance, sensor-based collision avoidance, and human-robot interfaces. Second half of class is devoted to final projects using various robotic platforms to build and demonstrate new robot task capabilities. Previous projects include the development of autonomous robot behaviors of drawing, painting, playing air hocket, yoyo, basketball, ping-pong or xylophone. Prerequisites: 223A or equivalent.

3 units, Spr (Khatib, O)

CS 225B. Robot Programming Laboratory

For robotics and non-robotics students. Students program mobile robots to exhibit increasingly complex behavior (simple dead reckoning and reactivity, goal-directed motion, localization, complex tasks). Topics: motor control and sensor characteristics; sensor fusion, model construction, and robust estimation; control regimes (subsumption, potential fields); probabalistic methods, including Markov localization and particle filters. Student programmed robot contest. Programming is in C++ on Unix machines, done in teams. Prerequisite: programming at the level of 106B, 106X, 205, or equivalent.

3-4 units, Aut (Konolige, K)

CS 227. Knowledge Representation and Reasoning

Representing knowledge symbolically in a form suitable for automated reasoning, and associated reasoning methods. Combines formal algorithmic analysis with a description of recent applications. Topics: object-oriented knowledge representation, description logics, inheritance networks, logic programming, propositional satisfiability, contraint satisfaction, planning and scheduling, abductive explanation, tractable reasoning. Prerequisites: familiarity with basic notions in data structures and with techniques in algorithm design and analysis. Computational logic (CS157 or equivalent). Recommended: previous or concurrent course in AI. Knowledge of Lisp or Prolog programming.

3 units, Spr (Staff)

CS 227B. General Game Playing

A general game playing system accepts a formal description of a game to play it without human intervention or algorithms designed for specific games. Hands-on introduction to these systems and artificial intelligence techniques such as knowledge representation, reasoning, learning, and rational behavior. Students create GGP systems to compete with each other and in external competitions. Prerequisite: programming experience. Recommended: 103 or equivalent.

3 units, Spr (Genesereth, M)

CS 228. Structured Probabilistic Models: Principles and Techniques

Probabilistic graphical modeling languages for representing complex domains, algorithms for reasoning using these representations, and learning these representations from data. Topics include: Bayesian and Markov networks, extensions to temporal modeling such as hidden Markov models and dynamic Bayesian networks, exact and approximate probabilistic inference algorithms, and methods for learning models from data. Also included are sample applications to various domains including speech recognition, biological modeling and discovery, medical diagnosis, message encoding, vision, and robot motion planning. Prerequisites: basic probability theory and algorithm design and analysis.

3-4 units, Win (Koller, D)

CS 228T. Structured Probabalistic Models: Theoretical Foundations

For students interested in advanced methods in machine learning and probabilistic AI. Describes the theoretical foundations for methods of inference and learning in probabilistic graphical models, allowing for the derivation of properties of these methods and for the development of more advanced methods. Sample topics include advanced methods in Markov chain Monte Carlo, approximate message-passing algorithms for inference derived from an optimization perspective, representation and inference in models involving continuous variables, learning undirected models, learning with hidden variables, and non-parametric Bayesian methods. Prerequisites: CS228; strong mathematical foundation.

3 units, Spr (Koller, D)

CS 229. Machine Learning

Topics: statistical pattern recognition, linear and non-linear regression, non-parametric methods, exponential family, GLMs, support vector machines, kernel methods, model/feature selection, learning theory, VC dimension, clustering, density estimation, EM, dimensionality reduction, ICA, PCA, reinforcement learning and adaptive control, Markov decision processes, approximate dynamic programming, and policy search. Prerequisites: linear algebra, and basic probability and statistics.

3-4 units, Aut (Ng, A)

CS 240. Advanced Topics in Operating Systems

Recent research. Classic and new papers. Topics: virtual memory management, synchronization and communication, file systems, protection and security, operating system extension techniques, fault tolerance, and the history and experience of systems programming. Prerequisite: 140 or equivalent.

3 units, Win (Engler, D), Spr (Mazieres, D)

CS 240X. Advanced Operating Systems II

Same content as 240, with expanded topics focusing on more difficult and specialized papers. Recent topics in systems research.

3 units, not given this year

CS 241. Secure Web Programming

Building secure Web applications is key to the continued success of the Web. Course will cover the key components and available tools for securing web applications. Discussions on browser security policy and how to properly use it, server-side abstractions for building secure applications, and commong errors found in existing applications. Course will include student presentations on course projects.

3 units, alternate years, not given this year

CS 242. Programming Languages

Central concepts in modern programming languages, impact on software development, language design trade-offs, and implementation considerations. Functional, imperative, and object-oriented paradigms. Formal semantic methods and program analysis. Modern type systems, higher order functions and closures, exceptions and continuations. Modularity, object-oriented languages, and concurrency. Runtime support for language features, interoperability, and security issues. Prerequisite: 107, or experience with Lisp, C, and an object-oriented language.

3 units, Aut (Mitchell, J; Fisher, K)

CS 243. Program Analysis and Optimizations

Program analysis techniques used in compilers and software development tools to improve productivity, reliability, and security. The methodology of applying mathematical abstractions such as graphs, fixpoint computations, binary decision diagrams in writing complex software, using compilers as an example. Topics include data flow analysis, instruction scheduling, register allocation, parallelism, data locality, interprocedural analysis, and garbage collection. Prerequisites: 103 or 103B, and 107.

3-4 units, Win (Lam, M)

CS 244. Advanced Topics in Networking
Classic papers, new ideas, and research papers in networking. Architectural principles: naming, addressing, routing; congestion control, traffic management, QoS; wireless and mobility; overlay networks and virtualization; network security; switching and routing; content distribution; and proposals for future Internet structures. Prerequisite: 144 or equivalent.
3-4 units, Win (McKeown, N)

CS 244B. Distributed Systems
Distributed operating systems and applications issues, emphasizing high-level protocols and distributed state sharing as the key technologies. Topics: distributed shared memory, object-oriented distributed system design, distributed directory services, atomic transactions and time synchronization, application-sufficient consistency, file access, process scheduling, process migration, and storage/communication abstractions on distribution, scale, robustness in the face of failure, and security. Prerequisites: CS 144 and CS 249A.
3 units, Spr (Cheriton, D)

CS 244C. Readings and Projects in Distributed Systems
Companion project option for 244B. Corequisite: 244B.
3-6 units, Spr (Cao, P)

CS 244E. Wireless Networking
(Same as EE 384E) Design and implementation of wireless networks and mobile systems. Retrospective of wireless communication and fundamental physical layer properties of various wireless communication technologies. Design of media access control and routing layers for various wireless systems. Adaptations necessary at transport and higher layers to cope with node mobility and error-prone nature of the wireless medium. Overview of other related issues including emerging wireless/mobile applications. Prerequisites: EE 284
3 units, Win (Katti, S; Levis, P)

CS 245. Database Systems Principles
File organization and access, buffer management, performance analysis, and storage management. Database system architecture, query optimization, transaction management, recovery, concurrency control. Reliability, protection, and integrity. Design and management issues. Prerequisites: 145, 161.
3 units, Win (Garcia-Molina, H)

CS 246. Mining Massive Data Sets
Distributed file systems: Hadoop, map-reduce; PageRank, topic-sensitive PageRank, spam detection, hubs-and-authorities; similarity search; shingling, minhashing, random hyperplanes, locality-sensitive hashing; analysis of social-network graphs; association rules; dimensionality reduction: UV, SVD, and CUR decompositions; algorithms for very-large-scale mining: clustering, nearest-neighbor search, gradient descent, support-vector machines, classification, and regression; submodular function optimization. Prerequisites: At lease one of CS107 or CS145; at least one of CS109 or STAT116, or equivalent.
3 units, Win (Leskovec, J)

CS 247. Human-Computer Interaction Design Studio
Project-based. Methods used in interaction design including needs analysis, user observation, idea sketching, concept generation, scenario building, storyboards, user character stereotypes, usability analysis, and market strategies. Prerequisites: 147 and 106A or equivalent background in programming.
3-4 units, Win (Heer, J)

CS 247L. Human Computer Interaction Technology Laboratory
Hands-on introduction to contemporary HCI technologies. Interaction design with Adobe Flash, mobile development, physical computing, and web applications. Corequisite: 247.
1 unit, Win (Heer, J)

CS 248. Interactive Computer Graphics
Rendering and animation for interactive computer graphics. Topics in rendering include: the graphics pipeline, rasterization, lighting and surface shading, texture mapping and its applications, graphics hardware, and rendering optimization. Topics in animation include: keyframing and interpolation, physics-based simulation, and character animation. Prerequisite: CS148.
3-4 units, Win (Koltun, V)

CS 249A. Object-Oriented Programming from a Modeling and Simulation Perspective
Topics: large-scale software development approaches for complex applications, class libraries and frameworks; encapsulation, use of inheritance and dynamic dispatch, design of interfaces and interface/implementation separation, exception handling, smart pointers and reference management, minimalizing dependencies and value-oriented programming. Inheritance: when and why multiple inheritance naming, directories, manager, and disciplined use of design patterns including functors, event notification and iterators. Prerequisites: C, C++, and programming methodology as developed in 106B or X, and 107 (107 may be taken concurrently). Recommended: 193D.
3 units, Aut (Cheriton, D)

CS 249B. Advanced Object-Oriented Programming
Software engineering of high quality large-scale complex software with a focus on evolvability, performance and cost. Software development processes, people and practice; audit: integrating invariant checks with production software; concurrency with modular object-oriented programming; collection implementation; generic programming and templates; design of value types; named descriptions for large value types; memory management; controlling placement, locality and consumption; run-time vs. static type checking and identification.
3 units, Win (Cheriton, D)

CS 254. Computational Complexity
An introduction to computational complexity theory. The P versus NP problem; diagonalization and relativization; space complexity, Savitch's algorithm, NL=coNL, Reingold's algorithm; counting problem and #P-completeness; circuit complexity; pseudorandomness, derandomixation, and the Natural Proofs barrier; complexity of approximation; quantum computing. Prerequisites: 154 or equivalent; mathematical maturity.
3 units, Spr (Trevisan, L)

CS 255. Introduction to Cryptography
For advanced undergraduates and graduate students. Theory and practice of cryptographic techniques used in computer security. Topics: encryption (single and double key), digital signatures, pseudo-random bit generation, authentication, electronic commerce (anonymous cash, micropayments), key management, PKI, zero-knowledge protocols. Prerequisite: basic probability theory.
3 units, Win (Boneh, D)

CS 256. Formal Methods for Reactive Systems
Formal methods for specification, verification, and development of concurrent and reactive programs. Reactive systems: syntax and semantics, fairness requirements. Specification language: temporal formulas (state, future, and past) and omega-automata. Hierarchy of program properties: safety, guarantee, obligation, response, persistence, and reactivity. Invariant generation. Deductive verification of programs: verification diagrams and rules, completeness. Modularity. Parameterized programs. Algorithmic verification of finite-state programs (model checking). Prerequisite: 154, 156, 157, or equivalent.
3 units, not given this year

CS 256L. Formal Methods for Reactive Systems Laboratory
Practical application of the specification and verification methods in 256. Individual projects include implementation of verification methods, verification case studies, or tool evaluation, depending on student preference.
2 units, not given this year

CS 258. Introduction to Programming Language Theory
Syntactic, operational, and semantic issues in the mathematical analysis of programming languages. Type systems and non-context-free syntax. Universal algebra and algebraic data types. Operational semantics given by rewrite rules; confluence and termination. Denotational semantics and elementary domain theory for languages with higher-type functions and recursion. Treatment of side effects. Prerequisites: 154, 157 or PHIL 160A.
3 units, not given this year

CS 259. Security Analysis of Network Protocols
General methods for security modeling and analysis, illustrated using network protocol security. Common security protocols and their properties including secrecy, authentication, key establishment, and fairness. Fully automated, finite-state, model-checking techniques. Constraint solving, process algebras, protocol logics,

probabilistic model checking, and game theory. Students select a protocol, web component, hardware architecture, or other system to analyze, specify it in a chosen model, use an analysis tool or method to find vulnerabilities and verify properties, and present findings.

3 units, Win (Mitchell, J)

CS 261. Optimization and Algorithmic Paradigms

Algorithms for network optimization: max-flow, min-cost flow, matching, assignment, and min-cut problems. Introduction to linear programming. Use of LP duality for design and analysis of algorithms. Approximation algorithms for NP-complete problems such as Steiner Trees, Traveling Salesman, and scheduling problems. Randomized algorithms. Introduction to online algorithms. Prerequisite: 161 or equivalent.

3 units, Win (Plotkin, S)

CS 262. Computational Genomics

(Same as BIOMEDIN 262) Applications of computer science to genomics, and concepts in genomics from a computer science point of view. Topics: dynamic programming, sequence alignments, hidden Markov models, Gibbs sampling, and probabilistic context-free grammars. Applications of these tools to sequence analysis: comparative genomics, DNA sequencing and assembly, genomic annotation of repeats, genes, and regulatory sequences, microarrays and gene expression, phylogeny and molecular evolution, and RNA structure. Prerequisites: 161 or familiarity with basic algorithmic concepts. Recommended: basic knowledge of genetics.

3 units, Win (Batzoglou, S)

CS 268. Geometric Algorithms

Techniques for design and analysis of efficient geometric algorithms for objects in 2-, 3-, and higher dimensions. Topics: convexity, triangulations and simplicial complexes, sweeping, partitioning, and point location. Voronoi/Delaunay diagrams and their properties. Arrangements of curves and surfaces. Intersection and visibility problems. Geometric searching and optimization. Random sampling methods. Impact of numerical issues in geometric computation. Example applications to robotic motion planning, visibility preprocessing and rendering in graphics, model-based recognition in computer vision, and structural molecular biology. Prerequisite: discrete algorithms at the level of 161. Recommended: 164.

3 units, Spr (Guibas, L)

CS 270. Modeling Biomedical Systems: Ontology, Terminology, Problem Solving

(Same as BIOMEDIN 210) Methods for modeling biomedical systems and for making those models explicit in the context of building software systems. Emphasis is on intelligent systems for decision support and Semantic Web applications. Topics: knowledge representation, controlled terminologies, ontologies, reusable problem solvers, and knowledge acquisition. Recommended: exposure to object-oriented systems, basic biology.

3 units, Win (Musen, M; Ghazvinian, A; Tirrell, R; Beck, A)

CS 271. Effective Design in Clinical Informatics

(Same as BIOMEDIN 211) Methods of designing and engineering software systems in complex clinical environments. Case studies illustrate factors leading to success or failure of systems. Project assignments involve focused team-based design work. Topics: user and organizational requirements, data and knowledge modeling, component-based system design, system prototyping, and human-systems interaction. Prerequisite: BIOMEDIN 210 recommended, or database or object-oriented programming course.

3 units, not given this year

CS 272. Introduction to Biomedical Informatics Research Methodology

(Same as BIOE 212, BIOMEDIN 212, GENE 212) Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor.

3 units, Spr (Altman, R)

CS 273A. A Computational Tour of the Human Genome

(Same as BIOMEDIN 273A, DBIO 273A) Introduction to computational biology through an informatic exploration of the human genome. Topics include: genome sequencing (technologies, assembly, personalized sequencing); functional landscape (genes, gene regulation, repeats, RNA genes, epigenetics); genome evolution (comparative genomics, ultraconservation, co-option). Additional topics may include population genetics, personalized genomics, and ancient DNA. Course includes primers on molecular biology, the UCSC Genome Browser, and text processing languages. Guest lectures from genomic researchers. No prerequisites. See http://cs273a.stanford.edu/.

3 units, Aut (Batzoglou, S; Bejerano, G)

CS 274. Representations and Algorithms for Computational Molecular Biology

(Same as BIOE 214, BIOMEDIN 214, GENE 214) Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Aut (Altman, R)

CS 275. Translational Bioinformatics

(Same as BIOMEDIN 217) Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming ability at the level of CS 106A and familiarity with statistics and biology.

4 units, Spr (Butte, A)

CS 276. Information Retrieval and Web Search

(Same as LINGUIST 286) Text information retrieval systems; efficient text indexing; Boolean, vector space, and probabilistic retrieval models; ranking and rank aggregation; evaluating IR systems. Text clustering and classification: classification algorithms, latent semantic indexing, taxonomy induction; Web search engines including crawling and indexing, link-based algorithms, and web metadata. Prerequisites: CS 107, CS 109, CS 161.

3 units, Spr (Nayak, P; Raghavan, P)

CS 277. Experimental Haptics

Haptics as it relates to creating touch feedback in simulated or virtualized environments. Goal is to develop virtual reality haptic simulators and applications. Theoretical topics: psychophysical issues, performance and design of haptic interfaces, haptic rendering methods for 3-D virtual environments, and haptic simulation and rendering of rigid and deformable solids. Applied topics: the CHAI haptic library; implementation of haptic rendering algorithms; collision detection in 3-D environments; design of real-time models for deformable objects. Guest speakers. Lab/programming exercises; a more open-ended final project. Enrollment limited to 20. Prerequisite: experience with C++. Recommended: 148 or 248, 223A.

3 units, Win (Barbagli, F; Salisbury, K)

CS 278. Systems Biology

(Same as BIOE 310, CSB 278) Experimental and computational approaches to the dissection of complex biologcal systems. Topics include network structure, non-linear dynamics, numerical modeling approaches, noise, and robustness. Topics are introduced in the context of recent papers from the primary literature.

4 units, Win (Ferrell, J)

CS 279. Computational Methods for Analysis and Reconstruction of Biological Networks

Types of interactions, including: regulatory such as transcriptional, signaling, and chromatin modification; protein-protein interac-

tions; and genetic. Biological network structure at scales such as single interaction, small subgraphs, and global organization. Methods for analyzing properties of biological networks. Techniques for reconstructing networks from biological data, including: DNA/protein sequence motifs and sequence conservation; gene expression data; and physical binding data such as protein-DNA, protein-RNA, and protein-protein. Network dynamics and evolution. Prerequisites: biology at the level of BIOSCI 41; computer science and data structures at the level of CS 103 and 106; and probability and statistics at the level of STATS 116 or CS 109.

3 units, not given this year

CS 294. Research Project in Computer Science
Student teams work under faculty supervision on research and implementation of a large project in some major sub-discipline in computer science. Lectures on state-of-the-art methods related to the particular problem domain. Prerequisites: consent of instructor.

3 units, not given this year

CS 294A. Research Project in Artificial Intelligence
Student teams under faculty supervision work on research and implementation of a large project in AI. State-of-the-art methods related to the problem domain. Prerequisites: AI course from 220 series, and consent of instructor.

3 units, Aut (Koller, D), Win (Ng, A)

CS 294H. Research Project in Human-Computer Interaction
Many of the most successful web applications are social, from personalized homepages to social networks. Focus is on fundamental interface design, systems, and algorithms concepts in designing social software. Case-based syllabus covers insights from research and industry. Students contribute to this growing field through a quarter-long, team-based project. Students are required to enter the class with an initial project idea.

3 units, not given this year

CS 294S. Research Project in Software Systems and Security
Topics vary. Focus is on emerging research themes such as programmable open mobile Internet that spans multiple system topics such as human-computer interaction, programming systems, operating systems, networking, and security. May be repeated for credit. Prerequisites: CS 103 and 107.

3 units, Spr (Lam, M)

CS 294W. Writing Intensive Research Project in Computer Science
Restricted to Computer Science and Computer Systems Engineering undergraduates. Students enroll in the CS 294W section attached to the CS 294 project they have chosen.

3 units, Aut (Koller, D), Win (Ng, A), Spr (Lam, M)

CS 295. Software Engineering
Software specification, testing, and verification. Emphasis is on current best practices and technology for developing reliable software at reasonable cost. Assignments focus on applying these techniques to realistic software systems. Prerequisites: 108. Recommended a project course such as 140, 143, or 145.

2-3 units, Spr (Aiken, A; Dill, D)

CS 298. Seminar on Teaching Introductory Computer Science
Faculty, undergraduates, and graduate students interested in teaching discuss topics raised by teaching computer science at the introductory level. Prerequisite: consent of instructor.

1-3 units, not given this year

CS 300. Departmental Lecture Series
Priority given to first-year Computer Science Ph.D. students. CS Masters students admitted if space is available. Presentations by members of the department faculty, each describing informally his or her current research interests and views of computer science as a whole.

1 unit, Aut (Mitchell, J)

CS 302. Tech Law with Progressive Minds
How the advent of computing technologies is reflected in the confluence of law, public policy, and technology. Issues relating to civil liberties, consumer protection, e-voting, copyright law, patent law, international patent law, trade secrets, political processes, and litigation.

1 unit, not given this year

CS 303. Designing Computer Science Experiments
Introduction to empirical research in computer science. Learn how to design, execute, interpret, and report on computer science experiments. Conducting empirical work and using experiments to build theory is one of the major ways to move computer science forward, but these issues are often omitted from computer science curricula. Course features case studies drawn from artificial intelligence, systems, and human-computer interaction. Emphasizes the decision-making aspects of research and the logic behind research procedures.

3 units, Spr (Klemmer, S; Levis, P)

CS 309. Industrial Lectureships in Computer Science
Guest computer scientist. By arrangement. May be repeated for credit. (Staff)

1 unit, not given this year

CS 309A. Cloud Computing
For technology and business students. The shift from traditional software model of disconnected development and CD-ROM deployment to engineering and delivery on the Internet as a service. Guest industry experts are typically CEOs of public companies who are delivering applications, platform or compute and storage cloud based services.

1 unit, Aut (Chou, T)

CS 315A. Parallel Computer Architecture and Programming
The principles and tradeoffs in the design of parallel architectures. Emphasis is on naming, latency, bandwidth, and synchronization in parallel machines. Case studies on shared memory, message passing, data flow, and data parallel machines illustrate techniques. Architectural studies and lectures on techniques for programming parallel computers. Programming assignments on one or more commercial multiprocessors. Prerequisites: EE 282, and reasonable programming experience.

3 units, Spr (Olukotun, O)

CS 315B. Parallel Computing Research Project
Advanced topics and new paradigms in parallel computing including parallel algorithms, programming languages, runtime environments, library debugging/tuning tools, and scalable architectures. Research project. Prerequisite: consent of instructor.

3 units, not given this year

CS 319. Topics in Digital Systems
Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

3 units, given occasionally

CS 321. Information Processing for Sensor Networks
Design and implementation of algorithms and protocols for performing information processing tasks in sensor networks, including routing, data dissemination and aggregation, information discovery and brokerage, service establishment (localization, time synchronization), sensor tasking and control, and distributed data storage. Techniques from signal processing, networking, energyware computing, distributed databases and algorithms, and embedded systems and platforms. Physical, networking, and application layers and design trade-offs across the layers. Prerequisites: linear algebra and elementary probability, networking background at the level of 144A or EE 284.

3-4 units, not given this year

CS 323. Understanding Images and Videos
Field of computer vision has seen an explosive growth in past decade. Much of recent effort in vision research is towards developing algorithms that can perform high-level visual recogniztion tasks on real-world images and videos. With development of Internet, this task becomes particularly challenging and interesting given the heterogeneous data on the web. Focus is on reading recent research papers that are focused on solving high-level visual recognition problems, such as object recognition and categorization, scene understanding, human motion understanding. Project required. Prerequisite: some experience in research with one of the following fields: computer vision, image processing, computer graphics, machine learning.

3 units, Spr (Li, F)

CS 326A. Motion Planning
Computing object motions in computer graphics, geometrical computing, robotics, or artificial intelligence for applications such as design, manufacturing, robotics, animated graphics, surgical planning, drug design, assembly planning, graphic animation of human figures, humanoid robots, inspection and surveillance, simulation of crowds, and biology. Path planning methods to gen-

erate collision-free paths among static obstacles. Extensions include uncertainty, mobile obstacles, manipulating moveable objects, maneuvering with kinematic constraints, and making and breaking contacts. Configuration space, geometric arrangements, and random sampling. Theoretical methods.

3 units, not given this year

CS 327A. Advanced Robotic Manipulation

Advanced control methodologies and novel design techniques for complex human-like robotic and bio mechanical systems. Class covers the fundamentals in operational space dynamics and control, elastic planning, human motion synthesis. Topics include redundancy, inertial properties, haptics, simulation, robot cooperation, mobile manipulation, human-friendly robot design, humanoids and whole-body control. Additional topcs in emerging areas are presented by groups of students at the end-of-quarter mini-symposium. Prerequisites: 223A or equivalent.

3 units, Spr (Khatib, O)

CS 329. Topics in Artificial Intelligence

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

3 units, given occasionally

CS 339. Topics in Numerical Analysis

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

3 units, given occasionally

CS 340. Topics in Computer Systems

Topics vary every quarter, and may include advanced material being taught for the first time. May be repeated for credit.

3-4 units, not given this year

CS 340V. Networked Systems for Virtual Worlds

Open to graduate students and advanced undergraduates. Systems and networking aspects of building large, distributed virtual 3D environments, with a focus on scalability, consistency, security, fairness, and federation. Topics include existing architectures, naming, routing, caching, migration, interoperability, and attribution. Open-ended research project. Prerequisite: some systems and networking background. May be repeated for credit.

3-4 units, not given this year

CS 341. Advanced Topics in Data Mining

Team project in data-mining of very large-scale data, including the problem statement and implementation and evaluation of a solution; some lectures on relevant materials will be given: Hadoop, Hive, Amazon EC2; other topics of possible relevance to some projects: computational advertising and the adwords problem; graph partitioning and community detection; extracting relations from the Web; stream data processing.

3-6 units, Spr (Rajaraman, A; Ullman, J)

CS 342. Programming Language Design

Tools for analysis and optimization of iterative coding systems. LDPC codes, Turbo codes, RA codes, optimized ensembles, message passing algorithms, density evolution, analytic techniques. Prerequisite: 376A.

3 units, not given this year

CS 343. Advanced Topics in Compilers

Topics change every year. May be repeated for credit. Prerequisite: 243.

3 units, Spr (Engler, D)

CS 344. Topics in Computer Networks

High-performance embedded system design. Student teams of two software engineers (C experience required) and one hardward engineer (Verilog experience required) build a fully functioning Internet router Work in teams of three. How router interoperates with others in class. Open-ended design challenge judged by panel of industry experts. Prerequisites: CS 144, 244, or network programming experience.

3 units, Spr (McKeown, N)

CS 344B. Advanced Topics in Distributed Systems

Continuation of 244B. The use of distributed systems research in practical systems. New applications due to the growth in high-bandwidth connections. Distributed systems knowledge and techniques from research and system implementations, and active research topics. Readings include research publications.

2 units, not given this year

CS 345. Advanced Topics in Database Systems

Content varies. May be repeated for credit with instructor consent. Prerequisite: 145. Recommended: 245.

3 units, given occasionally

CS 345C. Data Integration

Techniques for integrating data from multiple heterogeneous data sources. Topics: semantic heterogeneity; languages for mediating between disparate data sources; techniques for automatic schema reconciliation and reference reconciliation; adaptive query processing; basics of XML and its relevance to data integration; peer-to-peer data sharing data exchange; combining structured and unstructured data; and dataspaces. Recommended: 145.

3 units, not given this year

CS 345L. Large-Scale Data Mining

Topics include network models, ranking algorithms, reputation, collaborative filtering, and supervised and unsupervised learning. Individual or group applications-oriented programming project. 1 unit without project; 3 units with final project. Prerequisites: programming at the level of CS108; statistics at the level of MATH103 and STATS116. Recommended: machine learning at the level of CS229; knowledge of Java.

1-3 units, not given this year

CS 346. Database System Implementation

A major database system implementation project realizes the principles and techniques covered in earlier courses. Students independently build a complete database management system, from file structures through query processing, with a personally designed feature or extension. Lectures on project details and advanced techniques in database system implementation, focusing on query processing and optimization. Guest speakers from industry on commercial DBMS implementation techniques. Prerequisites: 145, 245, programming experience in C++.

3-5 units, Spr (Agrawal, P; Park, H)

CS 347. Transaction Processing and Distributed Databases

The principles and system organization of distributed databases. Data fragmentation and distribution, distributed database design, query processing and optimization, distributed concurrency control, reliability and commit protocols, and replicated data management. Distributed algorithms for data management: clocks, deadlock detection, and mutual exclusion. Heterogeneous and federated distributed database systems. Overview of commercial systems and research prototypes. Prerequisites: 145, 245.

3 units, Spr (Garcia-Molina, H)

CS 348A. Computer Graphics: Geometric Modeling

The mathematical tools needed for the geometrical aspects of computer graphics and especially for modeling smooth shapes. Fundamentals: homogeneous coordinates, transformations, and perspective. Theory of parametric and implicit curve and surface models: polar forms, Bezier arcs and de Casteljau subdivision, continuity constraints, B-splines, tensor product, and triangular patch surfaces. Subdivision surfaces and multiresolution representations of geometry. Representations of solids and conversions among them. Surface reconstruction from scattered data points. Geometry processing on meshes, including simplification. Prerequisite: linear algebra. Recommended: 164, 248.

3-4 units, not given this year

CS 348B. Computer Graphics: Image Synthesis Techniques

Intermediate level, emphasizing the sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photo-realism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or equivalent. Recommended: Fourier analysis or digital signal processing.

3-4 units, Spr (Hanrahan, P)

CS 349. Topics in Programming Systems
Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.
3 units, given occasionally

CS 349C. Topics in Programming Systems: Readings in Distributed Systems
Discussion of research publications that are of current interest in distributed systems. Students are expected to read all papers, and sign up for presentation of one paper. The course itself is 1 unit. Those interested in working on a project along with the readings should enroll for 3 units.
1-3 units, Aut (Cao, P; Danzig, P)

CS 355. Advanced Topics in Cryptography
Topics: pseudo-random generation, zero knowledge protocols, elliptic curve systems, threshold cryptography, security analysis using random oracles, lower and upper bounds on factoring and discrete log. May be repeated for credit. Prerequisite: 255.
3 units, not given this year

CS 357. Advanced Topics in Formal Methods
Topics vary annually. Possible topics include automata on infinite words, static analysis methods, runtime analysis methods, verification of real-time and hybrid systems, and formalization of middleware services. May be repeated for credit. Prerequisite: 256.
3 units, given occasionally

CS 359. Topics in the Theory of Computation
Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.
3 units, given occasionally

CS 359D. Hardness of Approximation
Results on and proof techniques for ruling out good approximation algorithms for NP-hard optimization problems. Topics: the PCP theorem; parallel repetition theorem; the unique games conjecture; applications to set cover, clique, max cut, network design, and problems. Prerequisites: 154 and 261, or equivalents.
3 units, not given this year

CS 359G. Graph Partitioning and Expanders
Three topics related to the mathematics of expander graphs: (1) Approximation algorithms for finding a sparse balanced cut iin a graph (spectral partitioning, Leighton-Rao algorithm, and Arora-Rao-Vazirani algorithm; (2) Explicit construction of expander graphs (combinatorial and algebraic); and (3) Analysis of Markov-Chain Monte-Carlo algorithm via the estimation of the convergence of certain random walks. Recommended: a basic course in linear algebra and a course on algorithms.
3 units, Win (Trevisan, L)

CS 361A. Advanced Algorithms
Advanced data structures: union-find, self-adjusting data structures and amortized analysis, dynamic trees, Fibonacci heaps, universal hash function and sparse hash tables, persistent data structures. Advanced combinatorial algorithms: algebraic (matrix and polynomial) algorithms, number theoretic algorithms, group theoretic algorithms and graph isomorphism, online algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms. May be repeated for credit. Prerequisite: 161 or 261, or equivalent.
3 units, not given this year

CS 361B. Advanced Algorithms
Topics: fundamental techniques used in the development of exact and approximate algorithms for combinational optimization problems such as generalized flow, multicommodity flow, sparsest cuts, generalized Steiner trees, load balancing, and scheduling. Using linear programming, emphasis is on LP duality for design and analysis of approximation algorithms; interior point methods for LP. Techniques for development of strongly polynomial algorithms.
3 units, given next year

CS 364A. Algorithmic Game Theory
Topics at the interface of theoretical computer science and game theory such as: algorithmic mechanism design; combinatorial and competitive auctions; congestion and potential games; cost sharing; existence, computation, and learning of equilibria; game theory and the Internet; network games; price of anarchy; and selfish routing. Prerequisites: 154N and 161, or equivalents.
3 units, Win (Roughgarden, T)

CS 364B. Topics in Algorithmic Game Theory
Topics on the interface of theoretical computer science and game theory. May be taken prior to 364A; may be repeated for credit. Prerequisites: 154N and 161, or equivalents.
3 units, not given this year

CS 365. Randomized Algorithms
(Same as CME 309) Design and analysis of algorithms that use randomness to guide their computations. Basic tools, from probability theory and probabilistic analysis, that are recurrent in algorithmic applications. Randomized complexity theory and game-theoretic techniques. Algebraic techniques. Probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, similarity search and metric embeddings, online algorithms. Prerequisites: CS 161 and STAT 116, or equivalents.
3 units, Win (Goel, A)

CS 369. Topics in Analysis of Algorithms
Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.
3 units, given occasionally

CS 369A. Advanced Geometric Algorithms
Approximate, randomized, and high-dimensional geometric algorithms. Topics of current interest: clustering; nearest-neighbor search; shortest paths; geometric random walks; shape fitting; geometric embeddings; coresets; geometric TSP; and linear programming. Prerequisites: 368 or equivalent.
3 units, not given this year

CS 369F. Topics in Analysis of Algorithms
Focus is on combinatorial optimization with emphasis on online algorithms.
3 units, Spr (Plotkin, S)

CS 369M. Algorithms for Modern Massive Data Set Analysis
Algorithmic and statistical methods for large-scale data analysis: matrix and graph algorithms; strengths and weaknesses of theoretical techniques for practical scientific and Internet data analysis; overlap with related problems in statistics, optimization, numerical analysis, and machine learning. Representative topics: matrix problems (numerical and statistical perpectives; algorithmic approaches, including Johnson-Lindenstrauss lemma and randomized projection and sampling algorithms; novel matrix factorizations); graph problems (graph partitioning algorithms, including spectral methods, flow-based methods, and recent geometric methods; local graph algorithms and approximate eigenvector computation); and applications to machine learning and statistical data analysis (motivating applications; algorithmic basis of the RKHS method; geometric data analysis, regularization, and statistical inference; boosting and its relationships to conjugate gradient methods, duality, convexity, online
3 units, not given this year

CS 369N. Novel Paradigms for Algorithmic Analysis
Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.
3 units, not given this year

CS 369P. Polyhedral Techyniques in Combinatorial Optimization
Graduate-level course in combinatorial optimization with a focus on polyhedral characterizations. First part of the course covers some classical results in combinatorial optimization: algorithms and polyhedral characterizations for matchings, spanning trees, matroids, and submodular functions. Second part covers some more recent work that builds upon these techniques-approximation algorithms using the primal-dual scheme, iterated rounding and dependent randomized rounding. Applications will include allocation in combinatorial auctions, network design, and variants of the traveling salesman problem. Prerequisites: Students should know basic computation theory and the material of CS261; in particular the fundamentals of linear programming, approximation algorithms and the notion of NP-completeness.
3 units, Aut (Staff)

CS 374. Algorithms in Biology
(Same as BIOMEDIN 374) Algorithms and computational models applied to molecular biology and genetics. Topics vary annually. Possible topics include biological sequence comparison, annotation of genes and other functional elements, molecular evolution, genome rearrangements, microarrays and gene regulation, protein folding and classification, molecular docking, RNA secondary structure, DNA computing, and self-assembly. May be repeated for credit. Prerequisites: 161, 262 or 274, or BIOCHEM 218, or equivalents.
2-3 units, Aut (Batzoglou, S)

CS 376. Research Topics in Human-Computer Interaction
Interactive systems, research areas in interaction techniques, and the design, prototyping, and evaluation of user interfaces. Topics: computer-supported cooperative work; audio, speech, and multimodal interfaces; user interface toolkits; design and evaluation methods; ubiquitous and context-aware computing; tangible interfaces, haptic interaction; and mobile interfaces.
3 units, Spr (Klemmer, S)

CS 377. Topics in Human-Computer Interaction
Contents change each quarter. May be repeated for credit. See http://hci.stanford.edu/academics for offerings.
2-3 units, given occasionally

CS 377L. Learning in a Networked World
(Same as EDUC 298) Foundations, theories and empirical studies for interdisciplinary advances in how we conceive of the potentials and challenges associated with lifelong, lifewide and life-deep learning in a networked world given the growth of always-on cyberinfrastructure for supporting information and social networks across space and time with personal computers, netbooks, and mobiles.
3 units, not given this year

CS 377V. Creating Health Habits with Social and Mobile Technologies
How to create habits in people via social and mobile tech. Design methods and psychological principles for long-term change. Focus on health behaviors. First, teams analyze best-in-class habit technologies. Next, teams create and test their own solutions for habit formation, leveraging Facebook, texting, and other platforms. No coding required.
3 units, not given this year

CS 377W. Create Engaging Web Applications Using Metrics and Learning on Facebook
Experimental course. Students work in small, interdisciplinary teams to create, launch, and optimize web-based applications for social networks such as Facebook. Tools include Google Analytics. Online experiments and user responses to learn how to iterate and improve applications. Guest experts.
3-4 units, not given this year

CS 378. Phenomenological Foundations of Cognition, Language, and Computation
Critical analysis of theoretical foundations of the cognitive approach to language, thought, and computation. Contrasts of the rationalistic assumptions of current linguistics and artificial intelligence with alternatives from phenomenology, theoretical biology, critical literary theory, and socially-oriented speech act theory. Emphasis is on the relevance of theoretical orientation to the design, implementation, and impact of computer systems as it affects human-computer interaction.
3-4 units, not given this year

CS 379D. Computer Vision and Image Analysis in the Study of Art
Application of algorithms to computer vision, image analysis, and two-dimensional Western art such as paintings, drawings, and etchings. Topics: multispectral image enhancement and color manipulation; geometric perspective and warped (anamorphic) perspective; visual metrology; view synthesis; statistical analysis of form; texture and brushstrokes; and shape-from-shading. These techniques, pattern classification, statistical estimation methods, and stylometry (quantification of artistic style) address art historical problems such as attribution, authentication, and dating to reveal artists¿ working methods.
3 units, not given this year

CS 390A. Curricular Practical Training
Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390 A, B, and C may each be taken once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 390B. Curricular Practical Training
Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390A,B,C may each be taken once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 390C. Curricular Practical Training
Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390A,B,C may each be taken once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 390D. Curricular Practical Training
Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. Students in F1 visas should be aware that completing 12 or more months of full-time CPT will make them ineligible for Optional Practical Training (OPT). 390A, B, C, D may each be taken once.
1 unit, not given this year

CS 393. Computer Laboratory
For CS graduate students. A substantial computer program is designed and implemented; written report required. Recommended as a preparation for dissertation research. Register using the section number associated with the instructor. Prerequisite: consent of instructor.
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 395. Independent Database Project
For graduate students in Computer Science. Use of database management or file systems for a substantial application or implementation of components of database management system. Written analysis and evaluation required. Register using the section num-

ber associated with the instructor. Prerequisite: consent of instructor.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 399. Independent Project

Letter grade only.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 399P. Independent Project

Graded satisfactory/no credit.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 402. Beyond Bits and Atoms: Designing Technological Tools

(Same as EDUC 236X) Practicum in designing and building technology-enabled curricula and learning environments. Students use software toolkits and state-of-the-art fabrication machines to design educational software, educational toolkits, and tangible user interfaces. How to design low-cost technologies, particularly for urban school in the US and abroad. The constructionist learning design perspective, critical pedagogy, and the application of complexity sciences in education.

3-5 units, Spr (Blikstein, P)

CS 402L. Beyond Bits and Atoms - Lab

(Same as EDUC 211X) This course is a hands-on lab in the prototyping and fabrication of tangible technologies, with a special focus in learning and education. We will learn how to use state-of-the-art fabrication machines (3D printers, 3D scanners, laser cutters, routers) to design educational toolkits, educational toys, science kits, and tangible user interfaces. A special focus of the course will be to design low-cost technologies, particularly for urban school in the US and abroad.

1-3 units, Win (Blikstein, P), Spr (Blikstein, P)

CS 422. Intelligent Avatar Laboratory

Lab course. Students, working either individually or in pairs, implement intelligent behaviors for autonomous avatars in virtual worlds. Brief tutorial on the software environment; students then design a behavior for the autonomous avatar(s), and once that is approved, implement the behavior. The programs can control a single avatars, or orchestrate a behavior of multiple avatars. Limited enrollment. Prerequisites: CS 106B or X, or equivalent. Recommended: experience with virtual worlds such as Second Life or World of Warcraft is a plus.

3 units, not given this year

CS 423. High-level Vision: Behaviors, Neurons and Computational Models

(Same as PSYCH 250) Interdisplinary approach aimed at understanding vision from several disciplines: neurophysiology, psychophysics, cognition, algorithms, and computational models. Focus is on the problem of scene understanding, covering topics from multiple perspectives drawing on recent research in psychology, neuroscience and computer science. Ongoing debates in the field, and discussion of recent empirical findings. Topics include theories of visual recognition for scene perception. What are the behavioral and cognitive characteristics of scene perception, and their connections to objection recognition. What are the neural computations that underlie scene perception? What are the roles of attention, expectation and experience in shaping scene recognition?

1-3 units, not given this year

CS 424P. Extracting Social Meaning and Sentiment

(Same as LINGUIST 287) Methods for extracting social meaning (speaker perspectives, emotions and attitudes) from text and speech. Topics include sentiment analysis and summarization, detection of deception, sarcasm, emotion, and personality. Analysis of meaning-bearing characteristics of the speaker and topic, including text, discourse, prosodic and other cues. Prerequisite: CS 124 or 221 or 229 or permission of instructors.

3 units, Aut (Jurafsky, D; Potts, C)

CS 447. Software Design Experiences

Small teams develop technology prototypes combining product and interaction design. Focus is on software and hardware interfaces, interaction, design aesthetics, and underpinnings of successful design including a reflective, interactive design process, group dynamics of interdisciplinary teamwork, and working with users. Prerequisite: CS 247A.

3-4 units, Win (Winograd, T)

CS 448. Topics in Computer Graphics

Topic changes each quarter. Recent topics: computational photography, data visualization, character animation, virtual worlds, graphics architectures, advanced rendering. See http://graphics.stanford.edu/courses for offererings and prerequisites. May be repeated for credit.

3-4 units, given occasionally

CS 448B. Data Visualization

Techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. Topics: graphical perception, data and image models, visual encoding, graph and tree layout, color, animation, interaction techniques, automated design. Lectures, reading, and project. Prerequisite: one of 147, 148, or equivalent.

3 units, Aut (Heer, J)

CS 448E. Research Topics in Computer Graphics

Selected topics in current computer graphics research. Analysis of research publications, class discussions, quarter-long research project. Topics change each offering. Sample topics: procedural modeling, character animation, multimodal interfaces, perception and cognition. May be repeated for credit. Prerequisite: CS248.

1-4 units, not given this year

CS 448F. Image Processing for Photography and Vision

Image processing with a focus on implementation of new techniques from the literature. Topics: sampling and reconstruction, linear and non-linear filters, features and alignment, compositing, gradient-domain techniques, and recent techniques from conferences such as SIGGRAPH and Eurographics. Prerequisites: Students should be comfortable coding in C++. An introductory graphics course such as CS148 is helpful but not necessary.

3 units, not given this year

CS 448G. Advanced Topics in Visualization

Advanced topics in information visualization, research issues in the design and evaluation of visual data analysis tools. Topics: models of visual perception and cognition, layout algorithms, color perception and palette design, optimization-based approaches to automated design, interaction techniques, software architectures for visual analytics, evaluation methods. Lectures, reading, and final project. Prerequisite: CS448B or consent of instructor.

3 units, Spr (Staff)

CS 448M. Simulation of Human Movement

Foundations of human movement and motor control. Motion capture, motion graphs, and kinematic motion controllers. Physics-based optimization and dynamic controllers. Simulation of walking, running, jumping, balance, object manipulation, and airborne maneuvers. Prerequisites: CS248 and CS205A, or equivalent.

1-4 units, Spr (Koltun, V)

CS 448S. Topics in Computer Graphics: Beyond Programmable Shading

There are strong indications that the future of interactive graphics programming is a model more flexible than today's OpenGL/Direct3D pipelines. As such, graphics developers need to have a basic understanding of how to combine emerging parallel programming techniques and more flexible graphics processors with the traditional interactive rendering pipeline. This course presents the state-of-the-art in combing traditional redering API usage with advanced task- and data-parallel computation to increase the image quality of interactive graphics. Prerequisites: Students should be comfortable with OpenGL and/or Direct3D and have had an introductory computer architecture course such as CS248 or equivalent.

3 units, not given this year

CS 450. Introduction to Biotechnology

Academic and industrial experts discuss latest developments in fields such as bioenergy, green process technology, the production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Discussions of biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.

3 units, not given this year

CS 468. Geometry Processing Algorithms

Contents of this course change with each offering. Past offerings have included geometric matching, surface reconstruction, colli-

sion detection, computational topology, etc. May be repeated for credit. Fall quarter 2010/11 topic will be Geometry Processing Algorithms. Techniques for modeling and efficient processing of polygonal geometric models. Topics: data structures for polygonal models, discrete differential geometry, mesh parameterization, mesh simplication and remeshing reconstruction from point clouds, mesh editing and deformation, geometric image editing. Recommended: 164.

3 units, Aut (Ben Chen Bolocan, M)

CS 476A. Music, Computing, and Design I: Software Paradigms for Computer Music

(Same as MUSIC 256A) Software design and implementation for computer audio. Strategies, best practices, and tradeoffs in building audio software systems of various sizes (S, M, L, XL), with a focus on interactive (real-time) systems. Lectures examine high-level designs as well as dissect code in a hands-on manner. Course work includes small programming assignments and a final software project. This course is the prerequisite for MUSIC 256B. Prerequisite: experience in C/C++ and/or Java.

1-4 units, Aut (Wang, G)

CS 476B. Mobile Music

(Same as MUSIC 256B) Aesthetic, design, and implementation of mobile music, centered around the modern super smartphones such as the iPhone). Similarities and intrinsic differences between mobile and traditional computing and design for music. Topics include mobile software design, social and cloud computing, mobile interface design, and programming phones, in the service of music. Prerequisite: MUSIC 256A.

1-4 units, Win (Wang, G)

CS 478. Computational Photography

Formerly numbered CS448A. Sensing strategies and algorithmic techniques that extend traditional digital photography. Topics: high dynamic range imaging, flash-noflash, coded aperture, coded exposure, multi-perspective, panoramic stitching, digital photomontage, all-focus, and light field imaging. Lectures, readings, and project. Prerequisite: 178 or equivalent.

3-4 units, not given this year

CS 499. Advanced Reading and Research

For CS graduate students. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 523. The Future of the Automobile

(Same as ME 302) Guest speakers from academia and industry present their research results, share their visions, explain challenges, and offer solutions regarding individual transportation. Students are requested to draft brief write-ups on selected topics that will be discussed in class to develop an understanding of the interactions of technology, business, and society with a specific automotive focus. No specific technical background is required as it is encouraged that everyone brings in specific expertise regarding the automobile as a student, researcher, and/or consumer.

1 unit, Aut (Beiker, S; Gerdes, C), Win (Beiker, S; Gerdes, C; Thrun, S), Spr (Beiker, S; Gerdes, C; Thrun, S)

CS 545. Database and Information Management Seminar

Current research and industrial innovation in database and information systems.

1 unit, Win (Widom, J)

CS 546. Seminar on Liberation Technologies

(Same as POLISCI 337S) This one-unit seminar will present speakers relevant in a variety of ways to how various forms of information technology are being used to defend human rights, improve governance, deepen democracy, empower the poor, promote economic development, protect the environment, enhance public health, and pursue a variety of other social goods.

1 unit, Aut (Cohen, J; Diamond, L), Win (Diamond, L; Winograd, T; Cohen, J), Spr (Winograd, T; Cohen, J)

CS 547. Human-Computer Interaction Seminar

Weekly speakers. May be repeated for credit.

1 unit, Aut (Dow, S), Win (Winograd, T), Spr (Winograd, T)

CS 548. Internet and Distributed Systems Seminar

Guest speakers from academia and industry. May be repeated for credit.

1 unit, not given this year

CS 549. Seminar on Computing and Design Thinking

Design shapes the world, both physical and digital. To produce better products, services and communities, we need a better understanding of how design practices lead to results. This seminar will examine cognitive, social, and organizational dimensions of creativity and problem solving. Each week, a prominent thought leader from academia or industry will offer their insights on ""design thinking"", as part of CS547, the Seminar on People, Computers and Design. Directly after the public talk, CS549 will meet in a smaller venue and a discussant will offer a short response to initiate a critical discourse. Corequisite: CS547.

2 units, not given this year

CS 571. Surgical Robotics Seminar

Surgical robots developed and implemented clinically on varying scales. Seminar goal is to expose students from engineering, medicine, and business to guest lecturers from academia and industry.engineering and clinical aspects connected to design and use of surgical robots, varying in degree of complexity and procedural role.

1 unit, Aut (Barbagli, F; Prisco, G)

CS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DANCE (DANCE) COURSES

UNDERGRADUATE COURSES IN DANCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

DANCE 13AX. Ballet Intensive

Rigorous daily practice that challenges and expands understanding of and perspective on the art form. Students gain experience with the demands of an intense regimen of ballet training and with practice-based and discussion-based artistic inquiry through dance labs, forums, and field trips. Strengthening technique, exploring ballet as an expressive form and performing art, and developing an artistic voice.

2 units, Aut (Elliott, K; Maffre, M)

DANCE 27. Faculty Choreography

Rehearsal and performance of faculty choreography. Selection by audition. May be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Frank, D; Moses, R)

DANCE 30. Chocolate Heads Dance and Performance Workshop

Students participate in the construction of a new dance driven performance work drawn from performance styles and various contemporary dances from around the world. Dancers and performers are drawn from diverse backgrounds including social dance, western classical, west African, musical theater, and other ethnic dance forms. Compositional and performance training. May be repeated for credit.

1 unit, Aut (Hayes, A), Win (Hayes, A)

DANCE 43. Liquid Flow: Introduction to Dance and Movement

Body expression, articulation, and anatomical basics through contemporary dance and other somatic practices. Emphasis is on development of awareness of the body in space and fluidity of motion. Exploration of improvisation and creativity. May be repeated for credit.

1 unit, Aut (Hayes, A)

DANCE 46. Social Dances of North America I

Introduction to the partner dances found in American popular culture: waltz, swing, tango, club two step, cha cha, merengue, and salsa. May be repeated for credit. (AU)

1 unit, Aut (Powers, R), Win (Powers, R), Spr (Powers, R)

DANCE 48. Beginning Ballet

Fundametals of ballet technique including posture, placement, the foundation steps, and ballet terms; emphasis on the development of coordination, balance, flexibility, sense of lines, and sensitivity to rhythm and music. May be repeated for credit.

1 unit, Aut (Maffre, M)

DANCE 51. Congolese Dance
Movements and choreography from Central Africa. Elements unique to all African dance movement: body isolation, polyrhythmic movement, and body posture. Live drumming. Open to all levels of dancers.
1 unit, Spr (Malonga, M)

DANCE 52. The Dance Jam: Process and Performance
Restaging of a number of seminal Bay Area modern dance works. Choreographers will work with students to recreate existing work from their repertory. The re-created work will be re- ordered into a completely new work.
1 unit, Aut (Moses, R)

DANCE 56. Ballet Repertory
Live collaboration with choreographer during bi-weekly rehearsals focusing on the creation of a new dance to be performed during the Spring Dance Division performance series and to be integrated in the Dance Division repertory. The course is designed to engage students in developing adaptability of technique, and artistic voice.
1 unit, Aut (Maffre, M)

DANCE 57. Dance Repertory
Current repertory of contemporary choreographers. Students perform the work of visiting artist with faculty supervision. Audition required. May be repeated for credit.
1 unit, Aut (Frank, D)

DANCE 58. Beginning Hip Hop
Steps and styling in one of America's 21st-century vernacular dance forms. May be repeated for credit.
1 unit, Aut (Reddick, R)

DANCE 59. Intermediate-Advanced Hip-Hop
Steps and styling in one of America's 21st-century vernacular dance forms. May be repeated for credit.
1 unit, Aut (Reddick, R)

DANCE 60. The Evolution of Hip Hop and the Dance Stage: From Broadway to Hollywood and MTV
The repertory of Hip Hop history through steps and choreography. May be repeated for credit.
1 unit, Spr (Reddick, R)

DANCE 100. Student Choreography: Studio to Stage
Student choreography developed under close faculty guidance, leading to performance. Requirement for students working towards performance on major Division concerts. May be repeated for credit.
1 unit, Win (Frank, D)

DANCE 102. Choreography and Composition
Fundamental techniques and approaches used in the creation of dance. Basic elements of composition including: style, form, theme and variation, and phrasing, development of movement vocabulary, symmetry and asymmetry, explicit versus abstract methods of expression, elements of time, quality and use of space, motif, and repetition. May be repeated for credit.
1 unit, Spr (Moses, R)

DANCE 104. Duets Project
Rehearsal experiences and techniques embedded in the reconstruction of repertory by three artists whose collective works represent differing approaches to the choreographic process. May be repeated for credit.
1 unit, Spr (Frank, D)

DANCE 105. Contemporary Afro Styles and Dancemaking: Aesthetic of the Cool
Studio class which studies traditional to current African diaspora dances. This course also looks at contemporary African American artistic expression and the aesthetic sensibility that is rendered through cultural activities such as: current dances, marching bands, street style and motion, step shows, vocal styles. May be repeated for credit
1 unit, Aut (Hayes, A)

DANCE 106. Essence of Contemporary Dance Performance: African Styles on Stage
Contemporary dance technique and repertory based on African diaspora movement styles. Focus is on articulation of expression, enhancement of stage presence, and awareness of individual movement strengths. May be repeated for credit.
1 unit, Win (Hayes, A)

DANCE 120. Hip Hop/Pop Fusion and Urban Dance: Choreography
Defining, developing, and exploring stylistic elements in the many variations of Hip Hop and Urban Dance Styles. Visiting Hip Hop professionals perform.
1 unit, Spr (Reddick, R)

DANCE 121. The Day Before Hip Hop: Lecture and Technique
Lecture and technique study of Hip Hop dance (street dance) technique and Hip Hop dance history prior to the existence of the umbrella term Hip Hop. History of street dance styles which may or may not fall under the umbrella term of Hip Hop; technical foundation rooted in an Afrocentric approach to movement that is dynamic, fluid, and rhythmically diverse in space.
1 unit, Win (Staff)

DANCE 138. Liquid Flow: Dance, Design, and Engineering
Dance technique and movement fundamentals drawn from Liquid Flow. Looking at the body as the source of design, students look at concepts and principles drawn from design and engineering through a tactile, kinetic, and kinesthetic lens. Improvisation and creative composition throughout the course.
1 unit, Win (Hayes, A)

DANCE 140. Intermediate Modern Dance
Contemporary dance technique, at the intermediate level. Focus on studio work to build dance skills, supplemented by movement exploration, professional concert attendance, readings, and participation in a culminating informal showing. Prerequisites: advanced beginner or intermediate skill level or consent of instructor. May be repeated for credit.
1 unit, Win (Frank, D)

DANCE 141. Advanced Modern Dance
Advanced dance technique. Complex movement combinations intended to build skills necessary to meet performance demands of contemporary concert dance. Studio work supplemented by professional concert attendance, readings, and participation in culminating informal showing. Intermediate/advanced skill level or permission of instructor required. May be repeated for credit.
2 units, Aut (Frank, D), Win (Moses, R), Spr (Frank, D)

DANCE 144. Intermediate Modern Jazz Dance
Practical skills of intermediate technique will focus on elements of contemporary jazz dance. Los Angeles, Broadway, and video dance styles will be covered. Studio work will focus on phrasing, endurance, technical proficiency, and musicality. Course includes viewing of a professional live performance. May be repeated for credit.
1 unit, Spr (Moses, R)

DANCE 145. ADVANCED JAZZ DANCE
Practical skills of intermediate technique will focus on elements of contemporary jazz dance. Los Angeles, Broadway, and video dance styles will be covered. Studio work focus is on phrasing, endurance, technical proficiency, and musicality. Course includes viewing of a professional live performance. May be repeated for credit.
2 units, Aut (Moses, R)

DANCE 146. Social Dances of North America II
Intermediate survey of dances in American popular culture: Lindy hop, Viennese waltz, cross-step waltz, foxtrot, and hustle. May be repeated for credit. Prerequisite: Dance 46 or equivalent.
1 unit, Aut (Powers, R), Spr (Powers, R)

DANCE 147. Living Traditions of Swing
Swing dancing: the early Lindy of the 1920s; 6- and 8-count Lindy hop, Shag, Big Apple, 1950s Rock 'n' Roll swing, disco Hustle and West Coast Swing. Partnering and improvisation. Swing's cross-cultural influences and personal creativity. May be repeated for credit.
1 unit, Win (Powers, R)

DANCE 148. Intermediate Ballet
Continuation of 48. Development of ballet technique with increased complexity of forms and combination of steps, and introducing pointe technique. Emphasis is on easing coordination and connectivity, and increasing strength. Open to men and women. Course designed to accommodate flat and pointe work. May be repeated for credit.
1 unit, Win (Elliott, K), Spr (Maffre, M)

DANCE 149. Advanced Ballet
Continuation of 148. Development of professional level ballet technique with increased complexity of forms and combination of steps. Emphasis is on classical and contemporary ballet technique. Open to men and women. Optional pointe work. May be repeated for credit.
2 units, Aut (Elliott, K), Win (Elliott, K), Spr (Elliott, K)

DANCE 156. Social Dances of North America III
Advanced survey of the partner dances found in American popular culture: waltz, redowa, Bohemian National Polka, tango, cha cha, salsa, samba. May be repeated for credit. Prerequisite: Dance 46 or equivalent experience.
1 unit, Win (Powers, R)

DANCE 156H. Dance and Theater: Twentieth-Century German Encounters
(Same as DRAMA 156H, DRAMA 256H) Twentieth-century German experiments at the intersections of dance and theater. From explorations with expressive bodies to propaganda spectacles and postdramatic performances: how do German artistic and cultural history combine with questions of medium and form? What do they look like in contemporary encounters? Written and performed assignments.
3-5 units, Aut (Elswit, K)

DANCE 160. Dance and History: From Postwar to Postmodernism
(Same as DRAMA 160, DRAMA 260) The cultural and historical unfolding of the genre of contemporary performance known as postmodern dance over the past six decades. Dance history used to trace the effects of visual art and movement experimentalists as they have teamed up since the first decades of the 20th century, redrawing the boundaries of live art and dance performance. GER:DB-Hum, EC-Gender
4 units, Win (Ross, J)

DANCE 166. History of Social Dance in Western Culture
Historic social dance from the past five centuries, including studio technique and history. Renaissance, Baroque, Regency Era, 19th Century, Ragtime Era, Swing Era and 1950s Rock'n'Roll social dances.
1 unit, Spr (Powers, R)

DANCE 190. Special Research
May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DANCE 191. Independent Research
Individual supervision of off-campus internship. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DANCE 197. Dance in Prisons: The Arts, Juvenile Justice, and Rehabilitation in America
Participatory seminar. The nexus of art, community, and social action, using dance to study how the performing arts affect self-construction, perception and experiences of embodiment, and social control for incarcerated teenagers in Santa Clara Juvenile Hall. Service Learning Course (certified by Haas Center). GER:DB-Hum, EC-AmerCul
4 units, Spr (Ross, J)

GRADUATE COURSES IN DANCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

DANCE 290. Special Research
Individual project on the work of any choreographer, period, genre, or dance-related topic. May be repeated for credit.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DEVELOPMENTAL BIOLOGY (DBIO) COURSES

UNDERGRADUATE COURSES IN DEVELOPMENTAL BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

DBIO 156. Human Developmental Biology and Medicine
(Same as HUMBIO 156A) The biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis; pattern formation in the nervous system and limb development; gene and grand multiple pregnancies; prematurity, in utero effects of teratogens; sex determination and differentiation; growth control; gigantism and dwarfism; neural tube defects; cardiac morphogenesis; progress in the developmental biology of humans. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.
3-4 units, Spr (Porzig, E)

DBIO 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN DEVELOPMENTAL BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

DBIO 201. Development and Disease Mechanisms
Mechanisms that direct human development from conception to birth. Conserved molecular and cellular pathways regulate tissue and organ development; errors in these pathways result in congenital anomalies and human diseases. Topics: molecules regulating development, cell induction, developmental gene regulation, cell migration, programmed cell death, pattern formation, stem cells, cell lineage, and development of major organ systems. Emphasis on links between development and clinically significant topics including infertility, assisted reproductive technologies, contraception, prenatal diagnosis, multiparity, teratogenesis, inherited birth defects, fetal therapy, adolescence, cancer, and aging.
4 units, Aut (Porzig, E; Kingsley, D; Kim, S)

DBIO 202. Assisted Reproductive Technologies
(Same as OBGYN 202, HUMBIO 150A) Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation.Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors.
1-3 units, Win (Porzig, E)

DBIO 203. Advanced Genetics
(Same as BIO 203, GENE 203) For graduate students in Bioscience programs; may be appropriate for graduate students in other programs. The genetic toolbox. Examples of analytic methods, genetic manipulation, genome analysis, and human genetics. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Faculty-led discussion sections with evaluation of papers. Students with minimal experience in genetics should prepare by working out problems in college level textbooks.
4 units, Aut (Stearns, T; Sidow, A; Kim, S)

DBIO 210. Developmental Biology
Current areas of research in developmental biology. How organismic complexity is generated during embryonic and post-embryonic development. The roles of genetic networks, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms such as vertebrates, insects, and nematodes. Team-taught.

Students meet with faculty to discuss current papers from the literature. Prerequisite: graduate standing, consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

5 units, Spr (Villeneuve, A; Nusse, R)

DBIO 215. Frontiers in Biological Research

(Same as BIOC 215, GENE 215) Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker¿s primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research.

1 unit, Aut (Harbury, P; Calos, M; Villeneuve, A), Win (Harbury, P; Villeneuve, A; Calos, M)

DBIO 221. Current Issues in Aging

(Same as GENE 221) Current research literature on genetic mechanisms of aging in animals and human beings. Topics include: mitochondria mutations, insulin-like signaling, sirtuins, aging in flies and worms, stem cells, human progeria, and centenarian studies. Prerequisite: GENE 203.

2 units, Spr (Kim, S; Brunet, A), alternate years, not given next year

DBIO 257. The Biology of Stem Cells

(Same as HUMBIO 157) The role of stem cells in human development and potential for treating disease. Guest lectures by biologists, ethicists, and legal scholars. Prerequisites: 2A,B, or consent of instructor.

3 units, Spr (Nusse, R; Fuller, M)

DBIO 273A. A Computational Tour of the Human Genome

(Same as BIOMEDIN 273A, CS 273A) Introduction to computational biology through an informatic exploration of the human genome. Topics include: genome sequencing (technologies, assembly, personalized sequencing); functional landscape (genes, gene regulation, repeats, RNA genes, epigenetics); genome evolution (comparative genomics, ultraconservation, co-option). Additional topics may include population genetics, personalized genomics, and ancient DNA. Course includes primers on molecular biology, the UCSC Genome Browser, and text processing languages. Guest lectures from genomic researchers. No prerequisites. See http://cs273a.stanford.edu/.

3 units, Aut (Batzoglou, S; Bejerano, G)

DBIO 296. Stem Cell Biology and Regenerative Medicine

(Same as PATH 296) For graduate and medical students. Embryonic and adult stem cells, including origin, regulation, self-renewal, differentiation, fate, and relationship to cancer; biological mechanisms and methods to translate findings to therapeutic applications. Medical students must enroll for 5 units; graduate students may choose to take only the basic science part for 3 units. Prerequisites: DBIO 201 and 210, or consent of instructor.

3-5 units, Win (Weissman, I; Nusse, R; Fuller, M)

DBIO 299. Directed Reading in Developmental Biology

Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DBIO 370. Medical Scholars Research

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DBIO 399. Graduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DBIO 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DIVISION OF LITERATURES, CULTURES, AND LANGUAGES (DLCL) COURSES

UNDERGRADUATE COURSES IN DIVISION OF LITERATURES, CULTURES, AND LANGUAGES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

DLCL 70N. From Vampires to Bathroom Walls: Folklore and Literature

(Stanford Introductory Seminar) Preference to freshmen. In the early 19th century, some Europeans started seeing the stories and songs of illiterate peasants as folklore to be collected, preserved, and perhaps transformed into new literature, art, and music. These folktales, such as legends of vampires, continue to inspire artists. The idea of folklore has expanded to include the shared practices or utterances of any group with at least one linking factor, including latrinalia (wall writings in a public bathroom). Sources include folklore from German, English, Russian, and Yiddish sources, and theoretical essays. Students collect living folklore, and analyze and present it.

4 units, Spr (Safran, G)

DLCL 99. Multimedia Course Lab

Designed to supplement the literature curriculum of existing undergraduate courses in DLCL departments in which a multimedia component may benefit collaborative or individual research projects. Taken for credit at the discretion of the instructor of the departmental literature course.

1 unit, Aut (Chandler, Z), Win (Chandler, Z), Spr (Chandler, Z)

DLCL 151. Monster Mothers and Critical Relations

(Same as DLCL 251) An inquiry into the principal modalities of the maternal figure as constructed in representative European, Asian, and American texts, including those of Euripedes, Balzac, Fontane, James, Tanizaki, Garcia Lorca, and Bazin. Such canonical literary works will be read with methodical attention to the relationship between primary texts and given analytical frameworks in Barthes, Benjamin, Freud, Kristeva, and Said, incorporating strategies of research.

3-5 units, Win (Staff)

DLCL 189. Honors Thesis Seminar

For undergraduate majors in DLCL departments; required for honors students. Planning, researching, and writing an honors thesis. Oral presentations and peer workshops. Research and writing methodologies, and larger critical issues in literary studies.

5 units, Aut (Barletta, V)

GRADUATE COURSES IN DIVISION OF LITERATURES, CULTURES, AND LANGUAGES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

DLCL 200. Teaching of Second Language Literatures

Focus is on literacy development in a second language, emphasizing literary texts, and assessing the learners' second-language linguistic level and requisite background knowledge with regard to particular literary texts. Instructional strategies and feedback techniques for written and oral work.

3 units, Aut (Bernhardt, E)

DLCL 201. The Learning and Teaching of Second Languages

Learning perspective rather than traditional teaching methods. Focus is on instructional decision making within the context of student intellectual and linguistic development in university settings to different populations. Readings in second-language acquisition. Might be repeatable for credit.

3 units, Spr (Bernhardt, E)

DLCL 251. Monster Mothers and Critical Relations
(Same as DLCL 151) An inquiry into the principal modalities of the maternal figure as constructed in representative European, Asian, and American texts, including those of Euripedes, Balzac, Fontane, James, Tanizaki, Garcia Lorca, and Bazin. Such canonical literary works will be read with methodical attention to the relationship between primary texts and given analytical frameworks in Barthes, Benjamin, Freud, Kristeva, and Said, incorporating strategies of research.
3-5 units, Win (Staff)

DLCL 308. Comparative Literature Colloquium
Participants discuss and critique work presented by graduate students and faculty in the DLCL. Work may include conference or seminar papers, thesis chapters, or works-in-progress. Feedback focuses on writing and argumentation, and more general responses to the subject matter. Meetings open to the public. May be repeated for credit.
1-2 units, Aut (Berman, R), Win (Berman, R), Spr (Berman, R)

DLCL 309. Teaching of Literature
Prepares graduate students in DLCL departments to teach literature at the undergraduate level. Topics include: the opportunities and problems of transposing a research project into a feasible course; the logic of syllabi and reading lists; the structuring of a course from week to week; and other matters relevant to first-time teachers of literature. Supervised by the graduate affairs committee of the DLCL. May be repeated for credit.
2 units, Aut (Staff), Spr (Staff)

DLCL 310. The Development of a Dissertation from Prospectus to Defense
Meets regularly throughout the year to advise and support dissertation-level students as they prepare a prospectus, begin writing, submit chapters, and complete their projects. Focus of the workshop shifts from term to term as appropriate to the participants. Supervised by the graduate affairs committee of the DLCL. May be repeated for credit.
2 units, Spr (Staff)

DLCL 311. Professional Workshop
Meets regularly throughout the year to discuss issues in the professional study of literature. Topics include the academic job market and the challenges of research and teaching at different types of institutions. Supervised by the graduate affairs committee of the DLCL. May be repeated for credit.
2 units, Win (Staff)

DRAMA (DRAMA) COURSES

UNDERGRADUATE COURSES IN DRAMA

Primarily for undergraduates; graduate students may enroll with consent of adviser.

DRAMA 10AX. Acting Intensive: American Realism of the Mid-20th Century
Introduction to the craft of acting and concepts for the experienced student. Focus is on process rather than result. Students build skills in acting, movement, voice, and speech, using material from the mid-20th-century plays of Tennessee Williams, Arthur Miller, Clifford Odets, William Inge, and others. These playwrights provided texts for the actors of the famous Group Theater (James Dean, Shelley Winters, Marlon Brando, Paul Newman). To this day, members of The Actors Studio (Al Pacino, Meryl Streep, Sean Penn, Sidney Poitier) continue the tradition of The Group Theatre. The Group Theatre originally developed this approach in the 30s, based on the innovations of the acting teacher Constantin Stanislavski. There has been a resurgence of American realism in contemporary productions that utilize actors of color who have transcended the casting barriers.
2 units, Aut (Kostopoulos, K)

DRAMA 10N. Arts and Ideas: 20th-Century Art in Conflict
(Stanford Introductory Seminar) Preference to freshmen. Focus is on drama and film that experiment with new possibilities of form, shaping the direction of later artistic practice. How the political and aesthetic concerns of the 20th century reflect and exploit new technologies, both in theater and film, altering the position and function of author, actor, director, and audience.
4 units, Spr (Rehm, R)

DRAMA 11N. Dramatic Tensions: Theater and the Marketplace
(Stanford Introductory Seminar) Preference to freshmen. Tension between artistic and commercial forces in modern theater; the conflicted state of the art form. Sources include major and emerging contemporary figures in commercial, fringe, and nonprofit theater in the U.S. and UK. Visits with writers, directors, and dramaturges. GER:DB-Hum
3-4 units, Aut (Freed, A)

DRAMA 12AX. Sketch Comedy and Improvisation
Explore improvisation and sketch comedy in an intensive ensemble and create an original show. Pure improvisational theater techniques. Concepts covered include spontaneity, shared control, creative collaboration, narrative, and status. Students apply those skills to writing and staging scripted monologues, two-handers, and ensemble sketches. Students create an original show with the entire class.
2 units, Aut (Klein, D)

DRAMA 12N. Antigone: From Ancient Democracy to Contemporary Dissent
(Stanford Introductory Seminar) (Same as CLASSGEN 6N) Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of Antigone by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. GER:DB-Hum, EC-Gender
3-5 units, Aut (Rehm, R)

DRAMA 13N. Law and Drama
(Stanford Introductory Seminar) Preference to freshmen. Beyond the obvious traits that make a good courtroom drama, theater and jurisprudence have much more in common. Just as drama is engaged not only in entertainment but also in examination of social conventions and mechanisms, so law is not only concerned with dispensing justice but with shaping and maintaining a viable human community. Students read and discuss a series of plays in which court proceedings are at the center of dramatic action and concluding with an investigation of the new genre of documentary drama.
3-5 units, Aut (Jakovljevic, B)

DRAMA 17N. Latino/Latina Performance in the United States
(Stanford Introductory Seminar) (Same as CSRE 160N) Preference to freshmen. Introduction to works by U.S. Latino and Latina performance artists producing from the margins of the mainstream Euro-American theater world. We will examine how performance art serves as a kind of dramatized political forum for Latino/a artists, producing some of the most transgressive explorations of queer and national/ethnic identities in the U.S. today. By the course¿s conclusion, each student will create and perform in a staged reading of an original performance piece. GER:DB-Hum, EC-AmerCul
3 units, Win (Moraga, C)

DRAMA 20. Acting for Non-Majors
(Same as DRAMA 124D) A class designed for all interested students. Creative play, ensemble work in a supportive environment. Designed for the student to experience a range of new creative skills, from group improvisation to partner work. Introductory work on freeing the natural voice and physical relaxation. Emphasis on rediscovering imaginative and creative impulses. Movement improvisation, listening exercises, and theater games release the energy, playfulness and willingness to take risks that is the essence of free and powerful performance. Course culminates with work on dramatic text.
1-3 units, Aut (Kostopoulos, K), Win (Kostopoulos, K), Spr (Kostopoulos, K), Sum (Kostopoulos, K)

DRAMA 22. Scene Work
For actors who complete substantial scene work with graduate directors in the graduate workshop.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 25N. Science-in-Theatre: A New Genre?
(Stanford Introductory Seminar) (Same as CHEM 25Q) Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Frankensteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment.
3 units, Win (Djerassi, C)

DRAMA 28. Makeup for the Stage
Techniques of make-up application and design for the actor and artist including corrective, age, character, and fantasy. Emphasis placed on utilizing make-up for development of character by the actor. Limited enrollment.
2 units, Aut (Strayer, C)

DRAMA 29. Theater Performance: Acting
Students cast in department productions receive credit for their participation as actors; 1-2 units for graduate directing workshop projects and 1-3 units for major productions (units determined by instructor). May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 30. How Theater is Designed
Team-taught. An introduction to theatrical set, costume and lighting design. Emphasis on balancing practical skill with conceptual ideas for live stage performance. Hands-on projects.
4 units, Aut (Gambatese, E; Ramsaur, M; Strayer, C), Sum (Staff)

DRAMA 31. Introduction to Lighting and Production
How light contributes to the creation of mood and atmosphere and different kinds of visibility in theatrical storytelling. The use of controllable qualities of light including color, brightness, angle, and movemen in the theatrical process of creative scenography. Hands-on laboratory time.
4 units, Win (Ramsaur, M)

DRAMA 34. Stage Management Techniques
The production process, duties, and responsibilities of a stage manager. Skills needed to stage manage a production.
2-4 units, Aut (Apperson, L)

DRAMA 39. Theatre Crew
Under faculty guidance, working backstage on Drama Department productions. Open to any student interested in gaining back stage experience. Night and weekend time required.
1-3 units, Aut (Apperson, L; Ramsaur, M), Win (Apperson, L; Ramsaur, M), Spr (Apperson, L; Ramsaur, M), Sum (Staff)

DRAMA 39D. Theater Performance: Prosser Stage Management
For students stage mananging a Department of Drama Senior Project or Assistant Staage managing a Department Drama production
2-4 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 42. Costume Construction
Course will cover the basics of costume and garment construction. Includes hand and machine skills as well as basic patterning ideas that may be applied to more advanced projects. Lecture/Lab
2 units, Win (Strayer, C)

DRAMA 101H. How Theater Thinks: Introduction to Theater and Performance
Gateway course for majors and students considering the Drama major. Theater practices and techniques such as space, actor, language, props, and composition: what is unique about them and how they address the spectator. Sources include plays and theoretical texts.
3-5 units, Win (Menon, J), Spr (Jakovljevic, B)

DRAMA 101P. How Practice Practices
(Same as DRAMA 341) This course explores the practical tools of theatre making. From thinking, to sketching, to composing theatre and performance, this course will serve as a general introduction to the practice of theatre.
3-5 units, Win (Staff)

DRAMA 103. Beginning Improvising
The improvisational theater techniques that teach spontaneity, cooperation, team building, and rapid problem solving, emphasizing common sense, attention to reality, and helping your partner. Based on TheatreSports by Keith Johnstone. Readings, papers, and attendance at performances of improvisational theater. Limited enrollment.
3 units, Aut (Klein, D), Win (Klein, D)

DRAMA 104. Introduction to Sketch Comedy
Writing, directing, and performing original comic scenes, live and on video. Emphasis is on collaborative ensemble process and product. Topics include character, premise, satire, parody, joke writing, and comic timing. Prerequisite: 103 or 121C, or consent of instructor.
3 units, Spr (Klein, D)

DRAMA 110. IDA & Teatro Vision Collaboration: The Burciaga Play Project
Culture Clash veteran performer, Herbert Siguenza, will come to Stanford to lead a workshop with students on the signature research to performance method of Culture Clash while conducting interviews with faculty, staff and alumni to develop a new work on the life and art of Jose Antonio Burciaga. GER:DB-Hum
3-5 units, Aut (Hernandez, G)

DRAMA 120A. Fundamentals of Acting
A substantive introduction to the basics of the craft of acting, this course gives all incoming students the foundation of a common vocabulary. Students will learn fundamental elements of dramatic analysis, and how to apply it in action. Topics include scene analysis, environment work, psychological and physical scoring, and development of a sound and serviceable rehearsal technique. Scene work will be chosen from accessible, contemporary, and realistic plays. Outside rehearsal time required.
1-3 units, Aut (Freed, A), Win (Kostopoulos, K)

DRAMA 120B. Fundamentals of Acting
Learn how to expand character work, beyond what is immediately familiar. Continuing basic practices from the first part of the sequence, in this quarter they will look beyond the strictly contemporary, and may begin to approach roles drawn from more challenging dramatic texts. This might include plays chosen from mid-century American classics, World Theater, or other works with specific historic or cultural requirements. Actors begin to learn how a performing artist researches and how that research can be used to enrich and deepen performance. Prerequisite: 120A or consent of instructor.
1-3 units, Spr (Kostopoulos, K)

DRAMA 120D. Studio Performance
Rehearsal and development of a studio performance project for an end of quarter presentation. Emphasis is on development of acting skills with minimal technical support. Material chosen from classic plays, American realism, world theater, or created group ensemble pieces.
1-5 units, not given this year

DRAMA 120V. Vocal Production and Audition
(Same as DRAMA 210V) An introductory study of the vocal mechanism and the development of voice and articulation for the stage. The actor's tools of phonetics, verbal action, and text analysis. Vocal technique applied to the actor's process in preparation for audition. Actors participate in the audition process, from beginning to end. Emphasis is on relaxation, selection of appropriate material, and versatility to show contrast and range.
1-3 units, Aut (Kostopoulos, K), Spr (Staff)

DRAMA 121C. Physical Characterization
Workshop incorporating styles of movement and characterization for the stage. Tools to aid in theatrical transformation. Triggers include psychological gesture, shifting centers, full face photographs, collected live studies, vocal shifts, and rhythmic and metabolic changes.
3 units, Aut (Bihr, J)

DRAMA 121S. Acting Shakespeare Project
Work on a shortened Shakespeare play leading to a studio performance project. Skills in understanding and performing Shakespeare, conducted as series of rehearsals, and culminating in group performance. Development of voice, movement, and speaking skills necessary for classical theater work. Prerequisites: DRAMA120A,B, or consent of instructor.
3 units, Win (Bihr, J)

DRAMA 122P. Undergraduate Performance Project
By Audition: Studio Production of Timberlake Wertenbaker's 1988 play, ""Our Country's Good. A significant contemporary work about the ability of art to dignify human lives, the drama is set a penal colony in New South Wales in the late 18th century. This project also involves a concentrated study of relevant historical and cultural themes.
2-9 units, Spr (Freed, A; Murphy, C)

DRAMA 124D. Acting for Non-Majors
(Same as DRAMA 20) Creative play, ensemble work in a supportive environment. New creative skills, from group improvisation to partner work. Introductory work on freeing the natural voice and physical relaxation. Emphasis on rediscovering imaginative and creative impulses. Movement improvisation, listening exercises, and theater games release the energy, playfulness, and willingness to take risks that is the essence of free and powerful performance. Course culminates with work on dramatic text.
1-3 units, Aut (Kostopoulos, K), Win (Kostopoulos, K), Spr (Kostopoulos, K), Sum (Kostopoulos, K)

DRAMA 127AC. Actors for Directing Projects
This class provides students with an opportuinty to enhance their acting skills. Working with directing instructors, students will participate in a variety of actor/director projects; Directed by Joanna Settle in the Autumn and Professor Rush Rehm in the Winter.
1-2 units, Aut (Settle, J), Win (Rehm, R)

DRAMA 131. Lighting Design
Hands-on laboratory projects in lighting and designing stage productions and other live performances. The content and format of lighting plots. Prerequisite DRAMA 31.
4 units, Spr (Ramsaur, M)

DRAMA 132. Costume Design
Process of designing costumes for the stage, covering script analysis, rendering techniques, character development and conceptual ideas. Project related work with smaller, pertinent exercises.Prerequisite: 30 or consent of instructor.
4 units, Spr (Strayer, C)

DRAMA 133. Stage Scenery Design
Craft and Theory of stage scenery design including visual research, spatial organization, basic drafting, sketching and model-building. Prerequisite: 30, or consent of instructor.
3-4 units, Win (Gambatese, E)

DRAMA 134. Stage Management Project
For students stage managing a Department of Drama production.
2-5 units, Aut (Staff), Win (Apperson, L), Spr (Apperson, L)

DRAMA 137. Hand Drafting for Designers
Fundamentals of hand-drafting. Standard drawing conventions; the use of line weight, color, composition, and graphic style. Creation of construction documents for real-world applications.May be repeated for credit.
3 units, Spr (Gambatese, E)

DRAMA 140. Projects in Theatrical Production
(Same as DRAMA 240) Assistant directing; stage, costume, lighting, and sound design; technical production, stage managing, or other work in connection with Department of Drama productions. Prerequisite: consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 151. Greek Tragedy
(Same as CLASSGEN 151, DRAMA 251) The plays of Aeschylus, Sophocles, and Euripides and the theatrical genre that developed along with the radical democracy of ancient Athens. Plays include the Oresteia, Prometheus Bound, Persians, Antigone, Electra, Oedipus Tyrannus, Philoctetes, Medea, Heracles, Trojan Women, Helen, Ion, and the Bacchae. Focus on the dramatic challenges posed by these plays, their political and historical context, and what they teach about today's theater.
3-5 units, Aut (Rehm, R)

DRAMA 151T. Great Books: Dramatic Traditions
(Same as DRAMA 351) The most influential and enduring texts in the dramatic canon from Sophocles to Shakepeare, Chekhov to Soyinka. Their historical and geopolitical contexts. Questions about the power dynamics involved in the formation of canons.
3-5 units, Win (Menon, J)

DRAMA 152. Beckett
(Same as DRAMA 358C, ENGLISH 389B) Beckett's plays and late writing, which have been described as proto-performance art. Recent Beckett scholarship, including new work about his analysis with Bion.
3-5 units, Spr (Phelan, M)

DRAMA 154RE. Residency:Think Like A Mountain
(Same as DRAMA 354RE) Practice and theory course that queries the validity of treating nature as a construct produced by language; this debate in the arts, sciences, and the humanities. From September 6-17, 2010 students partake in a field trip to the Rocky Mountains and participate in a seminar, attend the American Indian Artist Symposium, trek in Glacier National Park, visit the Helena National Forest, and produce and document two artworks that incorporate site. Permission Required.
2 units, Aut (Strom, M; Carlson, A; Preston, V), given once only

DRAMA 154SE. Seminar:Think Like A Mountain
(Same as DRAMA 354SE) Contemporary time-based art production in which the human is but one life form amount many. Currents in performance, participatory aesthetics, site-work, and social practices that challenge the humanist divisions of society and nature, human and animal, organic and technological. These debates in the arts, sciences, and the humanities through readings, discussions, field trips, visiting artist, and scholars.
3-5 units, Aut (Strom, M; Preston, V), given once only

DRAMA 156H. Dance and Theater: Twentieth-Century German Encounters
(Same as DANCE 156H, DRAMA 256H) 20th-century German experiments at the intersections of dance and theater. From explorations with expressive bodies to propaganda spectacles and post-dramatic performances: how do German artistic and cultural history combine with questions of medium and form? What do they look like in contemporary encounters? Written and performed assignments.
3-5 units, Aut (Elswit, K)

DRAMA 157H. Photography and Performance
(Same as ARTHIST 260A, DRAMA 257H) Intersections of performance and photography in theories, artistic practices, and daily lives: from photoconceptualism to surveillance and family portraits. How does performance remain differently through documentation? What does it mean to understand photographs as performances? Topics include stillness, traces, posing, and theatricality. Written and practical assignments. GER:DB-Hum
4 units, Win (Fay, B; Elswit, K)

DRAMA 158. Body and Camera
(Same as DRAMA 258S) Course explores interconnectedness between bodies, moving images and technologies. We will consider these shifting meanings through use of image capturing tools that extend or act as a prosthetic for the body. Students produce three projects using HD cameras, editing programs, real-time and computer control for video projectors. Against the histories of performance, media art and dance the course examines ways that digital moving images of the body produce meaning, circulate and expand on the project of live arts.
3-5 units, Aut (Staff)

DRAMA 160. Dance and History: From Postwar to Postmodernism
(Same as DANCE 160, DRAMA 260) The cultural and historical unfolding of the genre of contemporary performance known as postmodern dance over the past six decades. Dance history used to trace the effects of visual art and movement experimentalists as they have teamed up since the first decades of the 20th century, redrawing the boundaries of live art and dance performance. GER:DB-Hum, EC-Gender
4 units, Win (Ross, J)

DRAMA 162. Performance and the Text
(Same as DRAMA 262) Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles,

character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama. GER:DB-Hum

5 units, not given this year

DRAMA 164R. The Homeric Muse: Iliad, Odyssey, and Their Epic Influence

(Same as CLASSGEN 164) The course explores the great Homeric epics, the Iliad and Odyssey, and then turns to Derek Walcott's masterful re-working of Homer's poems, his Nobel-prize winning Omeros. Students also will attend the theatrical and cinematic adaptations that Stanford Summer Theater (SST) presents, featuring a production of The Wanderings of Odysseus, a staged reading of Walcott's Omeros, and films such as Oh Brother, Where Art Thou? Students also will also attend the SST symposium, featuring scholars from Oxford University and Stanford, who will discuss the Homeric epics and their influence.

3-5 units, Sum (Rehm, R)

DRAMA 166H. Historiography of Theater

(Same as DRAMA 304) Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.

3-5 units, Win (Rayner, A)

DRAMA 167. Avant Garde Theater

(Same as DRAMA 267) From its origins in the early 19th century to the present. GER:DB-Hum

5 units, Win (Jakovljevic, B)

DRAMA 168H. Art and Life: The Second Avant Garde

(Same as DRAMA 268H) Experiments in the second half of the 20th century that produced new genres such as happenings and performance art, and theoretical debates that attempted to reformulate relations between art forms and their changed role in society. How these fundamentals of performance were challenged and reshaped. GER:DB-Hum

5 units, not given this year

DRAMA 169A. Cultural Traffic: Race, Performance, and Globalization

(Same as AFRICAAM 169A, AMSTUD 169, CSRE 169A, DRAMA 303A) This course will examine the transnational intersections of race and performance. It will consider the question of s race understood internationally and how do such definitions travel. We examine critical race theory and study constructions of race through the lens of performance. The course will interrogate the transnational meanings of such performances. Students in this course will read, study, analyze and potentially even stage theoretical and performance texts from both inside and outside of the United States. Course also satisfies Drama 302/303 requirement.

3-5 units, Aut (George, N)

DRAMA 170A. Introduction to Directing

(Same as DRAMA 370) Practices of stage composition, work with the actor, approaches to character, and techniques of storytelling. Prerequisite: consent of instructor.

3-5 units, Aut (Settle, J)

DRAMA 170B. Directing Workshop: The Actor-Director Dialogue

(Same as DRAMA 372) This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.

3-5 units, Win (Rehm, R)

DRAMA 177. Writing for Performance: The Fundamentals

(Same as CSRE 177, DRAMA 277) Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter¿s end. GER:DB-Hum

5 units, Win (Moraga, C)

DRAMA 178. Page to Stage: Playwriting and Solo Performance

(Same as DRAMA 278) Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

3-5 units, Spr (Freed, A)

DRAMA 179C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop

(Same as CSRE 179C, DRAMA 279C) The study and practice of personal memoir writing and literary journalism. Course explores those writings that contain a public and private story, navigating an intimate and institutional world. Student writers serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what the facts can offer.

3-5 units, Spr (Moraga, C)

DRAMA 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America

(Same as CSRE 179G, CSRE 279G, DRAMA 279G) This ""gateway"" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

3-5 units, Spr (Moraga, C)

DRAMA 180Q. Noam Chomsky: The Drama of Resistance

(Stanford Introductory Seminar) Preference to sophomores. Chomsky's ideas and work which challenge the political and economic paradigms governing the U.S. Topics include his model for linguistics; cold war U.S. involvements in S.E. Asia, the Middle East, Central and S. America, the Caribbean, and Indonesia and E. Timor; the media, terrorism, ideology, and culture; student and popular movements; and the role of resistance. GER:DB-Hum

3-5 units, Aut (Rehm, R)

DRAMA 190. Special Research

Individual project on the work of a playwright, period, or genre. Prerequisite: consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 191. Independent Study

Individual supervision of off-campus internship. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 200. Senior Project

See ""Undergraduate Programs"" for description. (Staff)

2-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 201A. Honors Colloquium

See ""Undergraduate Programs"" for description.

1 unit, Aut (Menon, J), Win (Menon, J), Spr (Menon, J), Sum (Staff)

DRAMA 201B. Honors Colloquium

See ""Undergraduate Programs"" for description.

1 unit, Aut (Menon, J), Win (Menon, J), Spr (Menon, J), Sum (Staff)

DRAMA 201C. Honors Colloquium

See ""Undergraduate Programs"" for description.

1 unit, Aut (Menon, J), Win (Menon, J), Spr (Menon, J), Sum (Staff)

DRAMA 201D. Honors Colloquium

See ""Undergraduate Programs"" for description.

1 unit, Aut (Menon, J), Win (Menon, J), Spr (Menon, J), Sum (Staff)

DRAMA 202. Honors Thesis

See ""Undergraduate Programs"" for description. May be repeated for credit. (Staff)

2-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 203. Advanced Improvisation

Further development of improvisational skills.

3 units, Aut (Klein, D)

DRAMA 210V. Vocal Production and Audition

(Same as DRAMA 120V) An introductory study of the vocal mechanism and the development of voice and articulation for the stage. Students will be introduced to the actor's tools of phonetics, verbal action and text analysis. Vocal technique will then be applied to the actor's process in preparation for audition. Actors will

fully participate in the audition process, from beginning to end. Emphasis will be on relaxation, selection of appropriate material, and versatility to show contrast and range.

1-3 units, Aut (Kostopoulos, K), Spr (Staff)

DRAMA 213. Stanford Improv Ensemble

By audition only, for members of the improvisation troupe. Special project work. Prerequisite: 103.

1-2 units, Aut (Klein, D), Win (Klein, D), Spr (Klein, D)

DRAMA 231. Advanced Stage Lighting Design

Individually structured class in lighting mechanics and design through experimentation, discussions, and written reports. Prerequisite: 131 or consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Ramsaur, M), Sum (Staff)

DRAMA 232. Advanced Costume Design

Individually structured tutorial for costume designers. May be repeated for credit. Prerequisite: 132 or consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 233. Advanced Scene Design

Individually structured workshop. May be repeated for credit. Prerequisite: 133 or consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 234. Advanced Stage Management Project

For students stage managing a Department of Drama production. Prerequisite: 134.

2-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 235. Advanced Sound Design

Individually structured tutorial for sound designers. May be repeated for credit. Prerequisite: 135 or consent of instructor. (Staff)

1-5 units, Aut (Staff), Win (Staff), Sum (Staff)

GRADUATE COURSES IN DRAMA

Primarily for graduate students; undergraduates may enroll with consent of instructor.

DRAMA 240. Projects in Theatrical Production

(Same as DRAMA 140) Assistant directing; stage, costume, lighting, and sound design; technical production, stage managing, or other work in connection with Department of Drama productions. Prerequisite: consent of instructor.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 251. Greek Tragedy

(Same as CLASSGEN 151, DRAMA 151) Greek Tragedy explores the plays of Aeschylus, Sophocles, and Euripides and the theatrical genre that developed along with the radical democracy of ancient Athens. Plays include the Oresteia, Prometheus Bound, Persians, Antigone, Electra, Oedipus Tyrannus, Philoctetes, Medea, Heracles, Trojan Women, Helen, Ion, and the Bacchae. We will focus on the dramatic challenges posed by these plays, their political and historical context, and what they can teach us about today¿s theater.

3-5 units, Aut (Rehm, R)

DRAMA 256H. Dance and Theater: Twentieth-Century German Encounters

(Same as DANCE 156H, DRAMA 156H) Twentieth-century German experiments at the intersections of dance and theater. From explorations with expressive bodies to propaganda spectacles and postdramatic performances: how do German artistic and cultural history combine with questions of medium and form? What do they look like in contemporary encounters? Written and performed assignments.

3-5 units, Aut (Elswit, K)

DRAMA 257H. Photography and Performance

(Same as ARTHIST 260A, DRAMA 157H) Intersections of performance and photography in theories, artistic practices, and daily lives: from photoconceptualism to surveillance and family portraits. How does performance remain differently through documentation? What does it mean to understand photographs as performances? Topics include stillness, traces, posing, and theatricality. Written and practical assignments.

4 units, Win (Fay, B; Elswit, K)

DRAMA 258S. Body and Camera

(Same as DRAMA 158) Course explores interconnectedness between bodies, moving images and technologies. We will consider these shifting meanings through use of image capturing tools that extend or act as a prosthetic for the body. Students produce three projects using HD cameras, editing programs, real-time and computer control for video projectors. Against the histories of performance, media art and dance the course examines ways that digital moving images of the body produce meaning, circulate and expand on the project of live arts.

3-5 units, Aut (Staff)

DRAMA 260. Dance and History: From Postwar to Postmodernism

(Same as DANCE 160, DRAMA 160) The cultural and historical unfolding of the genre of contemporary performance known as postmodern dance over the past six decades. Dance history used to trace the effects of visual art and movement experimentalists as they have teamed up since the first decades of the 20th century, redrawing the boundaries of live art and dance performance.

4 units, Win (Ross, J)

DRAMA 262. Performance and the Text

(Same as DRAMA 162) Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles, character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama.

5 units, not given this year

DRAMA 267. Avant Garde Theater

(Same as DRAMA 167) From its origins in the early 19th century to the present.

5 units, Win (Jakovljevic, B)

DRAMA 268H. Art and Life: The Second Avant Garde

(Same as DRAMA 168H) Experiments in the second half of the 20th century that produced new genres such as happenings and performance art, and theoretical debates that attempted to reformulate relations between art forms and their changed role in society. How these fundamentals of performance were challenged and reshaped.

5 units, not given this year

DRAMA 277. Writing for Performance: The Fundamentals

(Same as CSRE 177, DRAMA 177) Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter¿s end.

5 units, Win (Moraga, C)

DRAMA 278. Page to Stage: Playwriting and Solo Performance

(Same as DRAMA 178) Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

3-5 units, Spr (Freed, A)

DRAMA 279C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop

(Same as CSRE 179C, DRAMA 179C) This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what ¿the facts¿ can offer.

3-5 units, Spr (Moraga, C)

DRAMA 279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America

(Same as CSRE 179G, CSRE 279G, DRAMA 179G) This ""gateway"" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

3-5 units, Spr (Moraga, C)

DRAMA 290. Special Research
Individual project on the work of a playwright, period, or genre.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 300A. Critical Styles I
Literary criticism and theory, emphasizing style as evidence of historical, cultural, and ideological concerns. Assumptions about written texts by authors such as Coleridge, Bradley, and Burke. How style reveals context. Students write in the style of authors discussed.
3-5 units, Aut (Jakovljevic, B)

DRAMA 300B. Critical Styles II
Notions of performance as they relate to gender, race, and globalization in critics such as Derrida, Butler, and Phelan. How style reveals context. Students write in the style of authors discussed.
3-5 units, Win (Rayner, A)

DRAMA 301. Performance and Performativity
Performance theory through topics including: affect/trauma, embodiment, empathy, theatricality/performativity, specularity/visibility, liveness/disappearance, belonging/abjection, and utopias and dystopias. Readings from Schechner, Phelan, Austin, Butler, Conquergood, Roach, Schneider, Silverman, Caruth, Fanon, Moten, Anzaldúa, Agamben, Freud, and Lacan. May be repeated for credit.
5 units, Spr (Menon, J)

DRAMA 303A. Cultural Traffic: Race, Performance, and Globalization
(Same as AFRICAAM 169A, AMSTUD 169, CSRE 169A, DRAMA 169A) This course will examine the transnational intersections of race and performance. It will consider the question of s race understood internationally and how do such definitions travel. We examine critical race theory and study constructions of race through the lens of performance. The course will interrogate the transnational meanings of such performances. Students in this course will read, study, analyze and potentially even stage theoretical and performance texts from both inside and outside of the United States. Course also satisfies Drama 302/303 requirement.
3-5 units, Aut (George, N)

DRAMA 304. Historiography of Theater
(Same as DRAMA 166H) Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.
3-5 units, Win (Rayner, A)

DRAMA 321. Proseminar
Workshop. Skills needed to participate in the academic profession including abstract, conference presentation, and dissertation or book chapter.
3-5 units, Aut (Phelan, M)

DRAMA 341. How Practice Practices
(Same as DRAMA 101P) This course explores the practical tools of theatre making. From thinking, to sketching, to composing theatre and performance, this course will serve as a general introduction to the practice of theatre.
3-5 units, Win (Staff)

DRAMA 351. Great Books: Dramatic Traditions
(Same as DRAMA 151T) The most influential and enduring texts in the dramatic canon from Sophocles to Shakepeare, Chekhov to Soyinka. Their historical and geopolitical contexts. Questions about the power dynamics involved in the formation of canons.
3-5 units, Win (Menon, J)

DRAMA 354RE. Residency:Think Like A Mountain
(Same as DRAMA 154RE) Practice and theory course that queries the validity of treating nature as a construct produced by language. Course will examine this debate in the arts, sciences, and the humanities. From September 6-17, 2010 students will partake in a two-week field trip to the Rocky Mountains. During this time students will participate in a seminar, attend the American Indian Artist Symposium, trek in Glacier National Park visit the Helena National Forest and produce and document two artworks that incorporate site. Permission Required.
2 units, Aut (Strom, M; Carlson, A; Preston, V), given once only

DRAMA 354SE. Seminar:Think Like A Mountain
(Same as DRAMA 154SE) Seminar will examine contemporary time-based art production in which the ""human"" is but one life form amount many. We will survey currents in performance, participatory aesthetics, site-work and social practices that challenge the humanist divisions of society and nature, human and animal, organic and technological. Course will consider these debates in the arts, sciences and the humanities through readings, discussions, field trips, visiting artist and scholars.
3-5 units, Aut (Strom, M; Preston, V), given once only

DRAMA 358C. Beckett
(Same as DRAMA 152, ENGLISH 389B) Beckett's plays and late writing, which have been described as proto-performance art. Recent Beckett scholarship, including new work about his analysis with Bion.
3-5 units, Spr (Phelan, M)

DRAMA 370. Introduction to Directing
(Same as DRAMA 170A) Practices of stage composition, work with the actor, approaches to character, and techniques of storytelling. Prerequisite: consent of instructor.
3-5 units, Aut (Settle, J)

DRAMA 372. Directing Workshop: The Actor-Director Dialogue
(Same as DRAMA 170B) This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.
3-5 units, Win (Rehm, R)

DRAMA 373. Directing and Dramaturgy
Dramaturgy, directorial methods, and visual concepts in the production of plays from the Elizabethan tradition to postmodernist texts. Work on the text is tested in the staging of scenes.
3-5 units, Win (Staff)

DRAMA 374. Projects in Directing
Creative projects to be determined in consultation with Drama graduate faculty and production advisor
3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 375. Main Stage Production
Production of a full-length play as part of the Department of Drama season. Public performance.
3-5 units, Aut (Ramsaur, M), Win (Elam, H), Spr (Elam, H), Sum (Staff)

DRAMA 377. Graduate Directors' Staged Reading Project
Presentation of a new or newly adapted work for the stage, in a mode employed in professional theater for the development of new plays. Two to four rehearsals. Public performance.
2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 390. Directed Reading
(Staff) Students may take directing reading only with the permission of their dissertation advisor.
1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 398. Graduate Dissertation Workshop with Professor Jisha Menon
This course offers graduate students the opportunity to work intensively on their research projects by sharing drafts of their prospectus, dissertation outlines, chapters in order to obtain critical feedback. Course meets every other week over Fall and Winter quarters.
1-5 units, Aut (Menon, J), Win (Menon, J)

DRAMA 399. Dissertation Research
(Staff)
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 801. TGR Project
(Staff)
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 802. TGR Dissertation
(Staff)
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTH SYSTEMS (EARTHSYS) COURSES

UNDERGRADUATE COURSES IN EARTH SYSTEMS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EARTHSYS 2. Earth System History
(Same as EESS 2) The evolution of Earth's systems from formation to the present. Couplings and relationships among biosphere, lithosphere, hydrosphere, and atmosphere. Topics include the evolution of life, origin of the oceans, atmosphere and continents, and changes in climate. Modern climate change and anthropogenic effects. GER:DB-NatSci
3 units, Win (Chamberlain, P)

EARTHSYS 4. Evolution and Extinction: Introduction to Historical Geology
(Same as GES 4) Focus is on the end-Cretaceous mass extinction. Principles of stratigraphy, correlation, the geological timescale, the history of biodiversity, and the interpretation of fossils. The use of data from sedimentary geology, geochemistry, and paleontology to test theories to explain the mass extinction event. Two half-day field trips. GER:DB-NatSci
4 units, alternate years, not given this year

EARTHSYS 8. The Oceans: An Introduction to the Marine Environment
(Same as EESS 8) For non-majors and majors in earth science or environmental science. The major ocean ecosystems and how they function both naturally and under the influence of human activities. Emphasis on the dominant organisms of each ecosystem and how they interact with each other and their physical and chemical environment. The types of ecosystems include coral reefs, deep-sea hydrothermal vents, coastal upwelling systems, blue-water oceans, estuaries, near-shore dead zones. Lectures, multimedia presentations, and group activities.
4 units, Spr (Arrigo, K)

EARTHSYS 10. Introduction to Earth Systems
For non-majors and prospective Earth Systems majors. Multidisciplinary approach using the principles of geology, biology, engineering, and economics to describe how the Earth operates as an interconnected, integrated system. Goal is to understand global change on all time scales. Focus is on sciences, technological principles, and sociopolitical approaches applied to solid earth, oceans, water, energy, and food and population. Case studies: environmental degradation, loss of biodiversity, and resource sustainability. GER:DB-NatSci
4 units, Aut (Ernst, G)

EARTHSYS 15SI. Reducing Stanford's Carbon Footprint
Sustainability issues within the areas of climate change policy, building energy consumption, the food system, behavior choices, technology, economics, and business solutions. Guest lectures and field trips to local buildings. Examination of Stanford's current carbon profile and energy consumption. Group project focused on reducing Stanford's carbon emissions.
2 units, Spr (Gonzalez Araiza, M)

EARTHSYS 18. Promoting Sustainability Behavior Change at Stanford
Stanford Green Living Council training course. Effective strategies for enacting sustainable behavior change on campus. Community-based social marketing, psychology, sociology, and design. Behavior change intervention project targeting a specific sustainable behavior. Lectures online.
2 units, Aut (Robinson, T)

EARTHSYS 21. Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years
(Same as ANTHRO 18, ARCHLGY 12) Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis. GER:DB-SocSci
3-5 units, Aut (Bird, D)

EARTHSYS 37N. Energy and the Environment on the Back of an Envelope
(Same as EESS 37N) Preference to freshmen. How quantitative understanding of the Earth helps inform decisions about energy supply. How can enough energy be provided to support future growth and development throughout the world without damaging the natural environment? Focus is on simple quantitative observations and calculations that facilitate evaluation of potential solutions to this problem; algebra only, no calculus. GER:DB-NatSci
3 units, given next year

EARTHSYS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration
(Stanford Introductory Seminar) (Same as EESS 38N, GES 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci
3 units, Win (Dunbar, R)

EARTHSYS 43Q. Environmental Problems
(Stanford Introductory Seminar) (Same as GES 43Q) Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to timber and mining practices, acid rain, and subsurface disposal of nuclear waste. GER:DB-NatSci
3 units, Win (Loague, K)

EARTHSYS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough
(Stanford Introductory Seminar) (Same as EESS 46N) Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's Changes in a California Estuary: A Profile of Elkhorn Slough. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.
3 units, Spr (Francis, C)

EARTHSYS 57Q. Climate Change from the Past to the Future
(Stanford Introductory Seminar) (Same as EESS 57Q) Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.
3 units, Aut (Chamberlain, P)

EARTHSYS 100. Environmental and Geological Field Studies in the Rocky Mountains
(Same as EESS 101, GES 101) Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.
3 units, Aut (Chamberlain, P)

EARTHSYS 101. Energy and the Environment
(Same as ENERGY 101) Energy use in modern society and the consequences of current and future energy use patterns. Case studies illustrate resource estimation, engineering analysis of energy systems, and options for managing carbon emissions. Focus is on energy definitions, use patterns, resource estimation, pollution. Recommended: MATH 21 or 42, ENGR 30. GER:DB-EngrAppSci

3 units, Win (Kovscek, A; Durlofsky, L)

EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes
(Same as ENERGY 102) The energy sources that power society are rooted in fossil energy although energy from the core of the Earth and the sun is almost inexhaustible; but the rate at which energy can be drawn from them with today's technology is limited. The renewable energy resource base, its conversion to useful forms, and practical methods of energy storage. Geothermal, wind, solar, biomass, and tidal energies; resource extraction and its consequences. Recommended: 101, MATH 21 or 42. GER:DB-EngrAppSci

3 units, Spr (Kovscek, A; Gerritsen, M)

EARTHSYS 103. Energy Resources
(Same as CEE 173A, CEE 207A) Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit. GER:DB-EngrAppSci

4-5 units, Aut (Woodward, J; Knapp, K)

EARTHSYS 104. The Water Course
(Same as GEOPHYS 104) The pathway that water takes from rainfall to the tap using student home towns as an example. How the geological environment controls the quantity and quality of water; taste tests of water from around the world. Current U.S. and world water supply issues. GER:DB-NatSci

3 units, not given this year

EARTHSYS 105. Food and Community: New Visions for a Sustainable Future
(Same as EESS 105) Service and research focused on providing healthy and environmentally friendly food for the under served in our community. Hands-on collaboration with the Stanford Glean student group, the Stanford Community Garden, and San Francisco nonprofits. Coverage of the broad spectrum from garden development to food dispersal to the needy. Design and implementation of projects that address an aspect of food and social justice, such as urban farming in low-income communities and sustainable food networks for the elderly. Service Learning Course (certified by Haas Center).

3-5 units, Aut (Chamberlain, P), Win (Chamberlain, P), Spr (Chamberlain, P), Sum (Staff)

EARTHSYS 108. Coastal Wetlands
(Same as EARTHSYS 208) Ecological structure and function of wetlands emphasizing local, coastal wetlands. Topics include: wetland distribution, classification, and history; and interactions between biotic and abiotic components of wetland ecosystems. Labs and local field trips for exposure to landscape patterns, and common sampling equipment and methods. Recommended: 104 or CEE 166A. GER:DB-NatSci

3 units, not given this year

EARTHSYS 109. Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision
(Same as CEE 109) Examination of program-based local actions that promote resource resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units.

2 units, Win (Koseff, J; Ahmed, F)

EARTHSYS 111. Biology and Global Change
(Same as BIO 117, EESS 111) The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing. GER:DB-NatSci

4 units, Win (Vitousek, P; Arrigo, K)

EARTHSYS 112. Human Society and Environmental Change
(Same as EESS 112, HISTORY 103D) Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A

4 units, Aut (Naylor, R; Frank, Z; Pizarro Gariazzo, R)

EARTHSYS 113. Earthquakes and Volcanoes
(Same as GEOPHYS 113) Earthquake location, magnitude and intensity scales, seismic waves, styles of eruptions and volcanic hazards, tsunami waves, types and global distribution of volcanoes, volcano forecasting. Plate tectonics as a framework for understanding earthquake and volcanic processes. Forecasting; earthquake resistant design; building codes; and probabilistic hazard assessment. For non-majors and potential earth scientists. GER:DB-EngrAppSci

3 units, Win (Segall, P)

EARTHSYS 114. Field Course on Tropical Biogeochemistry: Amazon as Case Study
(Same as BIO 114) Post-field seminar for students who went on the two-week field trip to the Amazon in September with Brazilian students under Professor Martinelli of the University of São Paulo and Stanford Latin American Studies. Land use changes over the last 30 years including the conversion of natural forest for cattle ranching and soy beans in the Amazon, the largest continuous area of tropical forests on Earth with the greatest number of plant and animal species. In English.

3 units, not given this year

EARTHSYS 116. Ecology of the Hawaiian Islands
(Same as BIO 116) Terrestrial and marine ecology and conservation biology of the Hawaiian Archipelago. Taught in the field in Hawaii as part of quarter-long sequence of courses including Earth Sciences and Anthropology. Topics include ecological succession, plant-soil interactions, conservation biology, biological invasions and ecosystem consequences, and coral reef ecology. Restricted to students accepted into the Earth Systems of Hawaii Program. GER:DB-NatSci

4 units, Aut (Vitousek, P; Palumbi, S), alternate years, not given next year

EARTHSYS 117. Earth Sciences of the Hawaiian Islands
(Same as EARTHSCI 117, EESS 117) Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production rates, and measuring biogeochemical processes are covered throughout the course. This course is restricted to students accepted into the Earth Systems of Hawaii Program.

4 units, Aut (Fendorf, S), alternate years, not given next year

EARTHSYS 118. Heritage, Environment, and Sovereignty in Hawaii
(Same as ANTHRO 118) The cultural, political economic, and environmental status of contemporary Hawaiians. What sorts of sustainable economic and environmental systems did Hawaiians use in prehistory? How was colonization of the Hawaiian Islands informed and shaped by American economic interests and the nascent imperialsm of the early 20th centrury? How was sovereignty and native Hawaiian identity been shaped by these forces? How has tourism and the leisure industry affected the natural environment? Course uses archaeological methods, ethnohistorical

sources, and historical analysis in an exploration of contemporary Hawaiian social economic and political life.

4 units, Aut (Wilcox, M)

EARTHSYS 122. Paleobiology

(Same as GES 123) Introduction to the fossil record with emphasis on marine invertebrates. Major debates in paleontological research. The history of animal life in the oceans. Topics include the nature of the fossil record, evolutionary radiations, mass extinctions, and the relationship between biological evolution and environmental change. Fossil taxa through time. Exercises in phylogenetics, paleoecology, biostratigraphy, and statistical methods. GER:DB-NatSci

4 units, Spr (Harnik, P)

EARTHSYS 123. From Local to Global: Collaborations for International Environmental Education

(Same as EDUC 122X) A collaboration with three universities in Africa. Discourse and debate using Internet and mobile technology interactions. Topics include the global environment, climate change, sustainable development, and food security.

2 units, not given this year

EARTHSYS 124. Environmental Justice: Local, National, and International Dimensions

(Same as EARTHSYS 224) Focus is on whether minorities and low income citizens suffer disproportionate environmental and health impacts resulting from government and corporate decision making in contexts such as the siting of industrial facilities and waste dumps, toxic chemical use and distribution, and the enforcement of environmental mandates and policies. Implications of environmental justice issues at the international level, emphasizing climate change.

4 units, not given this year

EARTHSYS 130. Soil Physics and Hydrology

(Same as GES 130) The occurrence, distribution, circulation, and reaction of water at the surface and within the near surface. Topics: precipitation, evapotranspiration, infiltration and vadose zone, groundwater, surface water and streamflow generation, and water balance estimates. Current and classic theory in soil physics and hydrology. Urban, rangeland, and forested environments. GER:DB-NatSci

3 units, Aut (Loague, K)

EARTHSYS 131. Communicating Environmental Research Using Narratives and Stories

(Same as EESS 131, EESS 231, EARTHSYS 231) Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

1 unit, not given this year

EARTHSYS 131H. Hydrologically-Driven Landscape Evolution

(Same as GES 131) Materials of the Earth and hydrologically driven landscape processes. Topics: hillslope hydrology, weathering of rocks and soils, erosion, flow failures, mass wasting, and conceptual models of landscape evolution. Current and classic theory in geomorphology. GER:DB-NatSci

3 units, Win (Loague, K)

EARTHSYS 132. Energy and Climate Cooperation in the Western Hemisphere

(Same as EARTHSYS 232, IPS 263, INTNLREL 146A) Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

4 units, not given this year

EARTHSYS 133. Climate Change Law and Policy: From California to the Federal Government

(Same as EARTHSYS 233) California climate laws, including the California Global Warming Solutions Act of 2006 (AB32), the Clean Cars and Trucks Bill (SB 1493), and the Greenhouse Gas Emissions Performance Standard (SB 1368), and complementary and subsidiary regulations such as the Renewable Portfolio Standard, the Low Carbon Fuel Standard, land use law, and energy efficiency and decoupling. The draft scoping plan to outline California's policies for achieving its ambitious economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. The history, details, and current status of California's efforts as platforms to delve into larger legal issues.

3 units, Spr (Grenfell, K)

EARTHSYS 134. Stable Isotopes in Biogeochemistry

(Same as EESS 134, EESS 234, EARTHSYS 234) Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals. GER:DB-NatSci

3 units, Spr (Chamberlain, P)

EARTHSYS 141. Remote Sensing of the Oceans

(Same as EESS 141, EESS 241, EARTHSYS 241) How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features. GER:DB-NatSci

3-4 units, Win (Arrigo, K)

EARTHSYS 142. Remote Sensing of Land

(Same as EESS 162, EARTHSYS 242) The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

4 units, Win (Lambin, E)

EARTHSYS 143. Marine Biogeochemistry

(Same as EESS 143, EESS 243, EARTHSYS 243) (Graduate students register for 243.) Processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Processes at the air-sea interface, production of organic matter in the upper ocean, remineralization of organic matter in the water column, and processing of organic matter in the sediments. Cycles of carbon, oxygen, and nutrients; the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget. GER:DB-NatSci

3-4 units, alternate years, not given this year

EARTHSYS 143J. Climate Change in the West: A History of the Future

(Same as HISTORY 243J) Global warming is changing the American West. But this region is no stranger to environmental change and human adaption to harsh environments. How can history create more clear thinking about the current crisis and choices for the future? The long history of climate change in the West, as well as current warming, through scientific research, historical sources, environmental histories, and visions for the future, including plans for mitigation and adaption, scientific predictions, and science fiction.

5 units, Spr (Christensen, J)

EARTHSYS 144. Fundamentals of Geographic Information Science (GIS)

(Same as EESS 164) Survey of geographic information including maps, satellite imagery, and census data, approaches to spatial data, and tools for integrating and examining spatially-explicit data. Emphasis is on fundamental concepts of geographic information science and associated technologies. Topics include geographic data structure, cartography, remotely sensed data, statistical analysis of geographic data, spatial analysis, map design, and geographic information system software. Computer lab assignments. GER:DB-NatSci

4 units, Aut (Nickel, B)

EARTHSYS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation
(Same as EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

3 units, Win (Thomas, L; Diffenbaugh, N)

EARTHSYS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation
(Same as EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.

3 units, Spr (Thomas, L; Diffenbaugh, N)

EARTHSYS 147. Controlling Climate Change in the 21st Century
(Same as EARTHSYS 247, HUMBIO 116) Global climate change science, impacts, and response strategies. Topics: scientific understanding of the climate system; modeling future climate change; global and regional climate impacts and vulnerability; mitigation and adaptation approaches; the international climate policy challenge; and decarbonization of energy and transportation systems. GER:DB-NatSci

3 units, not given this year

EARTHSYS 155. Science of Soils
(Same as EESS 155) Physical, chemical, and biological processes within soil systems. Emphasis is on factors governing nutrient availability, plant growth and production, land-resource management, and pollution within soils. How to classify soils and assess nutrient cycling and contaminant fate. Recommended: introductory chemistry and biology. GER:DB-NatSci

4 units, Spr (Fendorf, S)

EARTHSYS 156. Soil and Water Chemistry
(Same as EESS 156, EESS 256, EARTHSYS 256) (Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology. GER:DB-NatSci

1-4 units, alternate years, not given this year

EARTHSYS 158. Geomicrobiology
(Same as EESS 158, EESS 258, EARTHSYS 258) How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

3 units, given next year

EARTHSYS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction
(Same as EESS 160) Extracting information from data using statistical summaries and graphical visualization, statistical measures of association and correlation, distribution models, sampling, error estimation and confidence intervals, linear models and regression analysis, introduction to time-series and spatial data with geostatistics, applications including environmental monitoring, natural hazards, and experimental design. GER:DB-Math

3 units, not given this year

EARTHSYS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics
(Same as EESS 161, ENERGY 161) Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools. GER:DB-NatSci

3-4 units, Win (Staff)

EARTHSYS 164. Introduction to Physical Oceanography
(Same as CEE 164, CEE 262D) The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). GER:DB-NatSci

4 units, Win (Fong, D)

EARTHSYS 165. Promoting Behavior Change
(Same as HUMBIO 165) How to apply principles of behavioral change to a real world public health problem: climate change and environmental sustainability. Sources include theory, research, and practice from perspectives such as social and cognitive psychology, media and communication, education, behavioral medicine, social marketing, and consumer behavior. Student groups create an intervention to help elementary school students reduce their environmental footprint. Research performed in local high schools to develop optimally feasible, acceptable, and effective interventions. Prerequisite: Human Biology core or equivalent, or consent of instructor.

4 units, Spr (Robinson, T)

EARTHSYS 170. Environmental Geochemistry
(Same as GES 170) Solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and chemical interactions. Contrast between natural sources of hazardous elements and compounds and types and sources of anthropogenic contaminants and pollutants. Chemical and physical processes of weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. The release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The impact of contaminants and design of remediation strategies. Case studies. Prerequisite: 90 or consent of instructor. GER:DB-NatSci

4 units, Win (Brown, G)

EARTHSYS 173. Aquaculture and the Environment: Science, History, and Policy
(Same as EARTHSYS 273, EESS 173, EESS 273) Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures.

3 units, alternate years, not given this year

EARTHSYS 175. California Coast: Science, Policy, and Law
(Same as CEE 175A, CEE 275A, EARTHSYS 275) Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

3-4 units, Spr (Caldwell, M; Boehm, A; Sivas, D)

EARTHSYS 177. Interdisciplinary Research Survival Skills
(Same as EARTHSYS 277) Learning in interdisciplinary situations. Framing research questions. Developing research methods that benefit from interdisciplinary understanding. Writing for multiple audiences and effectively making interdisciplinary presentations. Discussions with interdisciplinary experts from across campus regarding interdisciplinary research projects.

2 units, Spr (Root, T)

EARTHSYS 178. The Ethics of Environmental Choices
(Same as EARTHSYS 278, PHIL 178A, PHIL 278A) (Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology. GER:DB-Hum

4 units, not given this year

EARTHSYS 180. Fundamentals of Sustainable Agriculture
(Same as EARTHSYS 280, EESS 180, EESS 280) Ecological, economic, and social dimensions of sustainable agriculture in the context of a growing world population. Focus is on management and technological approaches, and historical content of agricultural growth and change, organic agriculture, soil and water resource management, nutrient and pest management, biotechnology, ecosystem services, and climate change. GER:DB-NatSci

3 units, not given this year

EARTHSYS 180B. Principles and Practices of Sustainable Agriculture
(Same as EESS 180B) Field-based training in ecologically sound agricultural practices at the Stanford Community Farm. Weekly lessons, field work, and group projects. Field trips to educational farms in the area. Topics include: soils, composting, irrigation techniques, IPM, basic plant anatomy and physiology, weeds, greenhouse management, and marketing.

3-4 units, Aut (Wiederkehr, S), Spr (Wiederkehr, S)

EARTHSYS 181. Concepts of Urban Agriculture
(Same as EARTHSYS 281, EESS 181, EESS 281) For advanced undergraduates and graduate students from all fields. Seminar. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips to nearby cities; guest lectures; case studies; group projects. Attendance at first class is mandatory. Enrollment is limited. Enrollment permissions will be determined after first class meeting.

3 units, not given this year

EARTHSYS 182. Current Issues in Sustainable Agriculture
(Same as EARTHSYS 282, EESS 182, EESS 282) Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

2 units, Win (Wiederkehr, S)

EARTHSYS 183. Food Matters: Agriculture in Film
(Same as EARTHSYS 283, EESS 183, EESS 283) Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

1 unit, Win (Wiederkehr, S)

EARTHSYS 184. Climate and Agriculture
(Same as EARTHSYS 284, EESS 184, EESS 284) The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

3-4 units, alternate years, not given this year

EARTHSYS 189. Field Studies in Earth Systems
(Same as BIO 206, EESS 189) For advanced upper-division undergraduates and graduate students. Field-based, focusing on the components and processes by which terrestrial ecosystems function. Topics from biology, chemistry, ecology, geology, and soil science. Lecture, field, and lab studies emphasize standard field techniques, experimental design, analysis of data, and written and oral presentation. Small team projects test the original questions in the functioning of natural ecosystems. Admission by application; see Axess. Prerequisites: BIO 141 or EESS 160 (formerly GES 160), or equivalent. GER:DB-NatSci

5 units, not given this year

EARTHSYS 199. Honors Program in Earth Systems

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN EARTH SYSTEMS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EARTHSYS 323. Stanford at Sea
(Same as BIOHOPK 182H, BIOHOPK 323H, EESS 323) (Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

16 units, Spr (Block, B; Dunbar, R), alternate years, not given next year

EARTHSYS 208. Coastal Wetlands
(Same as EARTHSYS 108) Ecological structure and function of wetlands emphasizing local, coastal wetlands. Topics include: wetland distribution, classification, and history; and interactions between biotic and abiotic components of wetland ecosystems. Labs and local field trips for exposure to landscape patterns, and common sampling equipment and methods. Recommended: 104 or CEE 166A.

3 units, not given this year

EARTHSYS 210. Senior Seminar
Interdisciplinary problem analysis and oral communication. Students present results of their Earth Systems internship or research project. Students participate in a research or service learning group project focused on a local environmental issue. Service Learning Course (certified by Haas Center). Prerequisite: EARTHSYS 260.

3 units, Win (Kennedy, J)

EARTHSYS 211. Fundamentals of Modeling
(Same as EESS 211) Simulation models are a powerful tool for environmental research, if used properly. The major concepts and techniques for building and evaluating models. Topics include model calibration, model selection, uncertainty and sensitivity analysis, and Monte Carlo and bootstrap methods. Emphasis is on gaining hands-on experience using the R programming language. Prerequisite: asic knowledge of statistics.

3 units, Aut (Lobell, D)

EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions
(Same as EARTHSYS 124) Focus is on whether minorities and low income citizens suffer disproportionate environmental and health impacts resulting from government and corporate decision making in contexts such as the siting of industrial facilities and waste dumps, toxic chemical use and distribution, and the enforcement of environmental mandates and policies. Implications of

environmental justice issues at the international level, emphasizing climate change.

4 units, not given this year

EARTHSYS 231. Communicating Environmental Research Using Narratives and Stories

(Same as EESS 131, EESS 231, EARTHSYS 131) Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

1 unit, not given this year

EARTHSYS 232. Energy and Climate Cooperation in the Western Hemisphere

(Same as EARTHSYS 132, IPS 263, INTNLREL 146A) Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

4 units, not given this year

EARTHSYS 233. Climate Change Law and Policy: From California to the Federal Government

(Same as EARTHSYS 133) California climate laws, including the California Global Warming Solutions Act of 2006 (AB32), the Clean Cars and Trucks Bill (SB 1493), and the Greenhouse Gas Emissions Performance Standard (SB 1368), and complementary and subsidiary regulations such as the Renewable Portfolio Standard, the Low Carbon Fuel Standard, land use law, and energy efficiency and decoupling. The draft scoping plan to outline California's policies for achieving its ambitious economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. The history, details, and current status of California's efforts as platforms to delve into larger legal issues.

3 units, Spr (Grenfell, K)

EARTHSYS 234. Stable Isotopes in Biogeochemistry

(Same as EESS 134, EESS 234, EARTHSYS 134) Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

3 units, Spr (Chamberlain, P)

EARTHSYS 241. Remote Sensing of the Oceans

(Same as EESS 141, EESS 241, EARTHSYS 141) How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

3-4 units, Win (Arrigo, K)

EARTHSYS 242. Remote Sensing of Land

(Same as EESS 162, EARTHSYS 142) The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

4 units, Win (Lambin, E)

EARTHSYS 243. Marine Biogeochemistry

(Same as EESS 143, EESS 243, EARTHSYS 143) (Graduate students register for 243.) Processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Processes at the air-sea interface, production of organic matter in the upper ocean, remineralization of organic matter in the water column, and processing of organic matter in the sediments. Cycles of carbon, oxygen, and nutrients; the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget.

3-4 units, alternate years, not given this year

EARTHSYS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

(Same as EARTHSYS 146A, EESS 146A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

3 units, Win (Thomas, L; Diffenbaugh, N)

EARTHSYS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation

(Same as EARTHSYS 146B, EESS 146B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.

3 units, Spr (Thomas, L; Diffenbaugh, N)

EARTHSYS 247. Controlling Climate Change in the 21st Century

(Same as EARTHSYS 147, HUMBIO 116) Global climate change science, impacts, and response strategies. Topics: scientific understanding of the climate system; modeling future climate change; global and regional climate impacts and vulnerability; mitigation and adaptation approaches; the international climate policy challenge; and decarbonization of energy and transportation systems.

3 units, not given this year

EARTHSYS 250. Directed Research

Independent research related to student's primary track, carried out after the junior year, during the summer, and/or during the senior year. Student develops own project with faculty supervision. 10-15 page thesis. May be repeated for credit.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 256. Soil and Water Chemistry

(Same as EESS 156, EESS 256, EARTHSYS 156) (Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

1-4 units, alternate years, not given this year

EARTHSYS 258. Geomicrobiology

(Same as EESS 158, EESS 258, EARTHSYS 158) How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

3 units, given next year

EARTHSYS 260. Internship

Supervised field, lab, or private sector project. May consist of directed research under the supervision of a Stanford faculty member, participation in one of several off campus Stanford programs, or an approved non-Stanford program relevant to the student's

Earth Systems studies. Required of and restricted to declared Earth Systems majors. Includes 15-page technical summary research paper that is subject to iterative revision. (WIM)

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 272. Antarctic Marine Geology

(Same as EESS 242) For upper-division undergraduates and graduate students. Intermediate and advanced topics in marine geology and geophysics, focusing on examples from the Antarctic continental margin and adjacent Southern Ocean. Topics: glaciers, icebergs, and sea ice as geologic agents (glacial and glacial marine sedimentology, Southern Ocean current systems and deep ocean sedimentation), Antarctic biostratigraphy and chronostratigraphy (continental margin evolution). Students interpret seismic lines and sediment core/well log data. Examples from a recent scientific drilling expedition to Prydz Bay, Antarctica. Up to two students may have an opportunity to study at sea in Antarctica during Winter Quarter.

3 units, Aut (Staff), alternate years, not given this year

EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy

(Same as EARTHSYS 173, EESS 173, EESS 273) Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures.

3 units, alternate years, not given this year

EARTHSYS 275. California Coast: Science, Policy, and Law

(Same as CEE 175A, CEE 275A, EARTHSYS 175) Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

3-4 units, Spr (Caldwell, M; Boehm, A; Sivas, D)

EARTHSYS 277. Interdisciplinary Research Survival Skills

(Same as EARTHSYS 177) Learning in interdisciplinary situations. Framing research questions. Developing research methods that benefit from interdisciplinary understanding. Writing for multiple audiences and effectively making interdisciplinary presentations. Discussions with interdisciplinary experts from across campus regarding interdisciplinary research projects.

2 units, Spr (Root, T)

EARTHSYS 278. The Ethics of Environmental Choices

(Same as EARTHSYS 178, PHIL 178A, PHIL 278A) (Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

4 units, not given this year

EARTHSYS 280. Fundamentals of Sustainable Agriculture

(Same as EARTHSYS 180, EESS 180, EESS 280) Ecological, economic, and social dimensions of sustainable agriculture in the context of a growing world population. Focus is on management and technological approaches, and historical content of agricultural growth and change, organic agriculture, soil and water resource management, nutrient and pest management, biotechnology, ecosystem services, and climate change.

3 units, not given this year

EARTHSYS 281. Concepts of Urban Agriculture

(Same as EARTHSYS 181, EESS 181, EESS 281) For advanced undergraduates and graduate students from all fields. Seminar. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips to nearby cities; guest lectures; case studies; group projects. Attendance at first class is mandatory. Enrollment is limited. Enrollment permissions will be determined after first class meeting.

3 units, not given this year

EARTHSYS 282. Current Issues in Sustainable Agriculture

(Same as EARTHSYS 182, EESS 182, EESS 282) Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

2 units, Win (Wiederkehr, S)

EARTHSYS 283. Food Matters: Agriculture in Film

(Same as EARTHSYS 183, EESS 183, EESS 283) Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

1 unit, Win (Wiederkehr, S)

EARTHSYS 284. Climate and Agriculture

(Same as EARTHSYS 184, EESS 184, EESS 284) The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

3-4 units, alternate years, not given this year

EARTHSYS 290. Master's Seminar

Required of and open to Earth Systems master's students only. Discussion of topical published literature relevant to Earth systems.

2 units, Spr (Staff)

EARTHSYS 297. Directed Individual Study in Earth Systems

Under supervision of an Earth Systems faculty member on a subject of mutual interest.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 298. Earth Systems Book Review

For Earth Systems master's students and advanced undergraduates only. Analysis and discussion of selected literary nonfiction books relevant to Earth systems topics. Examples of previous topics include political presentations of environmental change in the popular press, review of the collected works of Aldo Leopold, disaster literature, and global warming.

2 units, Spr (Kennedy, J)

EARTHSYS 299. M.S. Thesis

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES (EEES) COURSES

GRADUATE COURSES IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EEES 302. Challenges and Practices in Crossdisciplinary Research and Teaching

Required EEES core course. Presentations by Earth Sciences faculty. Pedagogical tools to present interdisciplinary concepts to a non-specialist audience.

1 unit, not given this year

EEES 400. Research in Earth, Energy, and Environmental Sciences

May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EEES 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EAST ASIAN STUDIES (EASTASN) COURSES

UNDERGRADUATE COURSES IN EAST ASIAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EASTASN 70SI. Critical Issues in U.S.-China Relations Today
Multidisciplinary approach to historical factors, current events, and key issues that drive relations between the United States and China today, including: economic reform and the current financial crisis; security concerns over Taiwan, North Korea and Tibet; energy and the environment; role of NGOs and media in society; and human rights and prospects for political liberalization. Guest lectures from faculty and personal experiences from individuals who have lived or worked in China.

2 units, Spr (Staff)

EASTASN 114. Chinese Imagination of Death
(Same as CHINGEN 114, EASTASN 214) Examines the popular representations and imaginations of death and the afterlife in the Chinese tradition. Sources include philosophical discourses, literary and visual representations, religious and popular practices, and modern imaginations. All readings in English.

3-4 units, Win (Son, S), given once only

EASTASN 117. Health and Healthcare Systems in East Asia
(Same as EASTASN 217) China, Japan, and both Koreas. Healthcare economics as applied to East Asian health policy, including economic development, population aging, infectious disease outbreaks (SARS, avian flu), social health insurance, health service delivery, payment incentives, competition, workforce policy, pharmaceutical industry, and regulation. No prior knowledge of economics or healthcare required.

3-5 units, Win (Eggleston, K)

EASTASN 191. Journal of East Asian Studies
(Staff)

1 unit, Aut (Wigen, K), Win (Wigen, K), Spr (Wigen, K)

EASTASN 199. Directed Reading
(Staff)

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN EAST ASIAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EASTASN 214. Chinese Imagination of Death
(Same as CHINGEN 114, EASTASN 114) Examines the popular representations and imaginations of death and the afterlife in the Chinese tradition. Sources include philosophical discourses, literary and visual representations, religious and popular practices, and modern imaginations. All readings in English.

3-4 units, Win (Son, S), given once only

EASTASN 217. Health and Healthcare Systems in East Asia
(Same as EASTASN 117) China, Japan, and both Koreas. Healthcare economics as applied to East Asian health policy, including economic development, population aging, infectious disease outbreaks (SARS, avian flu), social health insurance, health service delivery, payment incentives, competition, workforce policy, pharmaceutical industry, and regulation. No prior knowledge of economics or healthcare required.

3-5 units, Win (Eggleston, K)

EASTASN 330. Core Seminar: Issues and Approaches in East Asian Studies
For East Asian Studies M.A. students only.

1 unit, Aut (Wigen, K)

EASTASN 390. Practicum Internship
On-the-job training under the guidance of experienced, on-site supervisors. Meets the requirements for curricular practical training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. May be repeated for credit. Prerequisite: qualified offer of employment and consent of adviser.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EASTASN 801. TGR Project

0 units, Aut (Wigen, K), Win (Wigen, K), Spr (Wigen, K), Sum (Wigen, K)

ECONOMICS (ECON) COURSES

UNDERGRADUATE COURSES IN ECONOMICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ECON 1A. Introductory Economics A
The economic way of thinking and the functioning of a market economy. The behavior of consumers and firms, markets for goods and inputs, and principles of international exchange. Applications and policy issues in economics. GER:DB-SocSci

5 units, Aut (Clerici-Arias, M), Win (Clerici-Arias, M), Sum (Wong, J)

ECON 1B. Introductory Economics B
Aggregate economic relationships, including output, employment, inflation, interest rates, and exchange rates. Short-run fluctuations and long-run growth. Issues in monetary and fiscal policy. Prerequisite: 1A. GER:DB-SocSci

5 units, Win (Tendall, M), Spr (Tendall, M), Sum (Leeson, R)

ECON 11N. Understanding the Welfare System
(Stanford Introductory Seminar) Preference to freshmen. Welfare reform legislation and the devolution revolution. The transfer of responsibility for antipoverty programs to the states. How recent reforms change the welfare system and who is likely to be affected. Food stamps, AFDC, TANF, SSI, and Medicaid. Income transfer programs such as earned income tax credit and income taxes, and labor market regulations such as minimum wages and overtime rules. Economic principles to understand the effectiveness of these programs and their consequences on the behavior of families. Pre- or corequisite: ECON 1. Recommended: basic understanding of labor markets, taxes, and transfers.

2 units, Aut (MaCurdy, T)

ECON 17N. Energy, the Environment, and the Economy
(Stanford Introductory Seminar) Preference to freshmen. The relationship between environmental quality and production and consumption of energy. Can environmentally-friendly energy production and consumption compete with conventional sources? How to estimate and compare environmental impact costs of nonrenewable sources such as fossil fuels and nuclear power versus renewable sources such as solar and wind power. Implicit subsidies in conventional energy sources and the environmental costs of these subsidies. Regulatory and legal barriers to more environmentally friendly energy sources.

2 units, Spr (Wolak, F)

ECON 50. Economic Analysis I
Individual consumer and firm behavior under perfect competition. The role of markets and prices in a decentralized economy. Monopoly in partial equilibrium. Economic tools developed from multivariable calculus using partial differentiation and techniques for constrained and unconstrained optimization. Prerequisites: 1A and MATH 51(must be taken for a letter grade). GER:DB-Math

5 units, Aut (Tendall, M), Spr (Cojoc, D), Sum (Bailey, M)

ECON 51. Economic Analysis II
Neoclassical analysis of general equilibrium, welfare economics, imperfect competition, externalities and public goods, intertemporal choice and asset markets, risk and uncertainty, game theory, adverse selection, and moral hazard. Multivariable calculus is used. Prerequisite: 50.

5 units, Aut (Einav, L), Win (Kojima, F), Sum (Santesteban, C)

ECON 52. Economic Analysis III
Long-run economic growth and short-run economic fluctuations. Focus on the macroeconomic tools of government: fiscal policy (spending and taxes) and monetary policy, and their effects on growth, employment, and inflation. Prerequisites: 1B, 50.

5 units, Win (Klenow, P), Spr (Piazzesi, M), Sum (Desmet, K)

ECON 90. Introduction to Financial Accounting
(Same as ECON 190) How to read, understand, and use corporate financial statements. Oriented towards the use of financial accounting information (rather than the preparer), and emphasizes the reconstruction of economic events from published accounting reports.
5 units, Aut (Stanton, F), Win (Ogneva, M)

ECON 91. Introduction to Cost Accounting
(Same as ECON 191) The use of internal financial data for managerial decision making.
5 units, Spr (Stanton, F)

ECON 101. Economic Policy Analysis
Economic policy analysis, writing, and oral presentation. Topics vary with instructor. Limited enrollment. Prerequisites: 51 and 52, 102B, and two field courses. Some sections require additional prerequisites. WIM
5 units, Aut (Steiner, F), Win (Steiner, F), Spr (Steiner, F)

ECON 102A. Introduction to Statistical Methods (Postcalculus) for Social Scientists
Description and examples of the use of statistical techniques relevant to economics. Basic rules of probability, conditional probability, discrete and continuous probability distributions. Point estimation, tests of hypotheses, confidence intervals, and linear regression model. Prerequisite: MATH 41 or equivalent. GER:DB-Math
5 units, Aut (Steiner, F), Win (Steiner, F)

ECON 102B. Introduction to Econometrics
Descriptive statistics. Regression analysis. Hypothesis testing. Confidence regions. Simultaneous equation models. Instrumental variables. Panel data. Limited dependent variables. Time series. Prerequisites: 50, 102A or equivalent. Recommended: computer experience.
5 units, Win (Harding, M), Spr (Mahajan, A)

ECON 102C. Advanced Topics in Econometrics
Identification and estimation of the effect of human capital variables on earnings (such as the return to education, tenure), and identification and estimation of labor supply models, focusing on microeconomic data. Topics: instrumental variable estimation, limited dependent variable models (probit, logit, and Tobit models), and panel data techniques (fixed effect and random effect models, dynamic panel data models).
5 units, Spr (Pistaferri, L)

ECON 103. Applied Econometrics
The construction and use of econometric models for analyzing economic phenomena. Students complete individual projects and core material. Topics vary with the instructor. Enrollment restricted to Juniors and Seniors. Limited enrollment. Prerequisites: 52, 102B.
5 units, not given this year

ECON 104. Econometrics Applied to Macroeconomics and Finance
Seminar in quantitative analysis of issues relating to the overall performance of the American and global economies. Emphasis on the recent economic crisis. Requires the execution and presentation of an original research paper using econometric techniques. Limited enrollment. Prerequisites: ECON 51, 52, 102B. Recommended: ECON 140.
5 units, not given this year

ECON 106. World Food Economy
The interrelationships among food, populations, resources, and economic development. The role of agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis is on public sector decision making as it relates to food policy.
5 units, Win (Naylor, R; Falcon, W)

ECON 111. Money and Banking
Money, interest rates, banks and other financial institutions at both micro and macro levels. Micro: alternative financial instruments, the determination of interest rates, the yield curve, and the role of banks and other capital market institutions in the intermediation process. Supply of money, regulation, and supervision. Macro: the choice of monetary policy by the central bank, the impact of monetary policy making institutions on this choice and the various channels through which monetary policy affects inflation and real variables in the economy. Emphasis is on the institutional structure of Federal Reserve System and the conduct of monetary policy in the U.S. Prerequisites: 50, 52.
5 units, Win (Schneider, K), Sum (Leeson, R)

ECON 113. Economics of Innovation
The modern, knowledge-based economy characterized by: rapid innovation; a dramatic increase in the rate of production of information and decline in the cost of producing it; and pervasive network externalities or increasing returns to scale. Emphasis is on the role of patents and alternative mechanisms for creating incentives for firms to innovate. Topics include: why there may be too much innovative activity; how patent laws may slow rather than help innovation; and the interaction between public and private sector innovation. Prerequisite: 51. Recommended: 102B.
5 units, Spr (Moser, P)

ECON 115. European Economic History
Economic changes and growth in W. Europe from antiquity to the present. The transformation of Europe from an economically and culturally backward part of the world to the center of the pre-WW I world economy. Topics: the role of techniques and sciences, variations of the extent of market activities, institutional changes, international politics, demography. Prerequisites: 51, 52. GER:DB-SocSci
5 units, not given this year

ECON 116. American Economic History
The American economy from colonial times to the present. Application of economic analysis to historical issues; the role of history in economic life. Topics: U.S. economic development in global and comparative context; origins and consequences of the American system of technology and business organization; economics of the Great Depression and New Deal; recent U.S. economic performance in historical perspective. Prerequisite: 1A. GER:DB-SocSci, EC-AmerCul
5 units, not given this year

ECON 117. Economic History and Modernization of the Islamic Middle East
From the rise of Islam to the present. Transformation of region from economically advanced to underdeveloped. Role of religion in economic successes and failures. Current obstacles to development. Topics: Islamic economic institutions; innovation and change; political economy of modernization; interactions with other regions; and economic consequences of Islamism. Prerequisites: ECON 51, 52, 102B.
5 units, not given this year

ECON 118. Development Economics
The economic problems and policy concerns of developing countries. Theories of growth and development; inequality and poverty; credit and labor markets; health and education; politics and corruption. Emphasis is on economic models and econometric evidence rather than case studies. Prerequisites: 52, 102B. GER:EC-GlobalCom
5 units, Aut (Staff)

ECON 120. Socialist Economies in Transition
Privatization, restructuring, and institutional change in E. Europe and the former Soviet Union. Analysis of property rights, corporate governance, incentives, and resource allocation in socialist and transitional economies. Emphasis is on liberalization and privatization policies (including mass and voucher programs) as the primary instruments to induce changes in behavior. Prerequisite: 50. Recommended: 51.
5 units, not given this year

ECON 123. Regulation and Competition in Less Developed Countries
The economics and workings of public intervention, control and liberalization of markets in less developed countries. Topics: natural monopoly regulation; institutions and regulatory commitment; infrastructure concessions; regulation and competition in network industries such as telecoms and electricity; liberalization of markets and competition policy; competition and efficiency; antitrust with a weak judiciary. Prerequisite: 51.
5 units, given next year

ECON 124. Contemporary Japanese Economy
Comparative and historical perspective. Micro and institutional aspects, such as firms, the employment system, corporate governance and financial institutions, and the macro economy. Elemen-

tary applications of macro- and microeconomics. Prerequisite: 50. GER:EC-GlobalCom

5 units, not given this year

ECON 126. Economics of Health and Medical Care

(Same as BIOMEDIN 156, BIOMEDIN 256, HRP 256) Graduate students with research interests should take ECON 248. Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisites: ECON 50 and ECON 102A or equivalent statistics. Recommended: ECON 51.

5 units, Aut (Bhattacharya, J)

ECON 127. Economics of Health Improvement in Developing Countries

(Same as MED 262) Application of economic paradigms and empirical methods to health improvement in developing countries. Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and 102B, and consent of instructor.

5 units, Win (Miller, N)

ECON 135. Finance for Non-MBAs

(Same as MS&E 245G) For graduate students and advanced undergraduates. The foundations of finance; applications in corporate finance and investment management. Financial decisions made by corporate managers and investors with focus on process valuation. Topics include criteria for investment decisions, valuation of financial assets and liabilities, relationships between risk and return, market efficiency, and the valuation of derivative securities. Corporate financial instruments including debt, equity, and convertible securities. Equivalent to core MBA finance course, FINANCE 220. Prerequisites: ECON 51, or ENGR 60, or equivalent; ability to use spreadsheets, and basic probability and statistics concepts including random variables, expected value, variance, covariance, and simple estimation and regression.

3-5 units, Win (Admati, A)

ECON 136. Market Design

Use of economic theory, experiments, and empirical analysis to design market rules and institutions. Topics include: competitive bidding and auction design; matching algorithms to allocate resources in the absence of prices; organization of regulated exchanges; design of internet markets for advertising, retail commerce, and financial trading. Prerequisites: recommended: 51.

5 units, Spr (Levin, J)

ECON 137. Information and Incentives

Incentives in situations where one part has more information than another. A part may have better information about things that it controls (moral hazard), or about things that are outside of its control (adverse selection). The general structure of incentive problems and the design of contracts and institutions to deal with such problems. Applications: executive and employee compensation, sharecropping, financial contracts and credit rationing, insurance, markets with unobservable quality, monopolistic price discrimination, regulation of natural monopolies, income taxation and redistribution, the provision of public goods, and auctions. Prerequisite: 51

5 units, not given this year

ECON 138. Risk and Insurance

The nature of economic risk, its effect on allocation of resources and its public policy implications. Preferences among risky prospects: expected utility theory and the theory of risk aversion. Allocation of risk using markets for contingent claims vs. insurance pools in economies with complete information. The functioning of insurance markets when information is asymmetric, under moral hazard and adverse selection. Can insurance markets function well in a competitive equilibrium? Role of asset markets in allocating risk. How some risks corporations face are associated with price fluctuations and can be hedged in financial markets. Hedging strategies using futures markets, and options and other derivative assets. Associated with the study of insruance markets, the role of risk taking in financial crises and how do insurance markets perform in such conditions. Prerequisite: 50.

5 units, Win (Kurz, M)

ECON 139D. Directed Reading

May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ECON 140. Introduction to Financial Economics

Modern portfolio theory and corporate finance. Topics: present value and discounting, interest rates and yield to maturity, various financial instruments including financial futures, mutual funds, the efficient market theory, basic asset pricing theory, the capital asset pricing model, and models for pricing options and other contingent claims. Use of derivatives for hedging. Prerequisites: 51, 102A.

5 units, Spr (Shoven, J), Sum (Gould, A)

ECON 141. Public Finance and Fiscal Policy

(Same as PUBLPOL 107) What role should and does government play in the economy? What are the effects of government expenditure, borrowing, and taxation? Policy topics: budget surpluses/deficits; tax reform; social security, public goods, and externalities; fiscal federalism; public investment; and cost-benefit analysis. Prerequisites: 51, 52 (can be taken concurrently).

5 units, Spr (Boskin, M)

ECON 144. Family Economics

Topics at the intersection of economics and demography. Causes and consequences of historical trends such as the demographic transition, the increase in female labor force participation and its macroeconomic implications, the connection between economic development and family laws (child labor laws, women's rights), and policies affecting families and children (such as parental leave policies, social security policy, education subsidies). Economic models of household bargaining, fertility choice, and intergenerational transfers. Prerequisites: 51.

5 units, not given this year

ECON 145. Labor Economics

Analysis and description of labor markets. Determination of employment, unemployment, hours of work, wages. Welfare programs and work effort. Wage differentials by schooling, experience, gender, and race. Economics of discrimination. Earnings inequality and changes in inequality. Employment contracts, labor unions, and bargaining. International comparisons. Prerequisites: 51, 102B. GER:EC-Gender

5 units, Win (Pencavel, J)

ECON 146. Economics of Education

How a decision to invest in education is affected by factors including ability and family background. Markets for elementary and secondary schooling; topics such as vouchers and charter schools, accountability, expenditure equalization among schools, and the teacher labor market.The market for college education emphasizing how college tuition is determined, and whether students are matched efficiently with colleges. How education affects economic growth, focusing on developing countries. Theory and empirical results. Application of economics from fields such as public economics, labor economics, macroeconomics, and industrial organization. Prerequisites: 50, 102B.

5 units, Spr (Fitzpatrick, M)

ECON 147. Economics of Human Resources

Investments in human capital including education, on-the-job training, government training, and health. The effects of human capital accumulation on wages and wage growth and on wage differentials by gender and race. Sample selections and experimental data. Poverty and inequality. Optional research project for public policy organization on labor market/human resources issues. Prerequisite: 51.

5 units, Win (Bloom, N; Pistaferri, L)

ECON 150. Economic Policy Analysis
(Same as PUBLPOL 104, PUBLPOL 204) The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making and analysis, and applications to program adoption and implementation. Prerequisite: ECON 50.
5 units, Win (Rosston, G; Landais, C)

ECON 153. Economics of the Internet
Economic models and tools used to understand online market phenomena, including standards, network and platform economics, online transactions, advertising, auctions, information, communications, and networking. The contemporary economics literature on internet markets and mobile communications markets. Public policy issues in competition policy, communication policy, and support for innovation. Prerequisites: 51 and 102B.
5 units, Aut (Bresnahan, T)

ECON 154. Economics of Legal Rules and Institutions
(Same as PUBLPOL 106, PUBLPOL 206) Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Locke, Mill, and Rawls. Economic efficiency and agent rationality, law as mitigation of market and cognitive failures, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50.
5 units, Aut (Owen, B)

ECON 155. Environmental Economics and Policy
Economic sources of environmental problems and alternative policies for dealing with them (technology standards, emissions taxes, and marketable pollution permits). Evaluation of policies addressing regional air pollution, global climate change, water allocation in the western U.S., and the use of renewable resources. Connections between population growth, economic output, environmental quality, and human welfare. Prerequisite: ECON 50. GER:DB-NatSci
5 units, Win (Staff)

ECON 156. Marine Resource Economics and Policy
Economic, political, and institutional frameworks for understanding the causes and potential solutions to marine resource problems. Marine policy formation, implementation and evaluation. Applications include: offshore energy production, managing fisheries, marine spatial planning, protecting biodiversity, and ocean recreaction. Prerequisite: Econ 1A and 1B
5 units, Spr (Staff)

ECON 157. Imperfect Competition
The interaction between firms and consumers in markets that fall outside the benchmark competitive model. How firms acquire and exploit market power. Game theory and information economics to analyze how firms interact strategically. Topics include monopoly, price discrimination, oligopoly, collusion and cartel behavior, anti-competitive practices, the role of information in markets, anti-trust policy, and e-commerce. Sources include theoretical models, real-world examples, and empirical papers. Prerequisite: 51.
5 units, Aut (Kastl, J)

ECON 158. Regulatory Economics
The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: economics and practice of public utility regulation in the communications, television, transportation, energy, and postal delivery sectors and health and safety regulation. Emphasis on the application of economic concepts in evaluating the performance and policies of government agencies. Antitrust law will be introduced and discussed where necessary. Prerequisite: 51or equivalent intermediate microeconomics course.
5 units, Win (Wolak, F)

ECON 160. Game Theory and Economic Applications
Introduction to game theory and its applications to economics. Topics: strategic and extensive form games,dominant strategies, Nash equilibrium, subgame-perfect equilibrium, Bayesian equilibrium, and behavioral game theory. The theory is applied to repeated games, voting, auctions, and bargaining with examples from economics and political science. Prerequisites: 51 and course in calculus.
5 units, Spr (Jackson, M; Fong, K)

ECON 162. Monetary Economics
Dynamic analysis of the role of money and monetary policy in the macro economy, using calculus. Topics: the exchange process and the role of money; inside and outside money; inflation and the inflation tax; international monetary systems; the indeterminacy of floating exchange rates; policies to fix the exchange rate and inflationary incentives; currency crises and speculative attacks; money and interest-bearing government debt; the government¿s budget constraint and the coordination of monetary and fiscal policies; hyperinflations and stabilizations; the effect of the national debt on consumption, savings, investment and output; time consistency of government policies. Prerequisite: 52.
5 units, not given this year

ECON 164. Law, Economics and Politics of International Trade
(Same as POLISCI 216) Taught by an economist and a lawyer. Examines aspects of the WTO system from legal and economic perspectives. Integrates a careful examination of topical legal issues with theoretical and empirical research in economics to develop both positive and normative themes regarding the WTO as an international institution. Overview of the economics of international cooperation on trade, and an introduction to the WTO as an institution and its core obligations. Topics may include: the dispute resolution system; the choice between multilateral and regional or bilateral trade agreements; the role of developing countries in the WTO; and the relationship between WTO law, domestic regulation and national sovereignty. Prerequisite: Econ 51 or equivalent undergraduate microeconomics.
2-5 units, Win (Bagwell, K; Sykes, A)

ECON 165. International Finance
Introduction to international macroeconomics. Topics: intertemporal approach to the current account, international investment patterns, sovereign debt, crises in international financial markets, real and nominal exchange rate determination and exchange rate policy. Prerequisite: ECON 52.
5 units, Sum (Desmet, K)

ECON 166. International Trade
Different sources of comparative advantage in production and trade among nations. Aggregate gains from trade, winners and losers from globalization. International migration, outsourcing and multinational companies. Trade policy and international trade agreements. Theory, empirical evidence, and real-life anecdotes.Llectures supplemented by in-class debates on current topics from the popular press. Prerequisite: 51.
5 units, Win (Staiger, R), Spr (Manova, K)

ECON 167. European Monetary and Economic Integration
The economics of the European Community and the internal market. Analysis of current competition, transportation, and factor market policies, including the problems of agriculture and unemployment. Fiscal harmonization and mercantilist rivalry. European Monetary Union (EMU): genesis, implementation, and consequences of a common currency and central bank. Foreign exchange and foreign trade. Prerequisites: 51, 52, or equivalents.
5 units, not given this year

ECON 168. International Finance and Exchange Rates
(Same as ECON 268) (Graduate students register for 268.) Monetary foundations of international exchange; the rules of the game since Bretton Woods. Foreign exchange risk under the world dollar standard. Hedging, forward covering, and interest parity relationships. International capital flows and the current account. Global trade imbalances; China and Japan versus the U.S. Inflation versus exchange rate targeting in developing countries. Prerequisite for undergraduates: 52; recommended: 165.
5 units, Win (McKinnon, R)

ECON 169. International Financial Markets and Monetary Institutions
(Same as ECON 269) (Graduate students register for 269.) How nations are linked financially through money, capital, and exchange markets, emphasizing policy issues including the role of

the International Monetary Fund, monetary and exchange rate policy, prevention and resolution of financial crises in emerging markets, current account imbalances, and capital mobility. Development and use of macroeconomic models of international financial linkages and microeconomic models of hedging, optimal selection of currencies for invoice and trade credit, and parity relationships in futures, swaps, and options markets. Prerequisite: 165.

5 units, not given this year

ECON 179. Experimental Economics
Methods and major subject areas that have been addressed by laboratory experiments. Focus is on a series of experiments that build on one another. Topics include decision making, two player games, auctions, and market institutions. How experiments are used to learn about preferences and behavior, trust, fairness, and learning. Final presentation of group projects. Prerequisites: 50, 51, 102A.

5 units, Win (Niederle, M)

ECON 190. Introduction to Financial Accounting
(Same as ECON 90) How to read, understand, and use corporate financial statements. Oriented towards the use of financial accounting information (rather than the preparer), and emphasizes the reconstruction of economic events from published accounting reports.

5 units, Aut (Stanton, F), Win (Ogneva, M)

ECON 191. Introduction to Cost Accounting
(Same as ECON 91) The use of internal financial data for managerial decision making.

5 units, Spr (Stanton, F)

ECON 198. Junior Honors Seminar
(Same as PUBLPOL 197) Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Enrollment limited to 25.

5 units, Win (Rothwell, G), Spr (Rothwell, G)

ECON 199D. Honors Thesis Research
In-depth study of an appropriate question and completion of a thesis of very high quality. Normally written under the direction of a member of the Department of Economics (or some closely related department). See description of honors program. Register for at least 1 unit for at least one quarter. Meets first week of Autumn Quarter (see Stanford Daily for details).

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN ECONOMICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ECON 202. Core Economics: Modules 1 and 2
(Non-Economics graduate students register for 202N.) Open to advanced undergraduates with consent of instructors. Theory of the consumer and the implications of constrained maximization; uses of indirect utility and expenditure functions; theory of the producer, profit maximization, and cost minimization; behavior under uncertainty; partial equilibrium analysis and introduction to models of general equilibrium. Limited enrollment. Prerequisite: thorough understanding of the elements of multivariate calculus and linear algebra.

2-5 units, Aut (Milgrom, P)

ECON 202N. 202 For Non-Economics Ph.D. Students
Core Economics modules 1 and 2 for non-Economics Ph.D. students.

2-5 units, Aut (Cojoc, D)

ECON 203. Core Economics: Modules 5 and 6
(Non-Economics graduate students register for 203N.) Non-cooperative game theory including normal and extensive forms, solution concepts, games with incomplete information, and repeated games. Externalities and public goods. The theory of imperfect competition: static Bertrand and Cournot competition, dynamic oligopoly, entry decisions, entry deterrence, strategic behavior to alter market conditions. Limited enrollment. Prerequisite: 202.

2-5 units, Win (Bernheim, D)

ECON 203N. 203 For Non-Economics Ph.D. Students
Non-cooperative game theory including normal and extensive forms, solution concepts, games with incomplete information, and repeated games. Externalities, public goods, and asymmetric information. The theory of imperfect competition and other applications. Limited enrollment. Prerequisite: 202N or consent of instructor.

2-5 units, Win (Cojoc, D)

ECON 204. Core Economics: Modules 9 and 10
The theory of contracts, emphasizing contractual incompleteness and the problem of moral hazard. Incentive regulation. Competition with imperfect information, including signaling and adverse selection. The theory of resource allocation over time, competitive equilibrium, and intertemporal efficiency. Limited enrollment. Prerequisite: 203.

2-5 units, Spr (Jackson, M)

ECON 210. Core Economics: Modules 3 and 7
Dynamic economics applied to aggregate economic fluctuations and economic growth. Solving dynamic, stochastic rational expectation models using discrete time dynamic programming. Growth theory (neoclassical models, growth accounting, technical change, endogenous growth) using optimal control theory. Limited enrollment.

2-5 units, Aut (Piazzesi, M; Klenow, P)

ECON 211. Core Economics: Modules 11 and 12
Investment theory and empirics, including adjustment costs and the q theory; consumption theory and empirics, focusing on the life-cycle model; and the labor market. Macro economics of financial markets. Limited enrollment. Prerequisite: 210.

2-5 units, Win (Hall, R; Schneider, K)

ECON 212. Core Economics: Modules 4 and 8
Monetary theory: economic fluctuations, the role of money (overlapping generations, cash in advance, money in the utility function), dynamic impact of changes in money on the economy, natural rate of unemployment and job creation/destruction, exchange rate determination, international transmission of money, dynamic stochastic general equilibrium models. Macroeconomic policy: rationale for central bank independence, time inconsistency, the impact of public debt, rules versus discretion, interest rate versus money rules, international monetary policy coordination, rational expectations, econometric policy evaluation. Limited enrollment. Prerequisites: 203, 211.

2-5 units, Spr (Taylor, J)

ECON 214. Development Economics I
Microeconomic analysis of markets and institutions in developing countries. Topics: the role of the household; health and nutrition; education; property rights; governance; and technology. Emphasis is on empirical tests of and evidence for theoretical models. Prerequisites: 202 or 202N, 270.

2-5 units, not given this year

ECON 215. Economic Development

2-5 units, Win (Mahajan, A)

ECON 216. Development Economics III
Use of quantitative theory to understand various aspects of the growth and development process. Emphasis on family and demographic issues and their importance for development. Theoretical models of fertility and marriage decisions, and their empirical relevance. Unified growth theories: demographic transition and industrial revolution. Family institutions such as marriage payments and polygamy. The political economy of family-related institutions, e.g. the evolution of women's and children's rights. Female labor supply and development. Theories of disease and development. Prerequisite: 202, 203, 204, 210, 211, 212, 270, 271, 272.

2-5 units, not given this year

ECON 220. Political Economy I
Positive and normative theories of political economy. Positive topics include direct democracy, electoral competition, legislative policy making, agenda setting, lobbying, comparative constitutions, and intergenerational politics, with applications to income taxation, redistribution, and the size of government. Normative topics include social choice theory with and without interpersonal comparisons, Pareto efficiency with public goods, potential Pareto improvements, welfare measurement, cost benefit analysis, and analysis of economic policy reform.
2-5 units, not given this year

ECON 221. Political Economy II
Continuation of 220. Preparation for advanced research in applied political economy. Focus is on econometric methods (panel data, IV, treatment estimation, nonlinear models, random coefficients, duration models, factor analysis) with applications to economic and political development, economic voting, war and economic interdependence, corruption, legislative behavior, and social networks.
2-5 units, not given this year

ECON 224. Science, Technology, and Economic Growth
Upper-division undergraduates may enroll with consent of instructor. The roles played by the growth of scientific knowledge and technical progress in the development of industrial societies. Emphasis is on the interactions between science and technology, and the organizational factors which have influenced their effectiveness in contributing to productivity growth.
2-5 units, not given this year

ECON 225. Economics of Technology and Innovation
Theoretical and empirical analysis of innovation. Topics include optimal design of patents laws and alternative mechanisms to create incentives for innovation, such as technology transfer to developing countries, (compulsory) licensing, and patent pools. Emphasis on empirical analyses of both historical and contemporary data.
2-5 units, Spr (Moser, P)

ECON 226. U.S. Economic History
The role of economic history as a distinctive approach to the study of economics, using illustrations from U.S. history. Topics: historical and institutional foundations of the U.S. rise to world economic preeminence; economic causes and consequences of slavery; the origins and character of national systems of technology; the Great Depression of the 30s.
2-5 units, not given this year

ECON 227. European Economic History
European economic history from middle ages to the twentieth century. Topics: competing hypotheses in explaining long term trends in economic growth and cross-country differences in long-term economic growth; formation, function, and persistence of institutions and organizations; the role of institutions and organizations (e.g. apprenticeship, servitude, partnerships, cooperatives, social networks, share cropping, and communes) as solutions to contractual problems; the economics of migration; the changing economic role of the family. Use of economic theory in guiding hypothesis testing, as well as construction of new datasets and the execution of empirical analysis.
2-5 units, Aut (Abramitzky, R)

ECON 228. Institutions and Organizations in Historical Perspective
Emphasis is on the formative period from the 11th to 18th centuries. Formation, function, and evolution of institutions; alternative conceptual frameworks such as neoclassical, transaction cost economics, institutionalism, and Marxism and neo-Marxism; game theory, mechanism design, and contract theory. Institutions related to trade organization, the organization of production, feudalism, mercantilism, and the state.
2-5 units, Win (Greif, A)

ECON 229. Topics in Economic History
Emphasis is on institutions and organizations, such as risk-sharing organizations, and property rights, such as patent laws and their effects on technological change and economic growth. Topics include: competing hypotheses for cross-country differences in long-term growth; the importance of institutions to economic growth; formation, function, and persistence of institutions and organizations; role of patent laws in creating incentives for innovation; informal networks as a mechanism to trade property rights; causes and effects of institutional change; tests of contract theory in history; and long-term migration and its effect on economic development.
2-5 units, not given this year

ECON 233. Advanced Macroeconomics I
Topics in the theory and empirics of economic growth.
2-5 units, Aut (Klenow, P)

ECON 234. Advanced Macroeconomics II
Current research in growth and development. Classic growth models (e.g. Romer, Lucas); recent models by Acemoglu, Aghion, and others. Covers diverse mix of evidence across industries and firms (not just countries) to test and quantify theoretical predictions. Topics: role of physical capital, human capital, technological change, allocative efficiency and openness in explaining long run growth and development facts.
2-5 units, Win (Hall, R)

ECON 235. Advanced Macroeconomics III
Current topics to prepare student for research in the field. Recent research in labor-market friction, reallocation, fluctuations, wage and price determination, innovation, and productivity growth. Research methods, presentations skills, and writing in advanced economics.
2-5 units, Spr (Staff)

ECON 236. Financial Economics I
Tools: solving choice problems and equilibrium models with multiple risky assets, many agents, and frictions. Applications: household finance (including housing and mortgage choice); risk sharing and financial innovation; economies; trading volume; international capital flows and financial market integration. Prerequisites: 210, 211, 212.
2-5 units, Win (Piazzesi, M)

ECON 237. Financial Economics II
Topics in financial Economics. Discussion of recent academic papers on asset pricing. Student presentations and course paper requirement. Designed for second year PhD students in economics or finance.
2-5 units, Spr (Schneider, K)

ECON 239D. Directed Reading
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ECON 241. Public Finance and Taxation I
Optimal taxation and design of tax/income transfer systems, including incidence and efficiency. Social welfare. Externalities and public goods. Local public economics, fiscal federalism, and education finance. Prerequisites: 202-204, 210, 270, 271, or equivalent with consent of instructor.
2-5 units, Win (Hoxby, C)

ECON 242. Public Finance and Taxation II
Topics concerning capital income taxation, including taxation and saving, taxation and risk taking, and the effects of corporate income taxation. Public expenditures, including social insurance programs and education. Prerequisites: 202, 203, 204, 210, 270, 271, or equivalent with consent of instructor. Recommended: 241.
2-5 units, Spr (Staff)

ECON 246. Labor Economics I
The demand for workers and hours of work, substitution among different types of labor in production, technological change, adjustment costs, restrictions on layoffs. The supply of labor, hours of work, participation, life-cycle models of behavior, welfare programs. Wage differentials by schooling, age, cohort, gender, and race. Changes in these wage differentials and differences across countries. Economics of discrimination. Income inequality. Employment contracts and turnover. Models of labor union behavior. Bargaining. Worker-owned enterprises.
2-5 units, Aut (Pencavel, J)

ECON 247. Labor Economics II
Recent topics in applied micro, focusing on top papers from the last five years. Skill-biased technical change, discrimination, media bias, management, pollution, culture, development and peer effects. Combination of student and faculty presentations. Additional sessions on general presentations, paper writing and research skills, as well as practical Stata sessions on estimation procedures and tricks. Short presentation of research idea required.
2-5 units, Win (Bloom, N)

ECON 248. Labor Economics III
Topics in current applied microeconomic research including skill-biased technical change, income distribution, program evaluation, job search, migration, consumption behavior. Student and faculty presentations

2-5 units, Spr (Pistaferri, L)

ECON 250. Environmental Economics
Applications of modern applied methods to issues of environmental policy. Topics include: environmental policy under uncertainty, environmental quality and health, the economics of alternative fuels, valuationof environmental amenities, models of consumer choice and demand for green products, behavioral aspects of choice, the economics of energy efficiency, commodity markets and recent developments in financial markets and regulation.

2-5 units, Win (Harding, M)

ECON 251. Natural Resource and Energy Economics
Issues in provision and management of non-renewable and renewable natural resources, and energy products and services. Theory and empirical methods related to: market structure, pricing, and performance of important energy and resource industries; sources of market failure in these industries; and alternative regulatory approaches. Prerequisites: 202, 203, 204, 271, and 272, or equivalents with consent of instructor.

2-5 units, not given this year

ECON 257. Industrial Organization 1
Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; price discrimination; price dispersion and consumer search; differentiated products; the role of information in markets, including insurance and adverse selection; auctions; collusion and cartel behavior; advertising; entry and market structure; market dynamics; strategic behavior.

2-5 units, Aut (Einav, L; Kastl, J)

ECON 258. Industrial Organization 2A
Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; collusion and cartel behavior; advertising; signaling; auctions; financial markets.

2-5 units, Win (Kastl, J; Bagwell, K)

ECON 259. Industrial Organization II B
Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; economics of antitrust and regulation, with focus on energy and environmental economics; the role of information asymmetries in markets: adverse selection and moral hazard, with focus on insurance and credit markets.

2-5 units, Win (Einav, L; Wolak, F)

ECON 260. Industrial Organization III
Current research and policy questions in industrial organization. Course combines lectures by the instructors with student presentations, with an emphasis on initiating dissertation research in industrial organization. Prerequisites: 257, 258.

2-5 units, Spr (Levin, J; Bresnahan, T)

ECON 265. International Economics I
International macroeconomics and finance, emphasizing current research. The course is organized around the role of different types of frictions (in asset and goods markets) in explaining features of the international macroeconomy. Prerequisites: 202, 203, 204, 210, 211, 212.

2-5 units, not given this year

ECON 266. International Economics II
Determinants of trade and comparative advantage. Trade with imperfectly competitive markets. Income distribution and gains from trade. Economic geography and trade. Commercial policies, political economy of trade policy and the economics of trade agreements.

2-5 units, Win (Staiger, R; Bagwell, K)

ECON 267. Topics in International Trade
Topics from the frontier of current international trade research, presented through recent theoretical and empirical papers. Firm heterogeneity in trade and firms' export decisions. Different types of foreign direct investment. Multinational firms and the interaction between international trade and the theory of the firm. Institutional frictions and their effects on trade and FDI activity. Course goal is to prepare students for doing research in international trade and related fields.

2-5 units, Spr (Manova, K)

ECON 268. International Finance and Exchange Rates
(Same as ECON 168) (Graduate students register for 268.) Monetary foundations of international exchange; the rules of the game since Bretton Woods. Foreign exchange risk under the world dollar standard. Hedging, forward covering, and interest parity relationships. International capital flows and the current account. Global trade imbalances; China and Japan versus the U.S. Inflation versus exchange rate targeting in developing countries. Prerequisite for undergraduates: 52; recommended: 165.

5 units, Win (McKinnon, R)

ECON 269. International Financial Markets and Monetary Institutions
(Same as ECON 169) (Graduate students register for 269.) How nations are linked financially through money, capital, and exchange markets, emphasizing policy issues including the role of the International Monetary Fund, monetary and exchange rate policy, prevention and resolution of financial crises in emerging markets, current account imbalances, and capital mobility. Development and use of macroeconomic models of international financial linkages and microeconomic models of hedging, optimal selection of currencies for invoice and trade credit, and parity relationships in futures, swaps, and options markets. Prerequisite: 165.

5 units, not given this year

ECON 270. Intermediate Econometrics I
Probability, random variables, and distributions; large sample theory; theory of estimation and hypothesis testing. Limited enrollment. Prerequisites: math and probability at the level of Chapter 2, Paul G. Hoel, Introduction to Mathematical Statistics, 5th ed.

2-5 units, Aut (Romano, J; Hong, H)

ECON 271. Intermediate Econometrics II
Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Limited enrollment. Prerequisite: 270.

2-5 units, Win (Wolak, F)

ECON 272. Intermediate Econometrics III
Continuation of 271. Nonlinear estimation, qualitative response models, limited dependent variable (Tobit) models. Limited enrollment. Prerequisite: 271.

2-5 units, Spr (MaCurdy, T)

ECON 273. Advanced Econometrics I
Possible topics: parametric asymptotic theory. M and Z estimators. General large sample results for maximum likelihood; nonlinear least squares; and nonlinear instrumental variables estimators including the generalized method of moments estimator under general conditions. Model selection test. Consistent model selection criteria. Nonnested hypothesis testing. Markov chain Monte Carlo methods. Nonparametric and semiparametric methods. Quantile Regression methods.

2-5 units, Aut (Hong, H)

ECON 274. Advanced Econometrics II
(Formerly 273B); Possible topics: nonparametric density estimation and regression analysis; sieve approximation; local polynomial regression; spline regression; cross validation; indirect inference; resampling methods: bootstrap and subsampling; quantile regression; nonstandard asymptotic distribution theory; empirical processes; set identification and inference, large sample efficiency and optimality.

2-5 units, Win (Romano, J)

ECON 275. Time Series Econometrics
Stochastic processes and concepts such as stationarity, ergodicity, and mixing. Inference with heteroskedastic and autocorrelated time series; autoregressive and moving average models; unit root processes and asymptotic analysis of such; tests for structural change; vector autoregressive models; cointegration; impulse response analysis; forecasting; ARCH and GARCH volatility models. Prerequisites: 270, 271.

2-5 units, Spr (Staff)

ECON 276. Limited Dependent Variables
(Formerly 274.) Parametric and semi-parametric approaches to the estimation of econometric models with discrete or limited dependent variables. Maximum likelihood, nonlinear panel data, duration models, rank estimation and index models, Bayesian approaches

and MCMC. Estimation of discrete choice models with endogeneity, simulation methods and computationally intensive approaches. Estimation of social network models. Random matrix theory. Prerequisite: 273 or consent of instructor.

2-5 units, not given this year

ECON 278. Behavioral and Experimental Economics I

This is the first half of a two course sequence (along with Econ 279) on behavioral and experimental economics. The sequence has two main objectives: 1) examines theories and evidence related to the psychology of economic decision making, 2) Introduces methods of experimental economics, and explores major subject areas (including those not falling within behavioral economics) that have been addressed through laboratory experiments. Focuses on series of experiments that build on one another in an effort to test between competing theoretical frameworks, with the objects of improving the explanatory and predictive performance of standard models, and of providing a foundation for more reliable normative analyses of policy issues. Prerequisites: 204 and 271, or consent of instructor.

2-5 units, Aut (Bernheim, D)

ECON 279. Behavioral and Experimental Economics II

This is the first half of a two course sequence (along with Econ 278) on behavioral and experimental economics. The sequence has two main objectives: 1) examines theories and evidence related to the psychology of economic decision making, 2) Introduces methods of experimental economics, and explores major subject areas (including those not falling within behavioral economics) that have been addressed through laboratory experiments. Focuses on series of experiments that build on one another in an effort to test between competing theoretical frameworks, with the objects of improving the explanatory and predictive performance of standard models, and of providing a foundation for more reliable normative analyses of policy issues. Prerequisites: 204 and 271, or consent of instructor.

2-5 units, Win (Niederle, M)

ECON 281. Normative Decision Theory and Social Choice

Normative principles of behavior, especially in single-person decision trees. Objective and subjective expected utility. Savage, Anscombe-Aumann, and consequentialist axioms. State dependence. Multi-person extensions: social choice, ethics, opinion pooling, and rationalizability in non-cooperative games. Prerequisite: 202 or equivalent. (Hammond)

2-5 units, not given this year

ECON 282. Contracts, Information, and Incentives

Basic theories and recent developments in mechanism design and the theory of contracts. Topics include: hidden characteristics and hidden action models with one and many agents, design of mechanisms and markets with limited communication, long-term relationships under commitment and under renegotiation, property rights and theories of the firm.

2-5 units, Aut (Segal, I)

ECON 283. Advanced Topics in Contracts and Organization

Recent developments and promising research. Topics change from year to year, and may include: reputational concerns and implicit contracts in long-term relationships, property rights and the hold-up problem, multilateral contracting, communication requirements of allocation problems, communication without full commitment. Prerequisite: 282 or consent of instructors.

2-5 units, not given this year

ECON 285. Auctions, Bargaining, and Pricing

(Same as MGTECON 602.) Theory of auctions and related literature in bargaining and pricing. Key papers include Myerson and Satterthwaite on bargaining, Myerson on optimal auctions, and Milgrom and Weber's classic work. How markets with complicated preferences and constraints, limitations on the use of cash, or variations in contract details among bidders decisively impair the performance of simple market rules. Emphasis on matching markets such as the National Resident Matching Program, asset auctions such as the spectrum auctions. Literature on dynamic bargaining.

2-5 units, Win (Milgrom, P; Niederle, M)

ECON 286. Game Theory and Economic Application

Solution concepts for non-cooperative games, repeated games, games of incomplete information, reputation, and experiments. Standard results and current research topics. Prerequisite: 203 or consent of instructor.

2-5 units, not given this year

ECON 287. General Equilibrium Theory

Existence, efficiency, and Walrasian equilibrium in exchange economies. Production, financial markets, incomplete markets, sequence economies with infinitely-lived agents. Prerequisites: 204 or consent of instructor.

2-5 units, not given this year

ECON 289. Advanced Topics in Game Theory and Information Economics

Topics course covering a variety of game theory topics with emphasis on market design, such as matching theory and auction theory. Prerequisites: Econ 285 or equivalent.

2-5 units, Spr (Kojima, F)

ECON 290. Multiperson Decision Theory

dents and faculty review and present recent research papers on basic theories and economic applications of decision theory, game theory and mechanism design. Applications include market design and analyses of incentives and strategic behavior in markets, and selected topics such as auctions, bargaining, contracting, and computation.

4 units, not given this year

ECON 291. Social and Economic Networks

Synthesis of research on social and economic networks by sociologists, economists, computer scientists, physicists, and mathematicians, with an emphasis on modeling. Includes methods for describing and measuring networks, empirical observations about network structure, models of random and strategic network formation, as well as analyses of contagion, diffusion, learning, peer influence, games played on networks, and networked markets.

2-5 units, not given this year

ECON 299. Practical Training

Students obtain employment in a relevant research or industrial activity to enhance their professional experience consistent with their degree programs. At the start of the quarter, students must submit a one page statement showing the relevance of the employment to the degree program along with an offer letter. At the end of the quarter, a three page final report must be supplied documenting work done and relevance to degree program. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ECON 300. Third-Year Seminar

Restricted to Economics Ph.D. students. Students present current research. May be repeated for credit.

1-10 units, Aut (Levin, J; Fong, K), Spr (Fong, K; Levin, J)

ECON 301. Microeconomic Workshop

1-10 units, not given this year

ECON 310. Macroeconomic Workshop

1-10 units, Aut (Hall, R; Klenow, P; Taylor, J; Amador, M; Tertilt, M; Piazzesi, M; Schneider, K; Bloom, N), Win (Hall, R; Klenow, P; Taylor, J; Tertilt, M; Amador, M; Piazzesi, M; Schneider, K; Bloom, N), Spr (Hall, R; Klenow, P; Taylor, J; Amador, M;

ECON 315. Development Workshop

1-10 units, Aut (DeGiorgi, G; Jayachandran, S; Mahajan, A), Win (Jayachandran, S; Mahajan, A; DeGiorgi, G), Spr (DeGiorgi, G; Mahajan, A; Jayachandran, S)

ECON 320. Political Economy Workshop

May be repeated for credit.

1-10 units, Aut (Bernheim, D; Harding, M; Jackson, M), Win (Bernheim, D; Harding, M; Jackson, M), Spr (Bernheim, D; Harding, M; Jackson, M)

ECON 325. Economic History Workshop

May be repeated for credit.

1-10 units, Aut (Greif, A; Wright, G; Abramitzky, R; Moser, P), Win (Greif, A; Wright, G; Moser, P; Abramitzky, R), Spr (Wright, G; Greif, A; Moser, P; Abramitzky, R)

ECON 341. Public Economics and Environmental Economics Seminar

Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and regulatory policies; their effects on levels and distribution of income, wealth, and environmental quality; alternative policies and methods of evaluation.

Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: 241 or consent of instructor.

1-10 units, Aut (Boskin, M; Shoven, J; Hoxby, C; Bloom, N), Win (Boskin, M; Shoven, J; Bloom, N; Hoxby, C), Spr (Boskin, M; Shoven, J; Bloom, N; Hoxby, C)

ECON 345. Applications Workshop

1-10 units, Aut (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Goulder, L; Hansen, P; Harding, M; Mahajan, A), Win (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Hansen, P; Goulder, L; Mahajan, A; Harding, M; Hong, H), Spr (MaCurdy, T; Pencavel

ECON 354. Workshop in Law and Economics

2-6 units, Aut (Staff), Win (Staff)

ECON 355. Industrial Organization Workshop

Current research in the field by visitors, presentations by students, and discussion of recent papers. Students write an original research paper, make a formal presentation, and lead a structured discussion.

1-10 units, Aut (Bresnahan, T; Einav, L; Kastl, J; Levin, J; Wolak, F), Win (Bresnahan, T; Einav, L; Kastl, J; Levin, J; Wolak, F), Spr (Bresnahan, T; Einav, L; Kastl, J; Levin, J; Wolak, F)

ECON 365. International Trade Workshop

1-10 units, Aut (Fitzgerald, D; Manova, K; Staiger, R; Bagwell, K), Win (Staiger, R; Fitzgerald, D; Manova, K; Bagwell, K), Spr (Fitzgerald, D; Staiger, R; Bagwell, K; Manova, K)

ECON 370. Econometrics Workshop

1-10 units, Aut (Hong, H; Hansen, P; Mahajan, A; Harding, M), Win (Hansen, P; Mahajan, A; Han, L; Harding, M), Spr (Hansen, P; Mahajan, A; Hong, H; Harding, M)

ECON 391. Microeconomic Theory Seminar

1-10 units, Aut (Segal, I; Milgrom, P; Niederle, M; Bernheim, D; Jackson, M; Kojima, F; Fong, K), Win (Bernheim, D; Milgrom, P; Niederle, M; Segal, I; Jackson, M; Kojima, F; Fong, K), Spr (Bernheim, D; Milgrom, P; Niederle, M; Segal, I; Jackson, M; Koj

ECON 400. Ph.D. Dissertation

(Staff)

1-15 units, Aut (Bresnahan, T), Win (Bresnahan, T), Spr (Bresnahan, T), Sum (Staff)

ECON 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ECON 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUCATION (EDUC) COURSES

UNDERGRADUATE COURSES IN EDUCATION

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EDUC 97X. Science Education through Community Service

This one-unit directed reading, service-learning course will focus on educational inequity in the sciences for k-8 children in the communities of the Ravenswood School District. It is intended for students who are participating in the Haas Center's Science in Service program. Students will attend a 2-hr/week seminar. Through the readings students will familiarize themselves with the communities, gain an understanding of the root causes of educational inequity in the sciences, and acquire skills in teaching science and mentoring children.

1 unit, Aut (Beck, K)

EDUC 98X. Service Learning Practicum

For Alternative Spring Break program leaders. The skills and philosophical framework to develop and lead an ASB experience.

1 unit, Aut (McConnell, J)

EDUC 100A. EAST House Seminar: Current Issues and Debates in Education

In Autumn Quarter, five current issues broadly related to education and society are discussed and debated among students and faculty. In Winter Quarter, topics pertaining to gender and education, particularly in developing countries, are explored. In Spring Quarter, the seminar revolves around race and ethnicity in higher education. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.

1 unit, Aut (Wotipka, C)

EDUC 100B. EAST House Seminar: Current Issues and Debates in Education

In Autumn Quarter, five current issues broadly related to education and society are discussed and debated among students and faculty. In Winter Quarter, topics pertaining to gender and education, particularly in developing countries, are explored. In Spring Quarter, the seminar revolves around race and ethnicity in higher education. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.

1 unit, Win (Wotipka, C)

EDUC 100C. EAST House Seminar: Current Issues and Debates in Education

(Same as ASNAMST 100C) In Autumn Quarter, five current issues broadly related to education and society are discussed and debated among students and faculty. In Winter Quarter, topics pertaining to gender and education, particularly in developing countries, are explored. In Spring Quarter, the seminar revolves around race and ethnicity in higher education. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.

1 unit, Spr (Wotipka, C)

EDUC 101. Introduction to Teaching and Learning

This course is designed to help undergraduates explore career interests in education; it is the core course for the Undergraduate Minor in Education, and fulfills requirements for Honors in Education. The course considers the philosophy, history, politics, professional practice and social structures of teaching in the United States. Students read and discuss teaching theory and research, participate in learning activities and visit school teaching sites, as well as examine and analyze artifacts and models of teaching.

3-5 units, Aut (Wolf, J)

EDUC 102. Examining Social Structures, Power, and Educational Access

Goal is to prepare Education and Youth Development fellows for their work with adolescents in the Haas Center's pre-college summer programs and to define their role in addressing educational inequities in the summer programs and beyond.

2-3 units, Spr (Wilson, J)

EDUC 103A. Tutoring: Seeing a Child through Literacy

(Same as EDUC 203A) Experience tutoring grade school readers in a low income community near Stanford under supervision. Training in tutoring; the role of instruction in developing literacy; challenges facing low income students and those whose first language is not English. How to see school and print through the eyes of a child. Ravenswood Reads tutors encouraged to enroll. Service Learning Course (certified by Haas Center). GER:DB-SocSci

4 units, Aut (Juel, C)

EDUC 103B. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices

(Same as EDUC 337) Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students.

3-5 units, Win (Ball, A)

EDUC 103C. Educational Policy, Diversity, and English Learners

Undergraduates engage in the real world of teaching. Historical and legal foundations, and materials, methods, and strategies for English and primary language development. Students tutor an English learner.

3-4 units, not given this year

EDUC 104X. Conduct of Research with and in Communities
For undergraduates interested in service learning and research in community settings. The historical and theoretical underpinnings of community-based participatory research (CBPR), action research, community-embedded research, participant observation, and qualitative research.
3-4 units, not given this year

EDUC 106. Interactive Media in Education
Workshop. (CTE)
3-5 units, not given this year

EDUC 107X. Social Psychology and Social Change
(Same as EDUC 371X, PSYCH 265) The major ideas, theories, and findings of social psychology and their applied status. Emphasis is on historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research also discussed. Advanced undergraduates and graduate students from other disciplines are welcome.
2-3 units, Spr (Cohen, G)

EDUC 109X. Educational Issues in Contemporary China
(Same as EDUC 309X) Reforms such as the decentralization of school finance, emergence of private schools, expansion of higher education, and reframing of educational policy to focus on issues of quality. Have these reforms exacerbated educational inequality.
3-4 units, Spr (Adams, J)

EDUC 110. Sociology of Education: The Social Organization of Schools
(Same as EDUC 310, SOC 132, SOC 332) Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy. GER:DB-SocSci
4 units, Win (Carter, P)

EDUC 111. The Young Adult Novel: A Literature For and About Adolescents
For undergraduates considering teaching or working with adolescents, and for those planning to apply to the coterminal program in the Stanford Teacher Education program (STEP). Students work together to define the genre of young adult novels. What they reveal about adolescence in America. How to read and teach young adult literature.
4 units, not given this year

EDUC 112X. Urban Education
(Same as EDUC 212X, SOC 129X, SOC 229X) (Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education. GER:DB-SocSci
3-4 units, Spr (Carter, P)

EDUC 113X. Gender and Sexuality in Schools
Issues at the intersection of queer theory and educational practice. Experiences, rights, and responsibilities of lesbian, gay, bisexual, transgender, intersex, queer, and questioning students and teachers as members of marginalized or majority cultures. GER:EC-Gender
1-3 units, Spr (Staff)

EDUC 115Q. Identities, Race, and Culture in Urban Schools
Preference to sophomores. How urban youth come to a sense of themselves as students, members of cultural and racial groups, and young people in urban America. The nature and interaction of racial and academic identities: how identity takes shape; how it has been conceptualized. The relation between identities and learning. Urban schools as contexts for identity development. Theoretical perspectives include psychology, sociolinguistics, sociology, anthropology, and education. Students shadow a high-school student in a public school and write a case study.
3 units, not given this year

EDUC 116X. Service Learning as an Approach to Teaching
History, theory, and practice. Topics include: responsive community partnerships, cultural awareness, the role of reflection, and best practices in service learning.
3 units, Spr (Mitchell, T)

EDUC 117. Research and Policy on Postsecondary Access
(Same as EDUC 417) The transition from high school to college. K-16 course focusing on high school preparation, college choice, remediation, pathways to college, and first-year adjustment. The role of educational policy in postsecondary access. Service Learning Course (certified by Haas Center).
3 units, Spr (Antonio, A)

EDUC 120C. Education and Society
(Same as EDUC 220C, SOC 130, SOC 230) The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling. GER:DB-SocSci
4-5 units, Aut (Ramirez, F)

EDUC 120X. Sociology of Knowledge Creation
(Same as EDUC 320X, SOC 330) The sociology of knowledge creation explores systematic relationships between thought and social structure in order to examine how human beings construct, interpret, and view reality. How knowledge is socially constructed, patterned, and used, and how everyday and tacit forms of knowledge are achieved. Emphasis is on the creation and patterning of scientific paradigms, social science disciplines, and the field of education.
3-4 units, Win (McFarland, D)

EDUC 121X. Hip Hop, Youth Identities, and the Politics of Language
(Same as AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, CSRE 121X, LINGUIST 155) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.
3-4 units, Spr (Alim, H)

EDUC 122X. From Local to Global: Collaborations for International Environmental Education
(Same as EARTHSYS 123) A collaboration with three universities in Africa. Discourse and debate using Internet and mobile technology interactions. Topics include the global environment, climate change, sustainable development, and food security.
2 units, not given this year

EDUC 123X. Contexts that Promote Youth Development: Understandings of Effective Interventions
How psychology, medicine, public health, sociology, education, and public policy define and promote youth development. How to build the resilience and competencies of youth through safe, supportive environments for building social, emotional, and intellectual skills. How to design settings that best promote youth development.
2-4 units, not given this year

EDUC 124. Collaborative Design and Research of Technology-integrated Curriculum
Design models for the development of educational materials through a studio-based, curriculum development project. Teams work with a teacher or non-school educator to design and test technology-integrated curricula. Focus is on the role that technologies can play in teaching and learning in school and out-of-school contexts. Open to all.
3-4 units, not given this year

EDUC 126X. Introduction to Public Service Learning
Offered through the Haas Center for Public Service. A foundation and vision for a future of public service leadership. Students identify personal values and assess strengths as leaders. The ethics of public service and leadership theory.
1-2 units, Win (Itliong, A)

EDUC 130. Introduction to Counseling
The goal of counseling is to help others to create more satisfying lives for themselves. Clients learn to create and capitalize on unexpected events to open up new opportunities. The success of counseling is judged, not by the words and actions of the counselor, but by the progress that the client makes in the real world after counseling itself is ended. Students are encouraged to exert their full

efforts within reasonable time limits to improve their competence. (PSE)

3 units, Win (Krumboltz, J)

EDUC 131. Mediation for Dispute Resolution

(Same as PSYCH 152) Mediation as more effective and less expensive than other forms of settling disputes such as violence, lawsuits, or arbitration. How mediation can be structured to maximize the chances for success. Simulated mediation sessions.

3 units, Aut (Krumboltz, J)

EDUC 134. Career and Personal Counseling

(Same as EDUC 234, PSYCH 192) Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences.

3 units, Spr (Krumboltz, J)

EDUC 136. World, Societal, and Educational Change: Comparative Perspectives

(Same as EDUC 306D, SOC 231) Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture. GER:DB-SocSci

4-5 units, Win (Martin, P)

EDUC 140. Honors Research

Provides opportunity for research in pursuit of senior honors theses.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 143. Boys' Psychosocial Development

(Same as HUMBIO 144) From early childhood through adolescence. Emphasis is on how boys' lives and experiences are embedded within their interpersonal relationships and social and cultural contexts. Interdisciplinary approach including perspectives from fields such as psychology, sociology, anthropology, family studies, and education. Prerequisite: Human Biology core, or Developmental Psychology , or consent of instructor. GER:EC-Gender

4 units, Spr (Chu, J)

EDUC 146X. Perspectives on the Education of Linguistic Minorities

Social, political, linguistic, and pedagogical issues associated with educating students who do not speak the language or language variety of the majority society. Focus is on the U.S.; attention to minorities elsewhere. American attitudes toward linguistic and racial minorities. Educational problems of linguistically different children and non-English- or limited-English-speaking children. Approaches to solving problems.

3-4 units, Spr (Staff)

EDUC 148X. Critical Perspectives on Teaching and Tutoring English Language Learners

Theoretical foundation for volunteer tutors of English language learners in urban environments working with children in school-based programs or adults in community-based settings.

3 units, not given this year

EDUC 149. Theory and Issues in the Study of Bilingualism

(Same as EDUC 249) Sociolinguistic perspective. Emphasis is on typologies of bilingualism, the acquisition of bilingual ability, description and measurement, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings. (SSPEP)

3-5 units, not given this year

EDUC 165. History of Higher Education in the U.S.

(Same as AMSTUD 165, EDUC 265, HISTORY 158C) Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities. (SSPEP-APA)

3-5 units, Aut (Gordon, L)

EDUC 166. The Centrality of Literacies in Teaching and Learning

Focus is on principles in understanding, assessing, and supporting the reading and writing processes, and the acquisition of content area literacies in secondary schools. Literacy demands within particular disciplines and how to use oral language, reading, and writing to teach content area materials more effectively to all students. (STEP)

3 units, Sum (Aukerman, M)

EDUC 170X. Preparation for Independent Public Service Projects

Open only to recipients of the Haas Summer Fellowship, which offers students the opportunity to initiate and carry out an innovative service project in collaboration with a community partner. Goal is to expand upon the work fellows did during the application process with respect to the feasibility and sustainability of their field projects.

2 units, Spr (Hawthorne, J)

EDUC 171. Early Childhood Education Practicum

Year-long seminar; restricted to students who participate in Jump-Start, a service learning program. Training for activities in preschool classrooms. Background on issues related to: young children's cognitive, language. and social development; classroom management; literacy; math; science teaching; cultural diversity; and early childhood education programs. May be repeataed for credit.

2-4 units, Aut (Stipek, D), Win (Stipek, D), Spr (Stipek, D)

EDUC 177. Education of Immigrant Students: Psychological Perspectives

(Same as EDUC 277) Historical and contemporary approaches to educating immigrant students. Case study approach focuses on urban centers to demonstrate how stressed urban educational agencies serve immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, current school reform movements, and government policies regarding equal educational opportunity. (SSPEP)

4 units, Win (Padilla, A)

EDUC 178X. Latino Families, Languages, and Schools

The challenges facing schools to establish school-family partnerships with newly arrived Latino immigrant parents. How language acts as a barrier to home-school communication and parent participation. Current models of parent-school collaboration and the ideology of parental involvement in schooling. (SSPEP) (Valdés)

3-5 units, not given this year

EDUC 179. Urban Youth and Their Institutions: Research and Practice

(Same as EDUC 279) The determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches, and the gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories. Case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary realities of urban youth for policy makers, educators, and researchers. Limited enrollment. Prerequisite: consent of instructor. (SSPEP/APA)

4-5 units, not given this year

EDUC 179B. Youth Empowerment and Civic Engagement

(Same as EDUC 279B) Focus is on youth development policies and practices: what makes them effective, and how they operate in broader institutional contexts. Research-based information; conceptual underpinnings; best learning from experience; and the perspective of expert youth workers, policymakers, and youth about what works.

2-4 units, not given this year

EDUC 180. Directed Reading in Education

For undergraduates and master's degree students. (All Areas)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 181. Multicultural Issues in Higher Education

(Same as EDUC 381) The primary social, educational, and political issues that have surfaced in American higher education due to the rapid demographic changes occurring since the early 80s. Research efforts and the policy debates include multicultural communities, the campus racial climate, and student development; affirmative action in college admissions; multiculturalism and the curriculum; and multiculturalism and scholarship.

4 units, not given this year

EDUC 189X. Language and Minority Rights

(Same as CHICANST 189W, CSRE 189W) Language as it is implicated in migration and globalization. The effects of globaliza-

tion processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages. GER:EC-GlobalCom

3 units, not given this year

EDUC 190. Directed Research in Education

For undergraduates and master's students. May be repeated for credit. (all areas)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 191X. Introduction to Survey Research

(Same as EDUC 291X) Planning tasks, including problem formulation, study design, questionnaire and interview design, pretesting, sampling, interviewer training, and field management. Epistemological and ethical perspectives. Issues of design, refinement, and ethics in research that crosses boundaries of nationality, class, gender, language, and ethnicity.

3-4 units, Win (Adams, J)

EDUC 193A. Listen Up! Core Peer Counseling Skills

Topics: verbal and non-verbal skills, open and closed questions, paraphrasing, working with feelings, summarization, and integration. Individual training, group exercises, role play practice with optional video feedback. Sections on relevance to crisis counseling and student life. Guest speakers from University and community agencies. Students develop and apply skills in University settings.

2 units, Aut (Martinez, A), Win (Martinez, A), Spr (Martinez, A)

EDUC 193B. Peer Counseling in the Chicano/Latino Community

Topics: verbal and non-verbal attending and communication skills, open and closed questions, working with feelings, summarization, and integration. Salient counseling issues including Spanish-English code switching in communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, and Chicana/o student experience in University settings. Individual training, group exercises, role play, and videotape practice.

1 unit, Aut (Martinez, A)

EDUC 193C. Peer Counseling in the African American Community

Topics: the concept of culture, Black cultural attributes and their effect on reactions to counseling, verbal and non-verbal attending, open and closed questions, working with feelings, summarization, and integration. Reading assignments, guest speakers, role play, and videotaped practice. Students develop and apply skills in the Black community on campus or in other settings that the student chooses.

1 unit, Aut (Adams, C), Spr (Adams, C)

EDUC 193F. Psychological Well-Being on Campus: Asian American Perspectives

Topics: the Asian family structure, and concepts of identity, ethnicity, culture, and racism in terms of their impact on individual development and the counseling process. Emphasis is on empathic understanding of Asians in America. Group exercises.

1 unit, Spr (Lin, O)

EDUC 193N. Peer Counseling in the Native American Community

Verbal and non-verbal communication, strategic use of questions, methods of dealing with strong feelings, and conflict resolution. How elements of counseling apply to Native Americans including client, counselor, and situational variables in counseling, non-verbal communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, the impact of family on personal development, gender roles, and the experience of Native American students in university settings. Individual skill development, group exercises, and role practice.

1 unit, not given this year

EDUC 193P. Peer Counseling at the Bridge

Mental health issues such as relationships, substance abuse, sexual assault, depression, eating disorders, academic stressors, suicide, and grief and bereavement. Guest speakers.

1 unit, Aut (Martinez, A), Win (Martinez, A), Spr (Martinez, A)

EDUC 193S. Peer Counseling on Comprehensive Sexual Health

Information on sexually transmitted infections and diseases, and birth control methods. Topics related to sexual health such as communication, societal attitudes and pressures, pregnancy, abortion, and the range of sexual expression. Role-play and peer-education outreach projects. Required for those wishing to counsel at the Sexual Health Peer Resource Center (SHPRC).

1 unit, Aut (Yisrael, D), Win (Yisrael, D), Spr (Yisrael, D)

EDUC 196X. The Design of Technologies for Casual Learning

(Same as EDUC 396X) Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term casual is borrowed from casual gaming to denote that the learning technologies are meant for learners to use inextreme informal learning circumstances (whileon the go, any time and any place). Course builds on learning about and synthesizing knowledge, theory, and development activity in four areas including learning theories, mobile technologies, games and participatory design processes.

3 units, Win (Goldman, S)

EDUC 197. Education, Gender, and Development

(Same as SOC 134) Theories and perspectives from the social sciences relevant to the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of girls and women and the role of development organizations and processes. (SSPEP) GER:EC-Gender

4 units, Spr (Wotipka, C)

EDUC 199A. Undergraduate Honors Seminar

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis. Prerequisite: consent of instructor. May be repeated for credit once.

3 units, Aut (Stevens, M)

EDUC 199B. Undergraduate Honors Seminar

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis. Prerequisite: consent of instructor. May be repeated for credit once.

1 unit, Win (Stevens, M)

EDUC 199C. Undergraduate Honors Seminar

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis. Prerequisite: consent of instructor. May be repeated for credit once.

1 unit, Spr (Stevens, M)

EDUC 245. Understanding Racial and Ethnic Identity Development

(Same as AFRICAAM 245) African American, Native American, Mexican American, and Asian American racial and ethnic identity development; the influence of social, political and psychological forces in shaping the experience of people of color in the U.S. The importance of race in relationship to social identity variables including gender, class, and occupational, generational, and regional identifications. Bi- and multiracial identity status, and types of white racial consciousness.

3-5 units, Win (LaFromboise, T)

GRADUATE COURSES IN EDUCATION

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EDUC 147X. Human-Computer Interaction in Education
Required for students in the Learning Design and Technology Master's Program. Concepts underlying the design of human-computer interaction including usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, design languages and genres, human cognitive and physical ergonomics, information and interactivity structures, design tools, and environments. Studio/discussion component applies these principles to the design of interactive technology for teaching and learning.
3 units, not given this year

EDUC 167. Educating for Equity and Democracy
Introduction to the theories and practices of equity and democracy in education. How to think about teaching and schooling in new ways; the individual moral and political reasons for becoming a teacher. (STEP)
2 units, Sum (Staff)

EDUC 176X. The Design of Technologies for Casual Learning: Lab
Lab. Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term casual is borrowed from casual gaming to denote that the learning technologies are meant for learners to use in extreme informal learning circumstances (while on the go, any time and any place). The class builds on learning about and synthesizing knowledge, theory and development activity in four areas including learning theories, mobile technologies, games and participatory design processes.
1 unit, Win (Marmon, S)

EDUC 185. Master's Thesis
(all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 200A. Introduction to Data Analysis and Interpretation
(Formerly EDUC 150.) Primarily for master's students in the School of Education. Focus is on reading literature and interpreting descriptive and inferential statistics, especially those commonly found in education. Topics: basic research design, instrument reliability and validity, description statistics, correlation, t-tests, one-way analysis of variance, and simple and multiple regression.
4 units, Aut (Porteus, A), Win (Porteus, A)

EDUC 200B. Introduction to Qualitative Research Methods
(Formerly EDUC 151.) Primarily for master's students: An introduction to the core concepts and methods of qualitative research. Through a variety of hands-on learning activities, readings, field experiences, class lectures, and discussions, students will explore the processes and products of qualitative inquiry.
4 units, Aut (Pope, D), Win (Wolf, J)

EDUC 200C. Introduction to Statistical Methods in Education
(Formerly EDUC 160.) Describing measured, count, and categorical data. Statistical inference procedures for comparisons of group outcomes and for associations among variables. Course content integrated with statistical computing in R. Students cannot also receive credit for PSYCH 60 or for STATS 60/160. (Master's students register for 200A.)
3-4 units, Aut (Hakuta, K)

EDUC 201. History of Education in the United States
(Same as AMSTUD 201, HISTORY 158B) How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching. (SSPEP)
3-5 units, Win (Gordon, L)

EDUC 202. Introduction to Comparative and International Education
Contemporary theoretical debates about educational change and development, and the international dimension of issues in education. Emphasis is on the development of students' abilities to make cross-national and historical comparisons of educational phenomena. (SSPEP/ICE)
4-5 units, Aut (Adams, J)

EDUC 202I. Education Policy Workshop in International and Comparative Education
For students in International and Comparative Education. Practical introduction to issues in educational policy making, educational planning, implementation, and the role of foreign expertise/consultants in developing country contexts. (SSPEP/ICE)
3-4 units, not given this year

EDUC 203. The Anthropology of Education
Learning across situations, organizations, institutions, and cultures. How and when people learn and where, with whom and for what and how answers to these questions change across the lifespan. Schools in relation to other settings in which learning takes place for children, adolescents, and adults. Apprenticeship, mentorship, and learning through observation and imitation.
3-5 units, not given this year

EDUC 203A. Tutoring: Seeing a Child through Literacy
(Same as EDUC 103A) Experience tutoring grade school readers in a low income community near Stanford under supervision. Training in tutoring; the role of instruction in developing literacy; challenges facing low income students and those whose first language is not English. How to see school and print through the eyes of a child. Ravenswood Reads tutors encouraged to enroll. Service Learning Course (certified by Haas Center).
4 units, Aut (Juel, C)

EDUC 204. Introduction to Philosophy of Education
How to think philosophically about educational problems. Recent influential scholarship in philosophy of education. No previous study in philosophy required. (SSPEP)
3 units, Spr (Callan, E)

EDUC 205X. The Impact of Social and Behavioral Science Research on Educational Issues
Ways in which research intersects with educational policy and practice. Emphasis is on behavioral, social, and cognitive traditions. Topics include early childhood education, early reading, science education, bilingual education, school desegregation, class size reduction, classroom organization, violence and juvenile crime, and affirmative action in higher education. Policy debates and how research informs or fails to inform deliberations and decisions in these areas.
3 units, Spr (Hakuta, K)

EDUC 206A. Applied Research Methods in International and Comparative Education I: Introduction
Required for M.A. students in ICE and IEAPA. Orientation to the M.A. program and research project; exploration of resources for study and research. (SSPEP/ICE)
1 unit, Aut (Wotipka, C)

EDUC 206B. Applied Research Methods in International and Comparative Education II: Master's Monograph Proposal
Required for M.A. students in ICE and IEAPA. Development of research skills through theoretical and methodological issues in comparative and international education. Preparation of a research proposal for the M.A. monograph. (SSPEP/ICE)
1-3 units, Win (Wotipka, C)

EDUC 206C. Applied Research Methods in ICE III: Data Collection and Analysis
Required for M.A. students in ICE and IEAPA. Practice in data collection and analysis. Preparation of the first draft of the M.A. monograph. (SSPEP/ICE)
1 unit, Spr (Wotipka, C)

EDUC 206D. Applied Research Methods in International and Comparative Education IV: Master's Monograph Workshop
Conclusion of the M.A. program in ICE and IEAPA; required of M.A. students. Reviews of students' research in preparation for their master's monograph. (SSPEP/ICE)
3 units, Sum (Wotipka, C)

EDUC 207X. School: What Is It Good For?
(Same as HISTORY 258D) Focus is on authors who establish claims that the purposes, functions, impacts, and social roles of schooling promote human capital, citizenship, social reproduction, values transmission, social mobility, class equality, racial equality, social stratification, disciplinary power, and the pursuit of individual interests. Historical and sociological approaches.
3-4 units, Win (Labaree, D)

EDUC 208B. Curriculum Construction
The theories and methods of curriculum development and improvement. Topics: curriculum ideologies, perspectives on design, strategies for diverse learners, and the politics of curriculum construction and implementation. Students develop curriculum plans for use in real settings. Service Learning Course (certified by Haas Center). (CTE)
3-4 units, Win (Pope, D)

EDUC 208C. Curriculum: In Theory and Policy
Focus is on key works on the organization and structuring of learning in formal and informal educational settings in light of contemporary issues in curriculum theory, relation of theory and practice, and strategies of curriculum policy development and implementation.
4 units, not given this year

EDUC 209X. Policy, Organization, and Leadership Studies Seminar
Focus is on orienting students to a variety of educational topics pertaining to elementary, secondary, and higher education including program management, financial literacy, and effective communication.
1 unit, Spr (Salinas, N)

EDUC 210X. Policy, Organization, and Leadership Studies Internship Workshop
Forum for POLS students to link their academic learning to real world experience through in-class discussions, presentations, and reflective writing. Fall Quarter is focused on understanding the intern¿s role within the larger organization. Winter Quarter is outward looking with a focus on understanding the broader fields the students' organizations reside within. Spring Quarter focus is on students learning from and being prepared to teach others.
1-3 units, Aut (Salinas, N), Win (Salinas, N), Spr (Salinas, N)

EDUC 211X. Beyond Bits and Atoms - Lab
(Same as CS 402L) This course is a hands-on lab in the prototyping and fabrication of tangible technologies, with a special focus in learning and education. We will learn how to use state-of-the-art fabrication machines (3D printers, 3D scanners, laser cutters, routers) to design educational toolkits, educational toys, science kits, and tangible user interfaces. A special focus of the course will be to design low-cost technologies, particularly for urban school in the US and abroad.
1-3 units, Win (Blikstein, P), Spr (Blikstein, P)

EDUC 212X. Urban Education
(Same as EDUC 112X, SOC 129X, SOC 229X) (Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.
3-4 units, Spr (Carter, P)

EDUC 213X. Introduction to Teaching
Key concepts in teaching and learning. Student prior knowledge and preconceptions; facts, concepts, and the organization of knowledge; active learning; behavior and cognition; constructing knowledge; metacognition; motivation and affect; transfer; goals and objectives; zone of proximal development; input; organizing learning; modeling; feedback; practice; individual and group differences among students; and pedagogical content knowledge.
3-4 units, Aut (Goldenberg, C)

EDUC 214X. Social Entrepreneurship
(Same as STRAMGT 369.) The efforts of private citizens to create effective responses to social needs and innovative solutions to social problems. New opportunities for applying business skills in the social sector. Concepts, practices, and challenges of social entrepreneurship in the U.S. and around the world. Frameworks and tools to be more effective in socially entrepreneurial.
4 units, not given this year

EDUC 215X. International Human Rights and Education
Theory and practice. Focus is on how education may be seen as a human rights issue and a tool to educate citizens about their human rights. The history of human rights and the spread of the international human rights regime in terms of organizations and treaties. Issues include street and working children, language rights, and women¿s right to education.
4-5 units, not given this year

EDUC 216X. Education, Race, and Inequality in African American History, 1880-1990
(Same as CSRE 216X, HISTORY 255E) Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis.
3-5 units, Aut (Gordon, L)

EDUC 217. Philosophical and Methodological Issues in Educational Research
The role causation in educational phenomena, and how to determine causal factors. Is educational research based on a positivistic paradigm? Randomized controlled experimental designs. Criteria for judging the rigor of qualitative modes of inquiry. Do Popperian or Deweyan approaches hold the key to resolving contentious issues? Does a postpositivist perspective hold promise?
3 units, not given this year

EDUC 218. Topics in Cognition and Learning: Educational Neuroscience
Topical seminar with changing topics on the psychological and social processes of learning. This year's course is on the applications of neuroscience to educational and behavioral topics. Applications to science, education, design, business, and philosophy. May be repeated for credit.
3 units, Aut (Schwartz, D)

EDUC 219E. The Creative Arts in Elementary Classrooms
For STEP Elementary only or for candidates in the Multiple Subjects program. Hands-on exploration of visual arts media and works of art.
1 unit, Aut (Malin, H)

EDUC 220A. Introduction to the Economics of Education
The relationship between education and economic analysis. Topics: labor markets for teachers, the economics of child care, the effects of education on earnings and employment, the effects of education on economic growth and distribution of income, and the financing of education. Students who lack training in microeconomics, register for 220Y for 1 additional unit of credit. (SSPEP/APA)
4 units, not given this year

EDUC 220B. Introduction to the Politics of Education
The relationships between political analysis and policy formulation in education; focus is on alternative models of the political process, the nature of interest groups, political strategies, community power, the external environment of organizations, and the implementations of policy. Applications to policy analysis, implementation, and politics of reform. (APA)
4 units, not given this year

EDUC 220C. Education and Society
(Same as EDUC 120C, SOC 130, SOC 230) The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.
4-5 units, Aut (Ramirez, F)

EDUC 220D. History of School Reform: Origins, Policies, Outcomes, and Explanations
(Same as HISTORY 258E) Required for students in the POLS M.A. program; others welcome. Focus is on 20th-century U.S. Intended and unintended patterns in school change; the paradox of reform that schools are often reforming but never seem to change much; rhetorics of reform and factors that inhibit change. Case studies emphasize the American high school. (SSPEP/APA)
3-5 units, Aut (Labaree, D)

EDUC 220Y. Introduction to the Economics of Education: Economics Section
For those taking 220A who have not had microeconomics before or who need a refresher. Corequisite: 220A. (SSPEP/APA)
1-2 units, not given this year

EDUC 221A. Policy Analysis in Education
Major concepts associated with the development, enactment, and execution of educational policy. Issues of policy implementation, agenda setting and problem formulation, politics, and intergovernmental relations. Case studies. Goal is to identify factors that affect how analysts and policy makers learn about and influence education. Limited enrollment. Prerequisite: consent of instructor. (SSPEP/APA)
4-5 units, not given this year

EDUC 222. Resource Allocation in Education
Problems of optimization and design, and evaluation of decision experience. Marginal analysis, educational production functions, cost effectiveness and cost-benefit analysis, constrained maximization, program evaluation. Introduction to linear models for large-scale data analysis. Implications to model assumptions. (SSPEP)
4-5 units, Spr (Carnoy, M)

EDUC 223. Good Districts and Good Schools: Research, Policy, and Practice
Recent studies of districts and schools that exceed expectations in producing desired results for students. Research methodologies, findings of studies, theories of change in reforming schools and districts and efforts to implement results. Components of good schools and districts. Required project studies a school or district to determine goodness. (SSPEP/APA, CTE)
3-4 units, not given this year

EDUC 224. Social Entrepreneurship and Social Innovation
Individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ entrepreneurial skills, such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else.
2-4 units, Spr (Staff)

EDUC 225X. Business Skills and Concepts for the Non-Business Student
For non-business students. Knowledge and tools for operating effectively in an organizational management capacity. Focus is on concepts developed for use in the business world in the areas of strategy, organizational behavior, financial accounting, and marketing. Case studies, podcasts, video, guest speakers, and team-based projects.
3-4 units, not given this year

EDUC 226X. Empirical Analysis of Education Governance
Emphasis is on strategies for empirical evaluation. Topics include: school board, superintendent, and principal decision making; the state role in education policy and budgeting; the impact of teacher unionization; and the growing influence of private foundations and parent associations. Students participate in an original data collection effort for an ongoing research project.
3 units, not given this year

EDUC 228E. Becoming Literate in School I
First in a three course sequence. Introduction to reading and language arts theory and methodology for candidates STEP Elementary Teacher program. Instructional methods, formats, and materials.
2 units, Sum (Juel, C)

EDUC 228F. Becoming Literate in School II
Second in a three-course required sequence of reading and language arts theory and methodology for candidates in the STEP Elementary program. Theories for guiding instruction and curricular choices.
2 units, Aut (Juel, C)

EDUC 228G. Becoming Literate in School III
Third in a three-course required sequence of reading and language arts theory and methodology for candidates in STEP Elementary Teacher program. Theories for guiding instruction and curricular choices.
2 units, Win (Juel, C)

EDUC 228H. Literacy, History, and Social Science
How elementary school teachers can teach history and social science within a literacy framework. Topics include: historical thinking, reading, and writing; current research; applying nonfiction reading and writing strategies to historical texts; using primary sources with elementary students; adapting instruction to meet student needs; state standards; evaluating curriculum; assessing student knowledge; developing history and social science units; and embedding history and social science into the general literacy curriculum.
1 unit, Spr (Martin, D)

EDUC 229A. Learning Design and Technology Seminar
Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT)
1 unit, Aut (Forssell, K)

EDUC 229B. Learning Design and Technology Seminar
Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT)
1 unit, Win (Forssell, K)

EDUC 229C. Learning Design and Technology Seminar
Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT)
1 unit, Spr (Forssell, K)

EDUC 229D. Learning Design and Technology Seminar
Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT)
2-5 units, Sum (Forssell, K)

EDUC 230X. Social Enterprise
(Same as STRAMGT 341.) Approaches for creating social value through a social enterprises including nonprofits, for-profits, and hybrid forms of organization. Perspectives include entrepreneur, CEO, funder, and board member. Topics include undertaking the social entrepreneurship process; mobilizing economic and human resources; achieving social objectives with commercial vehicles; crafting alliances; managing growth; measuring and managing performance; governing for excellence. Case studies. Student teams carry out field-based research in a significant strategic or operational issue of a social enterprise
4 units, not given this year

EDUC 231X. Education Schools: Historical and Sociological Perspectives
(Same as HISTORY 258F) The lowly status of the education school in the United States is the issue that defines the starting point of this course. Topics include an exploration the historical development of this institution, its major social function, and the interaction between the two. The course touches on a variety of scholarly domains, including the history of education, sociology of education, higher education, and educational policy.
3-4 units, alternate years, not given this year

EDUC 233A. Counseling Theories and Interventions from a Multicultural Perspective
(Same as AFRICAAM 233A) In an era of globalization characterized by widespread migration and cultural contacts, professionals face a unique challenge: How does one practice successfully when working with clients/students from so many different backgrounds? This course focuses upon the need to examine, conceptualize, and work with individuals according to the multiple ways in which they identify themselves. It will systematically examine multicultural counseling concepts, issues, and research. Literature on counselor and client characteristics such as social status or race/ethnicity and their effects on the counseling process and outcome will be reviewed. Issues in consultation with culturally and linguistically diverse parents and students and work with migrant children and their families are but a few of the topics covered in this course.
3-5 units, Spr (LaFromboise, T)

EDUC 233B. Adolescent Development and Mentoring in the Urban Context
Continution of 233A. Topics include: developmental psychology and service learning; collaborating with the community;psychological research on altruism and prosocial behavior; volunteers' motivations; attributions about poverty, and the problem of prejudice.
3 units, not given this year

EDUC 234. Career and Personal Counseling
(Same as EDUC 134, PSYCH 192) Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences.
3 units, Spr (Krumboltz, J)

EDUC 235X. The Creative Arts in Schools and Classrooms
Students work alongside teachers and performing artists to plan and implement classroom activities with elementary school children to prepare them for a Lively Arts performance. Background theory in education and arts education. Students develop a follow-up classroom activity for children in their own art form.
2 units, not given this year

EDUC 236X. Beyond Bits and Atoms: Designing Technological Tools
(Same as CS 402) Practicum in designing and building technology-enabled curricula and learning environments. Students use software toolkits and state-of-the-art fabrication machines to design educational software, educational toolkits, and tangible user interfaces. How to design low-cost technologies, particularly for urban school in the US and abroad. The constructionist learning design perspective, critical pedagogy, and the application of complexity sciences in education.
3-5 units, Spr (Blikstein, P)

EDUC 240. Adolescent Development and Learning
How do adolescents develop their identities, manage their inner and outer worlds, and learn? Presuppositions: that fruitful instruction takes into account the developmental characteristics of learners and the task demands of specific curricula; and that teachers can promote learning and motivation by mediating among the characteristics of students, the curriculum, and the wider social context of the classroom. Prerequisite: STEP student or consent of instructor. (STEP)
5 units, Aut (Padilla, A)

EDUC 241S. Organizational Learning
(Same as OB 586.) How firms learn from their experiences and the opportunities created by flawed learning. Common mistakes in learning and barriers to the adoption of effective practices. How to avoid common mistakes and build organizations that learn more effectively to identify possible opportunities in markets. Concepts and findings from organization theory, psychology, decision theory, and statistics.
2 units, not given this year

EDUC 241X. Organizational Learning
Why firms do not learn from their experiences and the opportunities created by flawed learning. Common mistakes in learning and barriers to the adoption of effective practices. How to avoid common mistakes and build organizations that learn more effectively to identify possible opportunities in markets. Concepts and findings from organization theory, psychology, decision theory, and statistics. Readings include teaching notes, papers in psychology and organization theory, HBR articles, and Moneyball by Michael Lewis who discusses market-level mistakes in professional baseball.
4 units, not given this year

EDUC 242. Language Use in the Chicano Community
(Same as SPANLIT 206) The significance and consequences of language diversity in the culture and society of the U.S. Experiences of non-English background individuals through focus on Spanish-English bilingual communities.
3-5 units, not given this year

EDUC 243. Writing Across Languages and Cultures: Research in Writing and Writing Instruction
Theoretical perspectives that have dominated the literature on writing research. Reports, articles, and chapters on writing research, theory, and instruction; current and historical perspectives in writing research and research findings relating to teaching and learning in this area.
3-5 units, not given this year

EDUC 244. Classroom Management
Student and teacher roles in developing a classroom community. Strategies for classroom management within a theoretical framework. STEP secondary only.
2 units, Aut (Haysman, C)

EDUC 244E. Elementary Classroom Culture and Management
How to best manage a classroom. Student and teacher roles in developing a classroom community. Strategies for classroom management within a theoretical framework. STEP elementary only.
1 unit, Sum (Staff)

EDUC 244F. Elementary Classroom Culture and Management
Skills for developing a positive classroom learning environment. Theoretical issues and opportunities to acquire strategies and make links with practice teaching class. STEP elementary only.
1 unit, Aut (Rose, D)

EDUC 246A. Secondary Teaching Seminar
Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.
3 units, Sum (Lotan, R)

EDUC 246B. Secondary Teaching Seminar
Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: guided observations, building classroom community, classroom interaction processes, topics in special education portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.
5 units, Aut (Lotan, R)

EDUC 246C. Secondary Teaching Seminar
Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student. (STEP)
5 units, Win (Lotan, R)

EDUC 246D. Secondary Teaching Seminar
Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.
2-7 units, Spr (Lotan, R)

EDUC 246E. Elementary Teaching Seminar
Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

3 units, Sum (Lit, I)

EDUC 246F. Elementary Teaching Seminar
Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

5-7 units, Aut (Lit, I)

EDUC 246G. Elementary Teaching Seminar
Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

3 units, Win (Lit, I)

EDUC 246H. Elementary Teaching Seminar
Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

5 units, Spr (Lit, I)

EDUC 247. Moral Education
Contemporary scholarship and educational practice related to the development of moral beliefs and conduct in young people. The psychology of moral development; major philosophical, sociological, and anthropological approaches. Topics include: natural capacities for moral awareness in the infant; peer and adult influences on moral growth during childhood and adolescence; extraordinary commitment during adulthood; cultural variation in moral judgment; feminist perspectives on morality; the education movement in today's schools; and contending theories concerning the goals of moral education. (PSE)

3 units, Spr (Damon, W)

EDUC 248X. Issues of Curriculum and Pedagogy in Multicultural Classrooms
Debates concerning race, class, gender and sexuality, and ethnicity as they impact curriculum and practice in heterogeneous classrooms. How teachers and students can become agents of educational change. Sources include videos, scholarship, popular press, and voices of practitioners, students, and families.

3-4 units, not given this year

EDUC 249. Theory and Issues in the Study of Bilingualism
(Same as EDUC 149) Sociolinguistic perspective. Emphasis is on typologies of bilingualism, the acquisition of bilingual ability, description and measurement, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings. (SSPEP)

3-5 units, not given this year

EDUC 250A. Inquiry and Measurement in Education
Part of doctoral research core. The logic of scientific inquiry in education, including identification of research questions, selection of qualitative or quantitative research methods, design of research studies, measurement, and collection, analysis and interpertation of evidence.

3 units, Aut (Stevens, M; Loeb, S)

EDUC 250B. Statistical Analysis in Education: Regression
Primarily for doctoral students; part of doctoral research core; prerequisite for advanced statistical methods courses in School of Education. Basic regression, a widely used data-analytic procedure, including multiple and curvilinear regression, regression diagnostics, analysis of residuals and model selection, logistic regression. Proficiency with statistical computer packages.

4 units, Win (Bettinger, E)

EDUC 250C. Qualitative Analysis in Education
Primarily for doctoral students; part of doctoral research core. Methods for collecting and interpreting qualitative data including case study, ethnograpy, discourse analysis, observation, and interview.

4 units, Spr (Goldman, S; Barron, B)

EDUC 251B. Statistical Analysis in Educational Research: Analysis of Variance
Primarily for doctoral students. ANOVA models as widely used data analytic procedures, especially in experimental, quasi-experimental, and criterion-group designs. Topics: single-factor ANOVA; factorial between and within subjects and mixed design ANOVA (fixed, random, and mixed models); analysis of covariance; and multiple comparison procedures. Prerequisite: 250A or equivalent. (all areas)

4 units, not given this year

EDUC 251C. Statistical Analysis in Educational Research: Applied Multivariate Analysis
Primarily for doctoral students in education, social, and behavioral sciences. Multivariate analysis of variance, discriminant analysis, factor analysis, correlation analysis. Advanced regression methods. Data compression: principal components analysis, clustering. Computer packages for data analysis. Prerequisite: 250B, 257, STATS 200, or equivalent. (all areas)

1-4 units, not given this year

EDUC 252. Introduction to Test Theory
Concepts of reliability and validity; derivation and use of test scales and norms; mathematical models and procedures for test validation, scoring, and interpretation. Prerequisite: STATS 190 or equivalent. (PSE)

3-4 units, not given this year

EDUC 253X. Teaching the Unteachable: Teaching and Representing the Holocaust
(Same as HISTORY 237B) Theodore Adorno asked whether it was possible to write poetry after Auschwitz; whatever the answer, each year witnesses exponential growth in state-sponsored mandates to teach the Holocaust. How and to what end does catastrophe become curriculum? How to assess what students learn from these efforts. The Nazis' efforts to teach for hate, and contemporary parallels. Historical and educational sources, especially films and memoirs.

3-5 units, not given this year

EDUC 254S. Leadership in Diverse Organizations
(Same as OB 593) This course is designed to help students improve their capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. The course is based on the premise that diversity can present unique challenges and opportunities and thereby pushes students to develop crucial leadership skills, many of which are relevant across a variety of situations. What social and psychological obstacles limit people's ability to work effectively across identity-based differences? What can you do to build the relational and organizational capacity to enable these differences to be a resource for learning and effectiveness within teams and organizations? Students should be prepared to experiment with various conceptual and analytic skills inside and outside of the classroom.

2 units, Aut (Meyerson, D)

EDUC 254X. Leadership in Diverse Organizations
How improve capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. Premise is that diversity presents challenges and opportunities that pushestudents to develop leadership skills relevant across a variety of situations. What social and psychological obstacles limit people's ability to work effectively across identity-based differences? What can people do to build the relational and organizational capacity to enable these differences to be a resource for learning and effectiveness within teams and organizations?

Focus is on dynamics of race and gender; attention to other dimensions of identity and difference in organizations, including sexual orientation, nationality, class, and religion.

4 units, not given this year

EDUC 255A. Experimental Research Designs in Educational Research

The course will cover the following topics: a) the logic of causal inference and the Fisher/Neyman/Rubin counterfactual causal model (Fisher, 1935; Heckman, 1979; Holland, 1986; Neyman, 1990; Rubin, 1978); b) randomized experiments; c) complex randomized experiments in education (cluster randomized trials, multi-site trials, staggered implementation via randomization, etc.); d) policy experiments with randomization; e) meta-analysis; and f) power in randomized experiments; g) the ethics and politics of randomized experiments.

5 units, Aut (Bettinger, E)

EDUC 255B. Causal Inference in Quantitative Educational and Social Science Research

(Same as SOC 257) Quantitative methods to make causal inferences in the absence of randomized experiment including the use of natural and quasi-experiments, instrumental variables, regression discontinuity, matching estimators, longitudinal methods, fixed effects estimators, and selection modeling. Assumptions implicit in these approaches, and appropriateness in research situations. Students develop research proposals relying on these methods. Prerequisites: exposure to quantitative research methods; multivariate regression.

3-5 units, Win (Reardon, S)

EDUC 255C. Applied Quasi-Experimental Research in Education

(Same as SOC 258) Hands-on practice in analysis of data from experimental and quasi-experimental research designs, including: instrumental variables estimators; regression discontinuity estimators; difference-in-difference estimators; matching estimators; fixed effects estimators; and panel data methods including individual fixed effects models, lagged covariate adjustment models, growth models. Prerequisite: EDUC 255B, EDUC 257C, or SOC 257.

3-5 units, Spr (Reardon, S)

EDUC 256. Psychological and Educational Resilience Among Children and Youth

(Same as HUMBIO 149) Theoretical, methodological, and empirical issues pertaining to the psychological and educational resilience of children and adolescents. Overview of the resilience framework, including current terminology and conceptual and measurement issues. Adaptive systems that enable some children to achieve successful adaptation despite high levels of adversity exposure. How resilience can be studied across multiple levels of analysis, ranging from cell to society. Individual, family, school, and community risk and protective factors that influence children's development and adaptation. Intervention programs designed to foster resilient adaptation in disadvantaged children's populations.

4 units, Spr (Padilla, A)

EDUC 257A. Statistical Methods for Behavioral and Social Sciences

For students with experience in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through log-linear models, logistic regression. Integrated with the use of statistical computing packages. Prerequisite: analysis of variance and regression at the level of STATS 161.

3 units, not given this year

EDUC 257B. Statistical Methods for Behavioral and Social Sciences

For students with experience in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through log-linear models, logistic regression. Integrated with the use of statistical computing packages. Prerequisite: analysis of variance and regression at the level of STATS 161.

3 units, not given this year

EDUC 258. Literacy Development and Instruction

Literacy acquisition as a developmental and educational process. Problems that may be encountered as children learn to read. How to disentangle home, community, and school instruction from development.

3 units, Spr (Juel, C)

EDUC 259X. Application of Hierarchical Linear Models in Behavioral and Social Research

The fundamental phenomenon of interest in educational research is the growth in knowledge and skills of individual students. Two facts, that children's growth is typically the object of inquiry and that such growth occurs in organizational settings, correspond to two of the most troublesome and persistent methodological problems in the social sciences: the measurement of change and the assessment of multi-level effects (also referred to as the unit of analysis problem). Although these two methodological problems have distinct, long-standing, and non-overlapping literatures, these problems, in fact, share a common cause: the inadequacy of traditional statistical techniques for the modeling of hierarchy.

4 units, not given this year

EDUC 260X. Understanding Statistical Models and their Social Science Applications

(Same as HRP 239, STATS 209) Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods

3 units, Win (Rogosa, D)

EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century

(Same as ETHICSOC 137R, POLISCI 137R, POLISCI 337R) Focus is on theories of justice. How the core ideals of freedom, equality, and security animate theories which John Rawls considers the first virtue of social institutions. Topics include the U.S. Constitution as a legal framework for the operation of these ideals, civil rights legislation and litigation as the arena of tensions between those ideals, and how ideas of justice function both at home and abroad to impact civil liberties in today's war on terror.

5 units, Win (Reich, R; Steyer, J; Karlan, P)

EDUC 262A. Curriculum and Instruction in English

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. (STEP)

2 units, Sum (Staff)

EDUC 262B. Curriculum and Instruction in English

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. STEP secondary only.

3 units, Aut (Willinsky, J)

EDUC 262C. Curriculum and Instruction in English

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. (STEP)

3 units, Win (Grossman, P)

EDUC 263A. Curriculum and Instruction in Mathematics

The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win

2 units, Sum (Staff)

EDUC 263B. Curriculum and Instruction in Mathematics

The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win

3 units, Aut (Dieckmann, J; Dance, K)

EDUC 263C. Curriculum and Instruction in Mathematics
The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win

3 units, Win (Boaler, J)

EDUC 263E. Quantitative Reasoning in Mathematics I
First of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

2 units, Sum (Murata, A)

EDUC 263F. Quantitative Reasoning in Mathematics II
Second of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

2-3 units, Aut (Bofferding, L)

EDUC 263G. Quantitative Reasoning in Mathematics III
Third of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

2 units, Win (Murata, A)

EDUC 264A. Curriculum and Instruction in World Languages
Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student. (STEP)

2 units, Sum (Staff)

EDUC 264B. Curriculum and Instruction in World Languages
Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. STEP secondary only.

3 units, Aut (Silva, M; Xu, X)

EDUC 264C. Curriculum and Instruction in World Languages
Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student. (STEP)

3 units, Win (Silva, M; Xu, X)

EDUC 264E. Methods and Materials in Bilingual Classrooms
Restricted to STEP elementary teacher candidates in the BCLAD program. Theories, research, and methods related to instruction of Spanish-English bilingual children, grades K-8. Approaches to dual language instruction, and pedagogical and curricular strategies for the instruction of reading, language arts, science, history, social science, and math in Spanish. Assessment issues and practices with bilingual students. In Spanish.

2 units, Aut (Poza, L)

EDUC 265. History of Higher Education in the U.S.
(Same as AMSTUD 165, EDUC 165, HISTORY 158C) Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities. (SSPEP-APA)

3-5 units, Aut (Gordon, L)

EDUC 266X. Workshop in Practical Quantitative Research on Educational Policy and Inequality
Conceptual and technical skills for analyzing data concerning educational policy and inequality. How to design analytic strategies using available data sources. Interpreting and presenting results. Prerequisite: 250A.

3 units, not given this year

EDUC 267A. Curriculum and Instruction in Science
Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP)

2 units, Sum (Brown, B)

EDUC 267B. Curriculum and Instruction in Science
Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP)

3 units, Aut (Brown, B)

EDUC 267C. Curriculum and Instruction in Science
Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP)

3 units, Win (Osborne, J)

EDUC 267E. Development of Scientific Reasoning and Knowledge
For STEP elementary teacher candidates. Theories and methods of teaching and learning science. How to develop curricula and criteria for critiquing curricula. Students design a science curriculum plan for a real setting. State and national science frameworks and content standards. Alternative teaching approaches; how to select approaches that are compatible with learner experience and lesson objectives. Focus is on the linguistic and cultural diversity of California public school students.

2 units, Aut (Lythcott, J)

EDUC 267F. Development of Scientific Reasoning and Knowledge II
Continuation of 267E. Scientific knowledge and pedagogical skills for supporting science instruction. Topics include: how children build scientific understandings and what that understanding might look and sound like in young children; what school science is and how concepts are connected to the doing of it; physical, life, and earth science constructs.

2 units, Spr (Osborne, J)

EDUC 268A. Curriculum and Instruction in History and Social Science
The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

2 units, Sum (Wineburg, S)

EDUC 268B. Curriculum and Instruction in History and Social Science
The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

3 units, Aut (Shed, E; Breakstone, J)

EDUC 268C. Curriculum and Instruction in History and Social Science
The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

3 units, Win (Shed, E; Smith, M)

EDUC 268E. Elementary History and Social Science
Teaching and learning history and social science in the elementary grades. What is included in the discipline and why it is important to teach. The development of historical thinking among children. How students learn and understand content in these disciplines.

3-4 units, not given this year

EDUC 269. Analysis of Teaching
Student learning and the epistemology of school subjects as related to the planning and implementation of teaching, analysis of curriculum, and evaluation of performance and understanding. Readings and activities are coordinated with student teaching activities of participants. Prerequisite: STEP student or consent of instructor.
3 units, not given this year

EDUC 269X. The Ethics in Teaching
Goal is to prepare for the ethical problems teachers confront in their professional lives. Skills of ethical reasoning, familiarity with ethical concepts, and how to apply these skills and concepts in the analysis of case studies. Topics: ethical responsibility in teaching, freedom of speech and academic freedom, equality and difference, indoctrination, and the teaching of values.
1 unit, Win (Callan, E), Spr (Callan, E)

EDUC 270A. Learning to Lead in Public Service Organizations
For Haas Center student service organization leaders. (Davis)
3-5 units, not given this year

EDUC 271X. Education Policy in the United States
Topics include: school finance systems; an overview of policies defining and shaping the sectors and institutional forms of schooling; an overview of school governance; educational human-resource policy; school accountability policies at the federal and state levels; and school assignment policies and law, including intra- and inter-district choice policies, desegregation law and policy.
5 units, Aut (Loeb, S)

EDUC 272X. Understanding and Creating Value-Added Measures of Teacher Effectiveness
A variety of approaches to measuring teacher effectiveness using student performance on state standardized tests. Recent research literature on value-added estimation, addressing issues such as bias and measurement error. Course uses administrative data from two large districts to create and compare multiple value-added measures. Prerequisites: OLS regression and basic programming in Stata.
3 units, not given this year

EDUC 273. Gender and Higher Education: National and International Perspectives
(Same as SOC 273) The effects of interactions between gender and the structures of higher education; policies seeking changes in those structures. Topics: undergraduate and graduate education, faculty field of specialization, rewards and career patterns, sexual harassment, and the development of feminist scholarship and pedagogy.
4 units, not given this year

EDUC 274X. School Choice: The Role of Charter Schools
(Formerly EDUC 153X.) Is school choice, including vouchers, charter schools, contract schools, magnet schools, district options, and virtual schools, a threat or an opportunity for public education? Focus is on the charter school movement nationally and in California as reform strategy. Roles and responsibilities of charter schools emphasizing issues of governance, finance, curriculum, standards, and accountability.
3 units, Spr (Kushner, M)

EDUC 276. Educational Assessment
Reliability, validity, bias, fairness, and properties of test scores. Uses of tests to monitor, manage, and reform instruction. Testing and competition, meritocracy, achievement gaps, and explanations for group differences.
3 units, not given this year

EDUC 277. Education of Immigrant Students: Psychological Perspectives
(Same as EDUC 177) Historical and contemporary approaches to educating immigrant students. Case study approach focuses on urban centers to demonstrate how stressed urban educational agencies serve immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, current school reform movements, and government policies regarding equal educational opportunity. (SSPEP)
4 units, Win (Padilla, A)

EDUC 278. Introduction to Issues in Evaluation
Open to master's and doctoral students with priority to students from education. Focus is on the basic literature and major theoretical and practical issues in program evaluation. Introduction to basic concepts and intellectual debates in the field: knowledge construction, purpose of evaluation, values in evaluation, knowledge utilization, professional standards of evaluation practice. Enrollment limited to 15. (SSPEP)
3 units, Spr (Porteus, A)

EDUC 279. Urban Youth and Their Institutions: Research and Practice
(Same as EDUC 179) The determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches, and the gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories. Case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary realities of urban youth for policy makers, educators, and researchers. Limited enrollment. Prerequisite: consent of instructor. (SSPEP/APA)
4-5 units, not given this year

EDUC 279B. Youth Empowerment and Civic Engagement
(Same as EDUC 179B) Focus is on youth development policies and practices: what makes them effective, and how they operate in broader institutional contexts. Research-based information; conceptual underpinnings; best learning from experience; and the perspective of expert youth workers, policymakers, and youth about what works.
2-4 units, not given this year

EDUC 281X. Technology for Learners
Does the use of technology improve learning? Many hope that technology will make learning easier, faster, or accessible to more learners. This course explores a variety of different approaches to designing tools for learning, the learning theories behind them, and the research that tests their effectiveness.
1-2 units, Aut (Forssell, K)

EDUC 283. Child Development In and Beyond Schools
(Formerly EDUC 144). How schools form a context for children's social and cognitive development. Focus is on early and middle childhood. Transactional processes between children and learning opportunities in classroom contexts. Topics include: alternative theoretical perspectives on the nature of child development; early experience and fit with traditional school contexts; assessment practices and implications for developing identities as learners; psychological conceptions of motivational processes and alternative perspectives; the role of peer relationships in schools; and new designs for learning environments. Readings address social science and methodological issues. STEP Elementary only.
2 units, Aut (Merino, N; Hill-Bonnet, L)

EDUC 284. Teaching and Learning in Heterogeneous Classrooms
Teaching in academically and linguistically heterogeneous classrooms requires a repertoire of pedagogical strategies. Focus is on how to provide access to intellectually challenging curriculum and equal-status interaction for students in diverse classrooms. Emphasis is on group work and its cognitive, social, and linguistic benefits for students. How to prepare for group work, equalize participation, and design learning tasks that support conceptual understanding, mastery of content and language growth. How to assess group products and individual contributions. (STEP)
3 units, Aut (Lotan, R)

EDUC 285. Supporting Students with Special Needs
For STEP teacher candidates. Needs of exceptional learners, identification of learning differences and disabilities, and adaptations in the regular inclusion classroom. Legal requirements of special education, testing procedures, development of individualized education plans, and support systems and services. Students follow a special needs learner to understand diagnosis, student needs, and types of services.
2-3 units, Spr (Fur, E)

EDUC 286B. Second Language Acquisition Research
Major research findings and theories in second language acquisition. Second language research and theories in formal and informal settings where a second language is learned. (SSPEP)
4 units, Win (Hakuta, K)

EDUC 287X. Graduate Research Workshop on Psychological Interventions
(Same as PSYCH 274) Psychological research has the potential to create novel interventions that promote the public good. Psychologically wise intervention research. Course supports student efforts to conduct such interventions, especially in the context of education, broadly conceived, as well as other areas. Classic interventions and important topics in intervention research, including effective delivery mechanisms, sensitive behavioral outcomes, the role of theory and psychological process, and considerations of the role of time and of mechanisms that can sustain treatment effects over time. Students present and receive feedback on their own ongoing and/or future intervention research. Prerequisite: graduate standing in Psychology or Education, or consent of instructor.
3 units, Win (Walton, G; Cohen, G)

EDUC 288. Organization Studies: Theories and Analyses
(Same as SOC 366) Principles of organizational behavior and analysis; theories of group and individual behavior; organizational culture; and applications to school organization and design. Case studies.
5 units, Aut (Meyerson, D)

EDUC 290. Leadership: Research, Policy, and Practice
Conceptions of leadership that include the classroom, school, district office, and state capitol. The role of complexity; organizational leaders outside of schools past and present, and how that complexity permitted leadership to arise. Case studies. (SSPEP/APA)
4 units, not given this year

EDUC 291. Learning Sciences and Technology Design Research Seminar and Colloquium
Students and faculty present and critique new and original research relevant to the Learning Sciences and Technology Design doctoral program. Goal is to develop a community of scholars who become familiar with each other's work. Practice of the arts of presentation and scholarly dialogue while introducing seminal issues and fundamental works in the field.
1-3 units, Aut (Schwartz, D), Win (Barron, B), Spr (Goldman, S)

EDUC 291X. Introduction to Survey Research
(Same as EDUC 191X) Planning tasks, including problem formulation, study design, questionnaire and interview design, pretesting, sampling, interviewer training, and field management. Epistemological and ethical perspectives. Issues of design, refinement, and ethics in research that crosses boundaries of nationality, class, gender, language, and ethnicity.
3-4 units, Win (Adams, J)

EDUC 293X. American Philosophy of Education
A century of classical writers in American philosophy, focusing on work on education, democracy, learning, and culture. Texts by Emerson, Peirce, James, Dewey, and Mead.
3-4 units, not given this year

EDUC 295. Learning and Cognition in Activity
(Same as PSYCH 261A) Methods and results of research on learning, understanding, reasoning, problem solving, and remembering, as aspects of participation in social organized activity. Principles of coordination that support cognitive achievements and learning in activity settings in work and school environments.
3 units, Spr (Pea, R)

EDUC 296X. School Leadership
Can one person really make a difference for all the students in a school? Accurate or not, that's the expectation faced by school principals. This course gives students practice in translating school improvement ideas into practice and also help them develop a personal vision for school improvement. For students in POLS or MA/MBA program in School of Education.
3 units, Aut (Staff)

EDUC 297X. Teaching and Learning in Higher Education
(Same as CTL 297X) Open to master's and doctoral students in all disciplines. How teachers can promote lasting learning and ask which pedagogies are most effective in today's college classrooms. Readings analyze teaching and learning in diverse disciplines and institutional types. Students observe the instruction of a Stanford master teacher. Students write a paper about the instruction of the teacher they observe or prepare a syllabus and commentary for a course of their design.
3-4 units, Win (Ehrlich, T)

EDUC 298. Learning in a Networked World
(Same as CS 377L) Foundations, theories and empirical studies for interdisciplinary advances in how we conceive of the potentials and challenges associated with lifelong, lifewide and life-deep learning in a networked world given the growth of always-on cyberinfrastructure for supporting information and social networks across space and time with personal computers, netbooks, and mobiles.
3 units, not given this year

EDUC 302X. Incentives In Education
Seminar. Theoretical and empirical literatures from psychology and economics that focus on group and individual incentives and their potential effects. Emphasis is on seminal experiments in psychology and the recent wave of economic field experiments that test the how individual incentives affect educational outcomes and intrinsic motivation.
1-4 units, not given this year

EDUC 303X. Designing Learning Spaces
Project-based. How space shapes personal interactions and affords learning opportunities In formal and informal settings. How to integrate learning principles into the design of spaces and develop a rubric to assess the impact on learning.
3-4 units, not given this year

EDUC 304. The Philosophical and Educational Thought of John Dewey
(Same as PHIL 242) Dewey's pragmatic philosophy and educational thought; his debt to Darwin, Hegel, Peirce, and James; his educational writings including Democracy and Education; and his call for a revolution in philosophy in Reconstruction in Philosophy. (SSPEP)
4 units, not given this year

EDUC 305X. Deprivation and Alienation in Fiction and Education
3-4 units, Spr (McDermott, R)

EDUC 306A. Economics of Education in the Global Economy
Case material considers development problems in the U.S. and abroad. Discussion sections on economic aspects of educational development. (SSPEP/ICE)
5 units, Aut (Carnoy, M)

EDUC 306B. Politics, Policy Making, and Schooling Around the World
Education policy, politics, and development. Topics include: politics, interests, institutions, policy, and civil society; how schools and school systems operate as political systems; how policy making occurs in educational systems; and theories of development.
3-4 units, Spr (Adams, J)

EDUC 306C. Political Economy of the Mind
Theories of political economy related to theories of the learning mind, emphasizing theories of genius. Readings from Pascal, Defoe, Smith, Balzac, Emerson, Marx, Veblen, Joyce, and Morrison. (SSPEP)
3-4 units, not given this year

EDUC 306D. World, Societal, and Educational Change: Comparative Perspectives
(Same as EDUC 136, SOC 231) Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.
4-5 units, Win (Martin, P)

EDUC 306Y. Economic Support Seminar for Education and Economic Development
Core economic concepts that address issues in education in developing and developed countries. Supply and demand, elasticity, discount rates, rate of return analysis, utility functions, and production functions. Corequisite: 306A. (Carnoy)
1 unit, Aut (Carnoy, M)

EDUC 307X. Organizing for Diversity: Opportunities and Obstacles in Groups and Organizations
Obstacles in organizations and groups that prevent people from participating, working effectively, and developing relationships in the context of diversity. How to create conditions in which diversity enhances learning and effectiveness? Experiential exercises;

students experiment with conceptual and analytic skills inside and outside of the classroom.

3-4 units, not given this year

EDUC 308X. Mobile Learning Technology for the Marginalized

Learning design principles as a basis for developing and evaluating mobile learning systems to address educational inequalities in underserved communities. Students analyze mobile learning scenarios, prototypes, and authoring tools while collaborating with research teams to develop a small-scale mobile empowerment scenario addressing education needs such as language, math, health, and civic and life skills in developing countries.

1-3 units, Spr (Kim, H)

EDUC 309X. Educational Issues in Contemporary China

(Same as EDUC 109X) Reforms such as the decentralization of school finance, emergence of private schools, expansion of higher education, and reframing of educational policy to focus on issues of quality. Have these reforms exacerbated educational inequality.

3-4 units, Spr (Adams, J)

EDUC 310. Sociology of Education: The Social Organization of Schools

(Same as EDUC 110, SOC 132, SOC 332) Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.

4 units, Win (Carter, P)

EDUC 311X. Designing Learning for Development: Learning Theories, Techonology Design and Social Change

Perspectives on learning and human development as they relate to prior technological interventions in the development sphere. Case studies in the international development context; historical perspective on learning and development. Methods of inquiry useful in a design process engaging technology within a development framework.

3 units, not given this year

EDUC 312A. Traditions of Microsociology

(Same as SOC 224A) The educational applications of sociological and social psychological theory and research to interaction processes in schools. Readings include: foundational works by Mead, Schutz, and Simmel; contemporary work by Goffman, Homans, Merton, Blau, and Harold. Readings span empirical settings such as work, classrooms, gangs, primate societies, and children's games. Topics: processes of influence, role differentiation, identity formation, social mechanisms, and intra/inter group dynamics of peer relations. Methods for observation and analysis of small groups. (SSPEP)

4 units, not given this year

EDUC 312B. Microsociology: Social Structure and Interaction

(Same as SOC 224B) How to interpret interpersonal situations using microsociological theories. Focuses on the role of intention, identity, routines, scripts, rituals, conceptual frameworks, talk and emotions in social interaction. Processes by which interactions reverberate outward to transform groups and social structures. Special consideration will be placed on organizational contexts like schools, workplaces and policy decision arenas.

4 units, Aut (McFarland, D)

EDUC 314. Workshop in Economics of Education

Research by students and faculty engaged in problems in the economics of education. Prerequisites: advanced graduate training in economics theory and methodology; current ongoing research. May be repeated for credit. (SSPEP)

1-2 units, not given this year

EDUC 315X. Race and Ethnicity in Society and Institutions

(Same as SOC 347) Primarily for doctoral students. Major theories and empirical research. Emphasis is on schooling and race, racial identity, urban issues, and the impact of immigration on race relations.

1-5 units, not given this year

EDUC 316. Social Network Analysis

(Same as SOC 369) Introduction to social network theory, methods, and research applications in sociology. Network concepts of interactionist (balance, cohesion, centrality) and structuralist (structural equivalence, roles, duality) traditions are defined and applied to topics in small groups, social movements, organizations, communities. Students apply these techniques to data on schools and classrooms. (SSPEP)

4-5 units, Aut (McFarland, D)

EDUC 317X. Workshop: Social Networks

(Same as SOC 317W) Yearlong workshop where doctoral students are encouraged to collaborate with peers and faculty who share an interest in researching the network dynamics, histories and theories of action that help explain particular social phenomena. Students present their own research and provide helpful feedback on others' work. Presentations may concern dissertation proposals, grants, article submissions, book proposals, datasets, methodologies and other texts. Repeatable for credit.

1-2 units, Aut (McFarland, D; Parigi, P), Win (McFarland, D; Parigi, P), Spr (McFarland, D; Parigi, P)

EDUC 318X. The Discourses of Teaching Reading

Students examine language, social relationships, and students' textual sense-making to further develop their conceptions of reading comprehension and their pedagogical practice as reading teachers. What it means to comprehend text; how classroom discourse matters in the development of textual understanding; and what understandings, purposes, and relationships should matter in classroom talk about text. Field work in which students facilitate small group text discussions for the duration of the quarter at a location of their choice.

3-5 units, Win (Aukerman, M)

EDUC 319. Research on Teaching

Introduction and historical perspective to theory, methods, and substantive findings of research on teaching.

1-4 units, not given this year

EDUC 320X. Sociology of Knowledge Creation

(Same as EDUC 120X, SOC 330) The sociology of knowledge creation explores systematic relationships between thought and social structure in order to examine how human beings construct, interpret, and view reality. How knowledge is socially constructed, patterned, and used, and how everyday and tacit forms of knowledge are achieved. Emphasis is on the creation and patterning of scientific paradigms, social science disciplines, and the field of education.

3-4 units, Win (McFarland, D)

EDUC 321B. Analysis of Social Interaction

Practicum on discourse, interactional, and cultural analysis of videotaped data. Analysis of interactional data, and the basis on which analytic claims can be founded. The transcription of speech and movement in social interaction, and how to identify the patterns which participants use to display and interpret cultural meanings. The theoretical assumptions hidden in transcription systems. Prerequisite: first- or second-year graduate student. (SSPEP/ICE)

4 units, Spr (Staff)

EDUC 322. Discourse of Liberation and Equity in Schools and Society

Issues and strategies for studying oral and written discourse as a means for understanding classrooms, students, and teachers, and teaching and learning in educational contexts. The forms and functions of oral and written language in the classroom, emphasizing teacher-student and peer interaction, and student-produced texts. Individual projects utilize discourse analytic techniques. Prerequisite: graduate status or consent of instructor. (SSPEP)

3-5 units, Win (Ball, A)

EDUC 323A. The Practice of Education Policy Analysis

Key issues in the K-12 education policy. Modern theories about the making of policy and its implementation. Preparation to do policy analysis in education. (SSPEP)

3 units, Win (Kelemen, M)

EDUC 325A. Proseminar 1

Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?

3 units, Aut (Carnoy, M; Willinsky, J)

EDUC 325B. Proseminar 2
Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?
3 units, Win (Borko, H; Barron, B)

EDUC 325C. Proseminar 3
Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?
2 units, Spr (Labaree, D; Ramirez, F)

EDUC 327A. The Conduct of Qualitative Inquiry
(Same as SOC 331) Two quarter sequence for doctoral students to engage in research that anticipates, is a pilot study for, or feeds into their dissertations. Prior approval for dissertation study not required. Students engage in common research processes including: developing interview questions; interviewing; coding, analyzing, and interpreting data; theorizing; and writing up results. Participant observation as needed. Preference to students who intend to enroll in 327C.
3-4 units, not given this year

EDUC 327C. The Conduct of Qualitative Inquiry
For doctoral students. Students bring research data for analysis and writing. Preference to those who have completed 327A.
1-4 units, Win (Carter, P)

EDUC 328X. Topics in Learning and Technology: Interactivity and Feedback
Content changes each year. Interactivity including manipulation of an object, talking to another person, or clicking on a mouse. Proposals for the active learning ingredient of interactivity, and how different technologies capitalize on these ingredients.
3 units, not given this year

EDUC 329X. Seminar on Teacher Professional Development
For master's and doctoral students. Theories, principles, and models of professional development. Issues include: different conceptions of teaching, practice, and development; what gets developed in professional development; pedagogies of professional development; structures to support teacher learning; evaluating professional development; and policy issues.
1-4 units, Aut (Borko, H)

EDUC 330X. Economic Approaches to Education Policy Analysis
(Same as GSBGEN 347) Policy issues in education using the tools of microeconomics. How schools are funded; implications for efficiency, equity, and adequacy of resources. The impact of school resources on educational and economic well-being. Teacher labor markets. How teachers impact student achievement. How systems of school choice affect schools and students. How accountability has changed schooling. The effects of changes in affirmative action and financial aid in higher education. Prerequisites: intermediate microeconomics and regression analysis.
4 units, not given this year

EDUC 331A. Introduction to Research Design in Administration and Policy Analysis
Required for first-year APA doctoral students; SSPEP first-year doctoral students with consent of instructor. How to conduct literature reviews. How to use literature to frame and formulate problem statements, research questions, and conceptual frameworks. (APA)
3 units, Spr (Stevens, M)

EDUC 332X. Theory and Practice of Environmental Education
Foundational understanding of the history, theoretical underpinnings, and practice of environmental education as a tool for addressing today's pressing environmental issues. The purpose, design, and implementation of environmental education in formal and nonformal settings with youth and adult audiences. Field trip and community-based project offer opportunities for experiencing and engaging with environmental education initiatives.
3 units, Spr (Ardoin, N)

EDUC 333A. Understanding Learning Environments
Advanced seminar. Theoretical approaches to learning used to analyze learning environments and develop goals for designing resources and activities to support effective learning practices.
3 units, Win (McDermott, R; Pea, R)

EDUC 333B. Imagining the Future of Learning
How to understand and forecast social, educational, technological trends; how to develop concepts and ideas for engaging learning and technology. Presentations of scenarios for future learning concepts from education, government, technology, business and leisure sectors. Experiments with the research and visioning processes.
3 units, not given this year

EDUC 334X. Education Advocacy Clinic
(Same as LAW 660.) For students enrolled in the Education (M.A.) and Law (J.D.) joint degree program and those who already possess Law degrees only. Students participate in educational rights and reform work with clients and communities, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. May be repeated for credit. Prerequisite: consent of instructor.
2-10 units, Win (Koski, W), Spr (Staff)

EDUC 336. Language, Identity, and Classroom Learning
As contemporary research focuses on how people act and recognize each other, analyzing interaction while acknowledging identity allows for a dynamic examination of cultural interaction. Broad cultural categorization can be overly expansive in identifying the characteristics of large groups of individuals.
1-3 units, Aut (Brown, B)

EDUC 337. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices
(Same as EDUC 103B) Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students.
3-5 units, Win (Ball, A)

EDUC 338X. Innovations in Education: Designing the teaching experience
Immersive experiences and real world projects focused around issues facing the teaching profession. Human capital as a top priority for the U.S. and other educational systems. Topics include teacher career ladders, induction, retention, and teacher knowledge sharing.
3-4 units, Spr (Goldman, S; Crandall, R)

EDUC 339. Advanced Topics in Quantitative Policy Analysis
For doctoral students. How to develop a researchable question and research design, identify data sources, construct conceptual frameworks, and interpret empirical results. Presentation by student participants and scholars in the field. May be repeated for credit.
1-2 units, Aut (Reardon, S; Loeb, S), Win (Reardon, S; Loeb, S), Spr (Reardon, S; Loeb, S)

EDUC 340. Psychology and American Indian Mental Health
Western medicine's definition of health as the absence of sickness, disease, or pathology; Native American cultures' definition of health as the beauty of physical, spiritual, emotional, and social things, and sickness as something out of balance. Topics include: historical trauma; spirituality and healing; cultural identity; values and acculturation; and individual, school, and community-based interventions. Prerequisite: experience working with American Indian communities.
3-5 units, Win (LaFromboise, T)

EDUC 341X. Urban School System Reform
Strategies for large-scale reform of complex school systems. Case studies of urban school systems. Sources include approaches developed in management studies, organizational behavior, and school reform. Political and community contexts; the role of urban superintendents and administrators in creating reform strategies. Factors such as labor relations and the regulatory environment. Guest speakers.
4 units, not given this year

EDUC 342. Child Development and New Technologies
Focus is on the experiences computing technologies afford children and how these experiences might influence development. Sociocultural theories of development as a conceptual framework for understanding how computing technologies interact with the social ecology of the child and how children actively use technology to meet their own goals. Emphasis is on influences of interactive technology on cognitive development, identity, and social development equity.
1-3 units, not given this year

EDUC 343X. Navigating the Academic Profession
For DARE doctoral fellows only. The roles and responsibilities of faculty members in American colleges and universities in the 21st century. How to become productive faculty members within the higher education enterprise.
1-2 units, Aut (Golde, C)

EDUC 344. Child Development and Schooling
How the practices and activities of schooling influence the social, emotional, and cognitive development of children. Metatheoretical approaches (mechanistic, organismic, developmental contextualist metamodels) and methods of conducting research on schooling and development (experimental, survey, ethnographic, intervention). Topics: how teaching practices influence cognitive growth in academic domains; how the organizational structures of schools (grade related transitions, class organizations) fit or fail to fit developmental needs; how friendship groups create contexts for learning and can lead to different trajectories of development; and how grading and other evaluative practices influence motivational orientations. Focus is on elementary school years. (PSE)
3-4 units, not given this year

EDUC 346. Research Seminar in Higher Education
Required for higher education students. Major issues, current structural features of the system, the historical context that shaped it, and theoretical frameworks. The purposes of higher education in light of interest groups including students, faculty, administrators, and external constituents. Issues such as diversity, stratification, decentralization, and changes that cut across these groups. (APA)
4 units, Aut (Antonio, A)

EDUC 347. The Economics of Higher Education
Topics: the worth of college and graduate degrees, and the utilization of highly educated graduates; faculty labor markets, careers, and workload; costs and pricing; discounting, merit aid, and access to higher education; sponsored research; academic medical centers; and technology and productivity. Emphasis is on theoretical frameworks, policy matters, and the concept of higher education as a public good. Stratification by gender, race, and social class.
4 units, Win (Bettinger, E)

EDUC 348X. Policy and Practice in Science Education
Values and beliefs that dominate contemporary thinking about the role and practice of science education, what the distinctive features of science are, and the arguments for its value as part of compulsory education. Research on the conceptual and affective outcomes of formal science education, how the changing nature of contemporary society challenges current practice, and the rationale for an alternative pedagogy, curriculum and assessment.
3-4 units, Spr (Osborne, J)

EDUC 350A. Psychological Studies in Education
Required of first-year doctoral students in Psychological Studies; others by consent of instructor. Introduction to the doctoral program in Psychological Studies in Education and to faculty and student research. (PSE)
2 units, not given this year

EDUC 350C. Psychological Studies in Education
Individual research projects in a group context. (PSE)
1-2 units, not given this year

EDUC 351A. Design and Analysis of Longitudinal Research
The analysis of longitudinal data is central to empirical research on learning and development. Topics: measurement of change, growth models, reciprocal effects, stability, analysis of durations including survival analysis, and experimental and non-experimental group comparisons. See http://www-stat.stanford.edu/~rag/ed351longit/ . Prerequisite: intermediate statistical methods. (PSE)
1-2 units, Spr (Rogosa, D)

EDUC 351C. Workshop in Technical Quality of Educational Assessments and Accountability
Topics include: determinations of accuracy for individual scores and group summaries; design and reporting of educational assessments; achievement instruments in state-level accountability systems; and policy implications of statistical properties. See http://www.stanford.edu/~rag/.
3 units, not given this year

EDUC 352X. Education Schools: Historical and Sociological Perspectives
The lowly status of the education school, defined as college, school, or department, within a university. Why does the education school get no respect? Its historical development, how it evolved into its current position in the academic hierarchy, and contemporary factors that help to reinforce that position. (SSPEP) (Labaree)
2-4 units, not given this year

EDUC 353A. Problems in Measurement: Item Response Theory
Alternative mathematical models used in test construction, analysis, and equating. Emphasis is on applications of item response theory (latent trait theory) to measurement problems, including estimation of item parameters and person abilities, test construction and scoring, tailored testing, mastery testing, vertical and horizontal test equating, and detection of item bias. Prerequisites: 252 and 257, or PSYCH 248 and 252, or equivalent. (PSE)
3 units, not given this year

EDUC 353C. Problems in Measurement: Generalizability Theory
Application to analysis of educational achievement data, including performance assessments. Fundamental concepts, computer programs, and actual applications. (PSE)
3 units, not given this year

EDUC 354X. School-Based Decision Making
Leadership and organizational issues. Leadership as it plays out in the pragmatic demands and tensions of site-level decision processes. The interdependence of factors critical to school achievement and equity outcomes: governance and culture, instruction, resource alignment, inquiry, community engagement. The complexity of decisions in these arenas and the capacity-building process of leadership for results.
3-4 units, Win (Hoagland, G)

EDUC 355X. Higher Education and Society
For undergraduates and graduate students interested in what colleges and universities do, and what society expects of them. The relationship between higher education and society in the U.S. from a sociological perspective. The nature of reform and conflict in colleges and universities, and tensions in the design of higher education systems and organizations.
3 units, not given this year

EDUC 356. Street History: Learning the Past in School and Out
(Same as HISTORY 337C) Interdisciplinary. Since Herodotus, history and memory have competed to shape minds: history cultivates doubt and demands interpretation; memory seeks certainty and detests that which thwarts its aims. History and memory collide in modern society, often violently. How do young people become historical amidst these forces; how do school, family, nation, and mass media contribute to the process?
3-5 units, Win (Wineburg, S)

EDUC 357X. Science and Environmental Education in Informal Contexts
There are ever-expanding opportunities to learn science in contexts outside the formal classroom, in settings such as zoos, museums, and science centers. How are issues around science and the environment presented in these contexts, how do people behave and learn in these contexts, and what messages do they take away? This course will cover the learning theories and empirical research that has been conducted in these settings. Case studies of nearby science centers will add an experiential dimension.
3-4 units, Win (Osborne, J; Ardoin, N)

EDUC 358X. Developments in Access to Knowledge and Scholarly Communication
Scholarly and educational implications of new academic communication systems. New dissemination methods in light of long-

standing issues of epistemology, intellectual property, propriety, access, value, and responsibility within the scholarly community. Contexts include publishing, archiving, indexing, and networking.

1-4 units, Win (Staff)

EDUC 359A. Research in Science and Mathematics Education: Assessment and Evaluation

Historical and international perspectives. Emphasis is on trends and issues in contemporary American research and policy. Opportunity to develop and discuss dissertation plans. (CTE) (Shavelson)

2-4 units, Aut (Shavelson, R)

EDUC 359B. Research in Science and Mathematics Education

For doctoral students interested in science education and literacy in school subjects.

2-3 units, Win (Brown, B)

EDUC 359C. Research in Science Education: Research in Science Teaching

The changing debate over conceptions of the nature of science and the calls to broaden it. Themes, directions, limitations, and epistemological foundations of the body of research on the nature of science.

2-3 units, not given this year

EDUC 359E. Research on Mathematics Education

Comparative and cultural perspectives on mathematics teaching and learning practices in the U.S. mathematics education in the context of cultural and educational systems. Teaching and learning as an interactive system, classroom discourse and math talk, teacher professional development, classroom culture and norms, educational equity, and issues of curriculum and standards.

2-4 units, not given this year

EDUC 360X. Developmental Psychopathology and Resilience

Theoretical, methodological, and empirical issues pertaining to developmental psychopathology and resilience of children and adolescents. Current conceptual and empirical issues; cognitive, affective, and motivational processes that underlie some of the most salient childhood mental health symptoms and disorders; family, school, and cultural factors that contribute to developmental psychopathology and resilience; and cutting-edge analytic methods that are currently employed in studies of developmental psychopathology and resilience.

3-4 units, Aut (Obradovic, J)

EDUC 361. Workshop: Networks and Organizations

(Same as SOC 361W) For students doing advanced research. Group comments and criticism on dissertation projects at any phase of completion, including data problems, empirical and theoretical challenges, presentation refinement, and job market presentations. Collaboration, debate, and shaping research ideas. Prerequisite: courses in organizational theory or social network analysis.

1-3 units, Aut (Powell, W), Win (Powell, W), Spr (Powell, W)

EDUC 362X. The Science Curriculum: Values and Ideology in a Contested Terrain

The issue of what should be taught in schools is a site of contestation where issues of beliefs, values and ideologies emerge. This course will use the school science curriculum and the history of its development to explore the common positions adopted and argued for in approaching curriculum development. Course will help students develop a knowledge of curriculum reform in school science and a deeper understanding of the arguments that have shaped its present form and their historical antecedents.

3-5 units, not given this year

EDUC 363X. Stress Reactivity and Biological Sensitivity to Context

Two biological systems: the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal (HPA) axis that help children respond to and cope with daily challenges, stressors, and adversities. How the ANS and HPA systems respond to daily stressors, as well as experiences of poverty, maltreatment, and neglect; how different indices of stress reactivity independently and jointly relate to various domains of competence and psychopathology; andhow stress reactivity moderates contextual influences on children's adaptation.

3-4 units, Win (Obradovic, J)

EDUC 364. Cognition and Learning

Cognitive psychology is the study of human thought including topics including the nature of expertise, creativity, and memory. Emphasis is on learning. The role of cognitive psychology in helping people learn, and determining the most desirable type of learning and whether people have learned. Students design and conduct their own learning study.

3-4 units, Win (Schwartz, D)

EDUC 365. Social, Emotional, and Personality Development

Limited to doctoral students in PSE and those with a background in child and adolescent development. Developmental processes that account for psychological adaptation in social relationships, schools, and other interpersonal settings. Theoretical models of social, personality, and emotional development. Topics such as self-concept, empathy, motivation, aggression, and personality formation.

3 units, Win (Damon, W)

EDUC 366X. Learning in Formal and Informal Environments

How learning opportunities are organized in schools and non-school settings including museums, after-school clubs, community art centers, theater groups, aquariums, sports teams, and new media contexts. Sociocultural theories of development as a conceptual framework. Readings from empirical journals, web publications, and books.Collaborative written or multimedia research project in which students observe and document a non-school learning environment.

3 units, not given this year

EDUC 367. Cultural Psychology

(Formerly 292.) The relationship between culture and psychological processes; how culture becomes an integral part of cognitive, social, and moral development. Both historical and contemporary treatments of cultural psychology, including deficit models, cross-cultural psychology, ecological niches, culturally specific versus universal development, sociocultural frameworks, and minority child development. The role of race and power in research on cultural psychology.

3-5 units, Aut (LaFromboise, T)

EDUC 368. Cognitive Development in Childhood and Adolescence

Cognitive development from the prenatal period through adolescence. Theoretical, methodological, and empirical issues pertaining to different domains of cognitive development, such as neurobiological plasticity, infant cognition, theory of mind, memory, language, and executive functions. Methods that researchers have employed in their study of cognitive development; limitations of current research and directions for future research; and translation of research findings for practitioners and policy makers.

3-4 units, Spr (Obradovic, J)

EDUC 369. Human Cognitive Abilities

(Same as PSYCH 133) Psychological theory and research on human cognitive abilities; their nature, development, and measurement; and their importance in society. Persistent controversies and new areas of research, recent perspectives on the nature-nurture debate and the roles of genetics, health and education in shaping HCAs. Prerequisite: PSYCH 1 or equivalent. (PSE)

3 units, not given this year

EDUC 370X. Theories of Cognitive Development

The contributions of Jean Piaget and Lev Vygotsky to the study of the developing mind of the child. Their theories, concepts, perspectives, empirical work, and lives. Topics: Piaget's genetic epistemology, constructivism, and idea of sensorimotor through formal operational stages; Vygotsky's cultural-historical approach, egocentric speech, and the relation between learning and development.

3 units, not given this year

EDUC 371X. Social Psychology and Social Change

(Same as EDUC 107X, PSYCH 265) The major ideas, theories, and findings of social psychology and their applied status. Emphasis is on historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research also discussed. Advanced undergraduates and graduate students from other disciplines are welcome.

2-3 units, Spr (Cohen, G)

EDUC 374. Philanthropy and Civil Society

(Same as POLISCI 334, SOC 374) Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current

scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.

1-3 units, Aut (Powell, W; Reich, R), Win (Powell, W; Reich, R), Spr (Powell, W; Reich, R)

EDUC 375A. Seminar on Organizational Theory

(Same as MS&E 389, SOC 363A) The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.

5 units, Aut (Powell, W)

EDUC 375B. Seminar on Organizations: Institutional Analysis

(Same as SOC 363B) Seminar. Key lines of inquiry on organizational change, emphasizing network, institutional, and evolutionary arguments.

3-5 units, not given this year

EDUC 376. State Theory and Educational Policy

The relationship between political system structures and educational change by analyzing theories and interpretations of how political systems function, and the implications of these theories for understanding education. Classical and Marxist interpretations. (SSPEP/ICE)

4 units, not given this year

EDUC 377. Comparing Institutional Forms: Public, Private, and Nonprofit

(Same as GSBGEN 346, PUBLPOL 317, SOC 377) Seminar. For students interested in the nonprofit sector, and those in the joint Business and Education program. The missions, functions, and capabilities of nonprofit, public, and private organizations. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials. Advanced undergraduates require consent of instructor.

4 units

EDUC 377B. Strategic Management of Nonprofits

Strategic, governance, and management issues facing nonprofit organizations and their leaders in the era of venture philanthropy and social entrepreneurship. Development and fundraising, investment management, performance management, and nonprofit finance. Case studies include smaller, social entrepreneurial and larger, more traditional organizations, including education, social service, environment, health care, religion, NGOs, and performing arts.

4 units, Win (Staff)

EDUC 377C. Strategic Issues in Philanthropy

(Also GSBGEN 381). Operational and strategic distinctions between traditional philanthropic entities, such as community, private, and corporate foundations, and contemporary models, such as funding intermediaries and venture philanthropy partnerships. Philanthropic strategies as they relate to foundation mission, grant making, evaluation, financial management, infrastructure, and board governance. Guest speakers include philanthropists, foundation presidents, and Silicon Valley business leaders. Group project in which students solicit a grant proposal from a local nonprofit organization and make a funding recommendation to a Silicon Valley-based foundation.

4 units, Aut (Arrillaga, L)

EDUC 377D. Strategic Leadership of Nonprofits

(Same as STRAMGT 378) Formulating, evaluating, and implementing mission and strategy. Case studies from nonprofits in social services, health care, education, and arts and culture. The interaction of strategy and mission, industry structure and evolution, strategic change, growth and replication, corporate strategy, governance, commercialization, alliances, capacity building, and leadership.

4 units

EDUC 378X. Seminar on Social Change Processes and Organizations

Theories of social change and influence processes within and through organizations. Social change organizations. The interaction of philanthropic institutions and other social change organizations within civil society. Meso-level theories of change.

3-4 units, not given this year

EDUC 380. Supervised Internship

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 381. Multicultural Issues in Higher Education

(Same as EDUC 181) The primary social, educational, and political issues that have surfaced in American higher education due to the rapid demographic changes occurring since the early 80s. Research efforts and the policy debates include multicultural communities, the campus racial climate, and student development; affirmative action in college admissions; multiculturalism and the curriculum; and multiculturalism and scholarship.

4 units, not given this year

EDUC 382. Student Development and the Study of College Impact

The philosophies, theories, and methods that undergird most research in higher education. How college affects students. Student development theories, models of college impact, and issues surrounding data collection, national databases, and secondary data analysis.

4 units, Win (Antonio, A)

EDUC 384. Advanced Topics in Higher Education

Topics vary each year and may include faculty development, legal issues, curricular change, knowledge production, professional socialization, management of organizational decline, leadership and innnovation, authority and power, diversity and equity, and interactions with government and industry. May be repeated for credit. Prerequisites: 346, consent of instructor. (APA)

3-5 units, not given this year

EDUC 386X. Leadership and Administration in Higher Education

Definitions of leadership and leadership roles within colleges and universities. Leadership models and organizational concepts. Case study analysis of the problems and challenges facing today's higher education administrators.

4 units, Spr (Ehrlich, T)

EDUC 387A. Workshop: Comparative Studies of Educational and Political Systems

(Same as SOC 311A) Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. (SSPEP/ICE)

1-5 units, Aut (Ramirez, F)

EDUC 387B. Workshop: Comparative Systems of Educational and Political Systems

(Same as SOC 311B) Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. (SSPEP/ICE)

1-5 units, Win (Ramirez, F; Meyer, J)

EDUC 387C. Workshop: Comparative Studies of Educational and Political Systems

(Same as SOC 311C) Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. May be repeated for credit. (SSPEP/ICE)

1-5 units, Spr (Ramirez, F; Meyer, J)

EDUC 388A. Language Policies and Practices

For STEP teacher candidates seeking to meet requirements for the English Learner Authorization on their preliminary credential. Historical, political, and legal foundations of education programs for English learners. Theories of second language learning, and research on the effectiveness of bilingual education. Theory-based methods to facilitate and measure English learners' growth in language and literacy acquisition, and create environments which promote English language development and content area learning through specially designed academic instruction in English. (STEP)

2 units, Win (Goldenberg, C; Rutherford Quach, S)

EDUC 389X. Race, Ethnicity, and Language

(Same as ANTHRO 320A, LINGUIST 253) Seminar. The linguistic construction of race and ethnicity across a wide variety of contexts and communities. The course takes a comparative perspective and highlights how different racial/ethnic formations participate in similar, yet different, ways of doing race though language, interaction and culture. Readings draw heavily from perspectives in linguistic anthropology and sociolinguistics.

3-4 units, Win (Alim, H)

EDUC 391X. Web-Based Technologies in Teaching and Learning
Project-based. Overview of instructional design theories and educational technologies to evaluate and develop a web-based educational application or system. Web-based applications and technologies designed for online interactions and collaborations. Instructional systems strategies to develop online environments that support and facilitate interactive learning. Students create a small-scale, web-based learning system.
3 units, not given this year

EDUC 393. Proseminar on Research in Education
Overview of the field of education for joint degree (M.B.A./M.A.) students. (SSPEP) (Strober)
4 units, Spr (Cohen, G)

EDUC 395. Scholarly Writing in Education and the Social Sciences
Focus is on producing articles for scholarly journals in education and the social sciences. Ethics and craft of scholarly publishing. Writing opinion articles for lay audiences on issues of educational and social import.
3-5 units, Aut (Wineburg, S)

EDUC 396X. The Design of Technologies for Casual Learning
(Same as EDUC 196X) Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term casual is borrowed from casual gaming to denote that the learning technologies are meant for learners to use in extreme informal learning circumstances (while on the go, any time and any place). The class builds on learning about and synthesizing knowledge, theory and development activity in four areas including learning theories, mobile technologies, games and participatory design processes.
3 units, Win (Goldman, S)

EDUC 401A. Mini Courses in Methodology: Statistical Packages for the Social Sciences
Statistical analysis using SPSS, including generating descriptive statistics, drawing graphs, calculating correlation coefficients, conducting t-tests, analysis of variance, and linear regression. Building up datasets, preparing datasets for analysis, conducting statistical analysis, and interpreting results.
1 unit, Aut (Staff), Win (Staff)

EDUC 401B. Mini Courses in Methodology: Stata
The computer as research tool. Statistical software Stata for data analysis, including t-tests, correlation, ANOVA, and multivariate linear regression.
1 unit, Aut (Arshan, N), Win (Arshan, N)

EDUC 405X. The Teaching of Literature: How We Teach and Why
(Same as ENGLISH 397X) For graduate students in English and English Education who are interested in questions surrounding the teaching of literature at both the secondary and collegiate level. The course weaves together theoretical considerations of the purposes for teaching literature, including assumptions about the kinds of readings and readers literature teachers are trying to create, with investigation of pedagogical practices.
2-4 units, not given this year

EDUC 410. Second-Year Research Workshop
For second-year doctoral students in APA and ICE. Issues in conceptualizing and designing research in the social sciences: methodology and epistemology; research proposals; and findings by students and faculty. Prerequisites: 306A,B,C,D or equivalents. (APA/ICE)
2-5 units, Aut (Antonio, A)

EDUC 412X. Organization Studies Research Workshop
For graduate students whose research is rooted in organization theory. Participants to present and receive feedback on their work including paper drafts, proposals and dissertation chapter. Sources include recent scholarship. May be repeated for credit.
1-2 units, not given this year

EDUC 417. Research and Policy on Postsecondary Access
(Same as EDUC 117) The transition from high school to college. K-16 course focusing on high school preparation, college choice, remediation, pathways to college, and first-year adjustment. The role of educational policy in postsecondary access. Service Learning Course (certified by Haas Center).
3 units, Spr (Antonio, A)

EDUC 418. Foundations of Case Study Research
Rationales for case study research in academic organizations emphasizing colleges and universities; high schools and related organizational contexts. Methodological training in fieldwork through hands-on data collection and analysis from interviews and documents. For doctoral students developing qualifying papers or dissertation proposals; required for higher education doctoral students; APA, SSE, and C&TE students with consent of instructor. (APA)
3-5 units, not given this year

EDUC 419X. Academic Achievement of Language Minority Students
Emphasis is on the current state of knowledge in the research literature and comparisons to students' experiences and observations in bilingual education, English as a second language, reading instruction, cultural issues in education, and research methods.
3-5 units, not given this year

EDUC 424. Introduction to Research in Curriculum and Teacher Education
Limited to second-year doctoral students in CTE. How to conceptualize, design, and interpret research. How to read, interpret, and critique research; formulate meaningful research questions; evaluate and conduct a literature review; and conceptualize a study. Readings include studies from different research paradigms. Required literature review in an area students expect to explore for their qualifying paper. (Darling-Hammond)
2-5 units, Spr (Borko, H)

EDUC 435X. Research Seminar in Applied Linguistics
(Same as LINGUIST 293) For graduate students in the schools of Education and Humanities and Sciences who are engaged in research pertaining to applied linguistic topics in original research. Topics: language policies and planning, language and gender, writing and critical thinking, foreign language education, and social applications of linguistic science. (SSPEP)
1-4 units, not given this year

EDUC 453. Doctoral Dissertation
For doctoral students only. (all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 465. Seminar in the Pedagogy of Teacher Education
For doctoral students interested in working in teacher education. Pedagogical approaches, including the use of modeling and simulations and hypermedia materials. Theoretical considerations of how teachers learn to teach.
3 units, Aut (Grossman, P)

EDUC 466. Doctoral Seminar in Curriculum Research
Required of all doctoral students in CTE, normally during their second year in the program. Students present their ideas regarding a dissertation or other research project, and prepare a short research proposal that often satisfies their second-year review. (CTE)
2-4 units, Aut (Goldenberg, C)

EDUC 470. Practicum
For advanced graduate students. (all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 480. Directed Reading
For advanced graduate students. (all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 490. Directed Research
For advanced graduate students. (all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 493. Workshop in Design and Analysis of Comparative Studies
Research design activities, for second-year and later students with data analysis or research design activities including dissertation planning or analysis. Readings and exercises developed around participating student research. Topics have included: multilevel data analysis, within-subjects designs, and implementation of matching methods for comparing non-equivalent groups. Various

computing customs accommodated. See http://www-stat.stanford.edu/~rag/ed493/. Prerequisite: intermediate statistical methods course work.

1-3 units, Spr (Rogosa, D)

EDUC 496. Research in History and Social Science Education
For doctoral students. Literature on historical learning and teaching and corresponding social sciences research designs, assessment, and curriculum evaluation.

3-5 units, not given this year

EDUC 801. TGR Project
For advanced graduate students. Instructor consent required. (all areas)

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 802. TGR Dissertation
For advanced graduate students. Instructor consent required. (all areas)

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ELECTRICAL ENGINEERING (EE) COURSES

UNDERGRADUATE COURSES IN ELECTRICAL ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EE 14N. Things about Stuff
(Stanford Introductory Seminar) Preference to freshmen. The stories behind disruptive inventions such as the telegraph, telephone, wireless, television, transistor, and chip are as important as the inventions themselves, for they elucidate broadly applicable scientific principles. Focus is on studying consumer devices; projects include building batteries, energy conversion devices and semiconductors from pocket change. Students may propose topics and projects of interest to them. The trajectory of the course is determined in large part by the students themselves. GER:DB-EngrAppSci

3 units, Aut (Lee, T)

EE 15N. The Art and Science of Engineering Design
(Stanford Introductory Seminar) The goal of this seminar is to introduce freshmen to the design process associated with an engineering project. The seminar will consist of a series of lectures. The first part of each lecture will focus on the different design aspects of an engineering project, including formation of the design team, developing a project statement, generating design ideas and specifications, finalizing the design, and reporting the outcome. Students will form teams to follow these procedures in designing a term project of their choice over the quarter. The second part of each lecture will consist of outside speakers, including founders of some of the most exciting companies in Silicon Valley, who will share their experiences about engineering design. On-site visits to Silicon Valley companies to showcase their design processes will also be part of the course. The seminar serves three purposes: (1) it introduces students to the design process of turning an idea into a final GER:DB-EngrAppSci

3 units, Win (Goldsmith, A; Le, M)

EE 17N. Engineering the Micro and Nano Worlds: From Chips to Genes
(Stanford Introductory Seminar) Preference to freshmen. Hands-on micro- and nano-fabrication including the Stanford Nanofabrication Facility (SNF) and the Stanford Nanocharacterization Laboratory (SNL) and field trips to local companies and other research centers to illustrate the many applications; these include semiconductor integrated circuits ('chips'), DNA microarrays, microfluidic bio-sensors and microelectromechanical systems (MEMS). Students create, design, propose, and execute a project. How to read critically a New York Times article on nanotechnology. GER:DB-EngrAppSci

3 units, Spr (Pease, R)

EE 21N. What is Nanotechnology?
(Stanford Introductory Seminar) Nanotechnology an often used word: scientists and engineers have some notion of what nanotechnology is, societal perception may be entirely different. The classic paper by Richard Feynman (There's Plenty of Room at the Bottom), which laid down the challenge to the nanotechnologists. Two classic books that offer a glimpse of what nanotechnology is: Engines of Creation: The Coming Era of Nanotechnology by Eric Drexler, and Prey by Michael Crichton. Drexler's thesis sparked the imagination of what nano machinery might do, whereas Crichton's popular novel channeled the public's attention to this subject by portraying a disastrous scenario of a technology gone astray. Course uses scientific knowledge to analyze the assumptions and predictions of these classic works. GER:DB-EngrAppSci

3 units, Win (Wong, P)

EE 25Q. Electric Automobiles and Aircraft
(Stanford Introductory Seminar) (Same as AA 116N) Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption. It has crucial impacts on climate change, air pollution, resource depletion, and national security. Students wishing to address these issues will need to reconsider how we move, finding sustainable transportation solutions. This course will provide an introduction to the issue, covering the past and present of transportation and its impacts; examining alternative fuel proposals; and digging deeper into the most promising option: battery electric vehicles. Energy requirements of air, ground, and maritime transportation; design of electric motors, power control systems, drive trains, and batteries; and technologies for generating renewable energy. Two fun opportunities for hands-on experiences with electric cars. Prerequisites: Introduction to calculus and Physics AP or elementary mechanics.

3 units, Aut (Cox, D; Enge, P)

EE 41. Physics of Electrical Engineering
How everything from electrostatics to quantum mechanics is used in common high-technology products. Electrostatics are critical in micro-mechanical systems used in many sensors and displays, and basic EM waves are essential in all high-speed communication systems. How to propagate energy in free space. Which aspects of modern physics are needed to generate light for the operation of a DVD player or TV. Introduction to semiconductors, solid-state light bulbs, and laser pointers. Hands-on labs to connect physics to everyday experience. GER:DB-EngrAppSci

5 units, Win (Solgaard, O)

EE 46. Engineering For Good: Save the World and Have Fun Doing It
Projects that provide immediate and positive impact on the world. Focus is on global health by learning from experts in this field. Students work on real-world projects with help from members of NGOs and social entrepreneurial companies as part of the hand-on learning experience. Prerequisite: ENGR 40 or EE 122A or CS 106B or consent of instructor.

3 units, not given this year

EE 47. Press Play: Interactive Device Design
Introduction to the human-centered and technical workings behind interactive devices ranging from cellphones and video controllers to smart cars and appliances. Students build a working MP3 player prototype of their own design, using embedded microcontrollers, digital audio decoders and component sensors, and other electronic hardware. Topics include electronics prototyping, interface prototyping, sensors and actuators, micro-controller development, physical prototyping, and user testing. Prerequisite: CS106A and X or consent of instructor.

3 units, not given this year

EE 48. Hacking Stuff
Students build miniature autonomous cars that compete in a race against the clock. How to design a complete system by bringing together the various disciplines of electrical engineering such as control theory, circuit design, microprocessor programming, and semiconductor device physics. Students design, build, and program each component of an autonomous vehicle and in doing so are introduced to the broad discipline of electrical engineering through lab work. GER:DB-EngrAppSci

3 units, Aut (Peumans, P)

EE 49. Building Networked Systems
Preference to sophomores. The design of a complete networked system by combining electrical engineering disciplines such as coding theory, communication theory and networking. Based on

programmable radios, the design and construction of a networked system capable of audio communication between any two nodes in a network, essentially building a simple phone network. Preference to sophomores. Application required. Prerequisites: CS106A, CS106B.

3 units, Spr (Katti, S)

EE 60N. Man versus Nature: Coping with Disasters Using Space Technology

(Stanford Introductory Seminar) (Same as GEOPHYS 60N) Preference to freshman. Natural hazards, such as earthquakes, volcanoes, floods, hurricanes, and fires, affect the lives of thousands of people worldwide everyday. Over the past twenty years developments in spaceborne imaging technology have made it possible to monitor and respond to such disasters much more rapidly than in the past, saving lives and money. Additionally, greater understanding of the physical processes involved allows anticipation and planning for mitigation of the consequences of the disasters. How these new tools are applied to natural disasters, and how the remotely-sensed data are manipulated and analyzed. The technical material consists of a summary of basic geophysical properties of the Earth, their physical characteristics that can be sensed remotely, and the design of satellite systems to measure these phenomena and predict/mitigate natural hazards. GER:DB-EngrAppSci

4 units, Aut (Zebker, H)

EE 100. The Electrical Engineering Profession

Lectures/discussions on topics of importance to the electrical engineering professional. Continuing education, professional societies, intellectual property and patents, ethics, entrepreneurial engineering, and engineering management.

1 unit, Aut (Staff)

EE 101A. Circuits I

First of two-course sequence. Introduction to circuit modeling and analysis. Topics include creating the models of typical components in electronic circuits and simplifying non-linear models for restricted ranges of operation (small signal model); and using network theory to solve linear and non-linear circuits under static and dynamic operations. Prerequisite: Physics 43 GER:DB-EngrAppSci

4 units, Win (Howe, R)

EE 101B. Circuits II

Second of two-course sequence. MOS large-signal and small-signal models. MOS amplifier design including DC bias, small signal performance, multistage amplifiers, frequency response, and feedback. Prerequisite: 101A. GER:DB-EngrAppSci

4 units, Spr (Hershenson, M)

EE 102A. Signal Processing and Linear Systems I

Concepts and mathematical tools in continuous-time signal processing and linear systems analysis, illustrated with examples from signal processing, communications, and control. Mathematical representation of signals and systems. Linearity and time-invariance. System impulse and step response. Frequency domain representations: Fourier series and Fourier transforms. Filtering and signal distortion. Time/frequency sampling and interpolation. Continuous-discrete time signal conversion and quantization.Stability and causality in linear systems. Laplace transforms and Bode plots. Feedback and control system design. Examples from filter design and linear control. Prerequisite: MATH 53 or ENGR 155A. GER:DB-EngrAppSci

4 units, Win (Pauly, J)

EE 102B. Signal Processing and Linear Systems II

Concepts and mathematical tools in discrete-time signal processing and linear systems analysis with examples from digital signal processing, communications, and control. Discrete-time signal models. Continuous-discrete-continuous signal conversion. Discrete-time impulse and step response. Frequency domain representations: Fourier series and transforms. Connection between continuous and discrete time frequency representations. Discrete Fourier transform (DFT) and fast Fourier transform (FFT). Digital filter and signal processing examples. Discrete-time and hybrid linear systems. Stability and causality. Z transforms and their connection to Laplace transforms. Frequency response of discrete-time systems. Discrete-time control. Prerequisite: 102A. GER:DB-EngrAppSci

4 units, Aut (Staff), Spr (Kahn, J), Sum (Staff)

EE 108A. Digital Systems I

Digital circuit, logic, and system design. Digital representation of information. CMOS logic circuits. Combinational logic design. Logic building blocks, idioms, and structured design. Sequential logic design and timing analysis. Clocks and synchronization. Finite state machines. Microcode control. Digital system design. Control and datapath partitioning. Lab. Prerequisite: ENGR 40. Corequisite for WIM: ENGR 102E. GER:DB-EngrAppSci, WIM

3-4 units, Aut (Mitra, S), Win (Mitra, S)

EE 108B. Digital Systems II

The design of processor-based digital systems. Instruction sets, addressing modes, data types. Assembly language programming, low-level data structures, introduction to operating systems and compilers. Processor microarchitecture, microprogramming, pipelining. Memory systems and caches. Input/output, interrupts, buses and DMA. System design implementation alternatives, software/hardware tradeoffs. Labs involve the design of processor subsystems and processor-based embedded systems. Prerequisite: 108A, CS 106B. GER:DB-EngrAppSci

3-4 units, Aut (Olukotun, O), Win (Dally, W)

EE 109. Digital Systems Design Lab

The design of integrated digital systems encompassing both customized software and hardware. Software/hardware design tradeoffs. Algorithm design for pipelining and parallelism. System latency and throughput tradeoffs. FPGA optimization techniques. Integration with external systems and smart devices. Firmware configuration and embedded system considerations. Enrollment limited to 25; preference to graduating seniors. Prerequisites: 108B, and CS 106B or X. GER:DB-EngrAppSci

4 units, Spr (Weaver, J)

EE 114. Fundamentals of Analog Integrated Circuit Design

Analysis and simulation of elementary transistor stages, current mirrors, supply- and temperature-independent bias, and reference circuits. Overview of integrated circuit technologies, circuit components, component variations and practical design paradigms. Performance evaluation using computer-aided design tools. Prerequisite: 101B.GER:DB-EngrAppSci GER:DB-EngrAppSci

3 units, Aut (Dutton, R)

EE 116. Semiconductor Device Physics

The fundamental operation of semiconductor devices and overview of applications. The physical principles of semiconductors, both silicon and compound materials; operating principles and device equations for junction devices (diodes, bipolar transistor, photodetectors). Introduction to quantum effects and band theory of solids. Prerequisite: ENGR 40. Corequisite: 101B. GER:DB-EngrAppSci

3 units, Spr (Peumans, P)

EE 122A. Analog Circuits Laboratory

Practical applications of analog circuits, including simple amplifiers, filters, oscillators, power supplies, and sensors. Design skills, computer-aided design, and circuit fabrication and debugging. The design process through proposing, designing, simulating, building, debugging, and demonstrating a project. Radio frequency and largely digital projects not suitable for EE 122. Prerequisite: ENGR 40 or equivalent. GER:DB-EngrAppSci

3 units, Aut (Giovangrandi, L)

EE 122B. Introduction to Biomedical Electronics

Key components of modern systems, their application in physiology measurements, and reduction to practice in labs. Fundamentals of analog/digital conversion and filtering techniques for biosignals, typical transducers (biopotential, electrochemical, temperature, pressure, acoustic, movement), and interfacing circuits. Issues of biomedical electronics (safety, isolation, noise). Prerequisite: EE122A

3 units, Spr (Giovangrandi, L)

EE 124. Introduction to Neuroelectrical Engineering

Fundamental properties of electrical activity in neurons, technology for measuring and altering neural activity, and operating principles of modern neurological and neural prosthetic medical systems. Topics: action potential generation and propagation, neuro-MEMS and measurement systems, experimental design and statistical data analysis, information encoding and decoding, clinical diagnostic systems, and fully-implantable neural prosthetic systems design. Prerequisite: EE 101B and EE 102B.

3 units, Win (Shenoy, K)

EE 133. Analog Communications Design Laboratory
(Same as EE 233) Design, testing, and applications. Amplitude modulation (AM) using multiplier circuits. Frequency modulation (FM) based on discrete oscillator and integrated modulator circuits such as voltage-controlled oscillators (VCOs). Phased-lock loop (PLL) techniques, characterization of key parameters, and their applications. Practical aspects of circuit implementations. Labs involve building and characterization of AM and FM modulation/demodulation circuits and subsystems. Enrollment limited to 30 undergraduates and coterminal EE students. Prerequisite: 101B. Undergraduate students enroll in EE133 and Graduate students enroll in EE233. GER:DB-EngrAppSci
3-4 units, Win (Dutton, R)

EE 134. Introduction to Photonics
Photonics, optical sensors, and fiber optics. Conceptual and mathematical tools for design and analysis of optical communication and sensor systems. Experimental characterization of semiconductor lasers, optical fibers, photodetectors, receiver circuitry, fiber optic links, optical amplifiers, and optical sensors. Class project aimed on confocal microscopy for biomedical applications. Laboratory experiments. Prerequisite: 41 or equivalent. GER:DB-EngrAppSci
4 units, Aut (Staff)

EE 136. Introduction to Nanophotonics and Nanostructures
Electromagnetic and quantum mechanical waves and semiconductors. Confining these waves, and devices employing such confinement. Localization of light and applications: metallic mirrors, photonic crystals, optical waveguides, microresonators, plasmonics. Localization of quantum mechanical waves: quantum wells, wires, and dots. Generation of light in semiconductors: spontaneous and stimulated emission, lasers, and light emitting diodes. Devices incorporating localization of both electromagnetic and quantum mechanical waves such as resonant cavity quantum well lasers and microcavity-based single photon sources. System-level applications such as optical communications, biochemical sensing, and quantum cryptography. Prerequisite: familiarity with electromagnetic and quantum mechanical waves and semiconductors at the level of EE 41 or equivalent. GER:DB-EngrAppSci
3 units, Aut (Vuckovic, J)

EE 140. The Earth From Space: Introduction to Remote Sensing
(Same as GEOPHYS 140) Global change science as viewed using space remote sensing technology. Global warming, ozone depletion, the hydrologic and carbon cycles, topographic mapping, and surface deformation. Physical concepts in remote sensing. EM waves and geophysical information. Sensors studied: optical, near and thermal IR, active and passive microwave. GER:DB-EngrAppSci
3 units, not given this year

EE 141. Engineering Electromagnetics
Lumped versus distributed circuits. Transient response of transmission lines with resistive and reactive loads. Reflection, transmission, attenuation and dispersion. Steady-state waves on transmission lines. Standing wave ratio, impedance matching, and power flow. Coulomb's law, electrostatic field, potential and gradient, electric flux and Gauss's Law and divergence. Metallic conductors, Poisson's and Laplace's equations, capacitance, dielectric materials. Electrostatic energy and forces. Steady electric currents, Ohm's Law, Kirchoff's Laws, charge conservation and the continuity equation, Joule's Law. Biot-Savart's law and the static magnetic field. Ampere's Law and curl. Vector magnetic potential and magnetic dipole. Magnetic materials, forces and torques. Faraday's Law, magnetic energy, displacement current and Maxwell's equations. Uniform plane waves. Prerequisites: 102A, MATH 52. GER:DB-EngrAppSci
3 units, Aut (Hesselink, L)

EE 168. Introduction to Digital Image Processing
Computer processing of digital 2-D and 3-D data, combining theoretical material with implementation of computer algorithms. Topics: properties of digital images, design of display systems and algorithms, time and frequency representations, filters, image formation and enhancement, imaging systems, perspective, morphing, and animation applications. Instructional computer lab exercises implement practical algorithms. Final project consists of computer animations incorporating techniques learned in class. Prerequisite: Matlab programming. GER:DB-EngrAppSci
3-4 units, not given this year

EE 169. Introduction to Bioimaging
Bioimaging is important for both clinical medicine, and medical researchIntroduction to several of the major imaging modalities, using a signal processing perspective. Multi-dimensional Fourier transforms, and image quality metrics. Projection imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT), systems that use beam forming (ultrasound), and systems that use Fourier encoding (MRI).
3 units, Aut (Pauly, J)

EE 178. Probabilistic Systems Analysis
Introduction to probability and statistics and their role in modeling and analyzing real world phenomena. Events, sample space, and probability. Discrete random variables, probability mass functions, independence and conditional probability, expectation and conditional expectation. Continuous random variables, probability density functions, independence and expectation, derived densities. Transforms, moments, sums of independent random variables. Simple random processes. Limit theorems. Introduction to statistics: significance, hypothesis testing, estimation and detection, Bayesian analysis. Prerequisites: basic calculus and linear algebra. GER:DB-EngrAppSci
3 units, Spr (El Gamal, A)

EE 179. Introduction to Communications
This course covers the design and performance analysis of both analog and digital communication systems. Topics include current communication systems (cellular, WLANs, radio and TV broadcasting, satellites, Internet), Fourier techniques, energy and power spectral density, random variables and random (noise) signals, filtering and modulation of noise, analog modulation (AM and FM) and its performance in noise, digital modulation (PSK and FSK), optimal receiver design, and probability of bit error for digital modulation. Prerequisite: 102A. GER:DB-EngrAppSci
3 units, Win (Goldsmith, A)

EE 190. Special Studies or Projects in Electrical Engineering
Independent work under the direction of a faculty member. Individual or team activities involve lab experimentation, design of devices or systems, or directed reading.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 191. Special Studies and Reports in Electrical Engineering
Independent work under the direction of a faculty member given for a letter grade only. If a letter grade given on the basis of required written report or examination is not appropriate, enroll in 190.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN ELECTRICAL ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EE 203. The Entrepreneurial Engineer
Seminar. For prospective entrepreneurs with an engineering background. Contributions made to the business world by engineering graduates. Speakers include Stanford and other engineering and M.B.A. graduates who have founded large and small companies in nearby communities. Contributions from EE faculty and other departments including Law, Business, and MS&E.
1 unit, Win (Melen, R)

EE 204. Business Management for Electrical Engineers and Computer Scientists
For graduate students with little or no business experience. Leading computer, high-tech, and Silicon Valley companies and their best practices. Tools and frameworks for analyzing decisions these companies face. Corporate strategy, new product development, marketing, sales, distribution, customer service, financial accounting, outsourcing, and human behavior in business organizations. Case studies. Prerequisite: graduate standing.
3 units, Spr (Gibbons, F; Siegel, M)

EE 212. Integrated Circuit Fabrication Processes
For students interested in the physical bases and practical methods of silicon VLSI chip fabrication, or the impact of technology on device and circuit design, or intending to pursue doctoral research

involving the use of Stanford's Nanofabrication laboratory. Process simulators illustrate concepts and provide a virtual lab experience. Topics: principles of integrated circuit fabrication processes, physical and chemical models for crystal growth, oxidation, ion implantation, etching, deposition, lithography, and back-end processing. Required for 410.

3 units, Aut (Plummer, J)

EE 214. Advanced Analog Integrated Circuit Design

Analysis and design of analog integrated circuits in advanced MOS and bipolar technologies. Device operation and compact modeling in support of circuit simulations needed for design. Emphasis is on quantitative evaluations of performance using hand calculations and circuit simulations; intuitive approaches to design. Analytical and approximate treatments of noise and distortion; analysis and design of feedback circuits. Design of archetypal analog blocks for networking and communications such as broadband gain stages and transimpedance amplifiers. Prerequisite: EE 114.

3 units, Win (Murmann, B)

EE 216. Principles and Models of Semiconductor Devices

Carrier generation, transport, recombination, and storage in semiconductors. Physical principles of operation of the p-n junction, heterojunction, metal semiconductor contact, bipolar junction transistor, MOS capacitor, MOS and junction field-effect transistors, and related optoelectronic devices such as CCDs, solar cells, LEDs, and detectors. First-order device models that reflect physical principles and are useful for integrated-circuit analysis and design. Prerequisite: 116 or equivalent.

3 units, Aut (Harris, J), Win (Saraswat, K; Howe, R)

EE 218. Introduction to Nanotechnology and Nanoelectronics

Device physics and operation principles. Device and material options beyond silicon FETs at the nanoscale. Topics identified by the International Technology Roadmap for Semiconductors, emerging research devices section; see http://public.itrs.net. Non-silicon-based devices such as carbon nanotubes, semiconductor nanowires, and molecular devices; and non-FET based devices such as single-electron transistors (SET), resonant tunneling diodes (RTD), and quantum dots. Logic and memory devices. Sources include current literature and reference books. Prerequisite: Undergraduate device physics. Recommended: Introductory graduate solid state physics.

3 units, not given this year

EE 222. Applied Quantum Mechanics I

Emphasis is on applications in modern devices and systems. Topics include: Schrödinger's equation, eigenfunctions and eigenvalues, operator approach to quantum mechanics, Dirac notation, angular momentum, hydrogen atom, perturbation theory, variational method, and time-dependent perturbation theory with applications to optical absorption, nonlinear optical coefficients, and Fermi's golden rule. Prerequisites: MATH 52 and 53, PHYSICS 65 (or PHYSICS 43 and 45).

3 units, Aut (Miller, D)

EE 223. Applied Quantum Mechanics II

Continuation of 222, including more advanced topics: quantum mechanics of crystalline materials, methods for one-dimensional problems, spin, systems of identical particles (bosons and fermions), introductory quantum optics (electromagnetic field quantization, coherent states), fermion annihilation and creation operators, interaction of different kinds of particles (spontaneous emission, optical absorption, and stimulated emission). Quantum information and interpretation of quantum mechanics. Other topics in electronics, optoelectronics, optics, and quantum information science. Prerequisite: 222.

3 units, Win (Miller, D)

EE 225. Bio-chips, Imaging and Nanomedicine

(Same as MATSCI 382) The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

3 units, Win (Wang, S)

EE 228. Basic Physics for Solid State Electronics

Topics: energy band theory of solids, energy bandgap engineering, classical kinetic theory, statistical mechanics, and equilibrium and non-equilibrium semiconductor statistics. Prerequisite: course in modern physics.

3 units, Aut (Fan, S)

EE 231. Introduction to Lasers

How lasers work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent optical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to the level of 142, preferably 241, and some atomic or modern physics such as PHYSICS 70 or 130, 131.

3 units, Win (Digonnet, M)

EE 232. Laser Dynamics

Continuation of 231, emphasizing dynamic and transient effects including spiking, Q-switching, mode locking, frequency modulation, frequency and spatial mode competition, linear and nonlinear pulse propagation, short pulse expansion, and compression. Prerequisite: 231.

3 units, not given this year

EE 233. Analog Communications Design Laboratory

(Same as EE 133) Design, testing, and applications. Amplitude modulation (AM) using multiplier circuits. Frequency modulation (FM) based on discrete oscillator and integrated modulator circuits such as voltage-controlled oscillators (VCOs). Phased-lock loop (PLL) techniques, characterization of key parameters, and their applications. Practical aspects of circuit implementations. Labs involve building and characterization of AM and FM modulation/demodulation circuits and subsystems. Enrollment limited to 30 undergraduates and coterminal EE students. Prerequisite: 101B. Undergraduate students enroll in EE133 and Graduate students enroll in EE233.

3-4 units, Win (Dutton, R)

EE 234. Photonics Laboratory

Photonics and fiber optics with a focus on communication and sensing. Experimental characterization of semiconductor lasers, optical fibers, photodetectors, receiver circuitry, fiber optic links, optical amplifiers, and optical sensors and photonic crystals. Prerequisite: EE 242 or equivalent.

3 units, Win (Vuckovic, J)

EE 235. Guided Wave Optical Devices

Guided wave optics, optical waveguide devices, and integrated optics. Wave propagation in layered media, slab waveguides, and optical fibers. Rectangular waveguides. Optical waveguide technology. Coupled-mode theory. Numerical analysis of complex waveguides. Photonic crystals and surface plasmon optics. Physics and design of waveguide devices. Fiber sensors, waveguide gratings, waveguide modulators, directional couplers, ring filters. Prerequisite: electromagnetic theory to the level of 142 or equivalent.

3 units, Spr (Fan, S)

EE 237. Solar Energy Conversion

Basics of solar energy conversion in photovoltaic devices and solar thermal systems. Solar cell device physics: electrical and optical. Solar system issues including module assembly, inverters, and micro-inverters. Concentrated solar power. Students design solar cells. Prerequisite: EE 116 or EE 216.

3 units, Win (Peumans, P)

EE 242. Electromagnetic Waves

Continuation of 141. Maxwell's equations. Plane waves in lossless and lossy media. Skin effect. Flow of electromagnetic power (Poynting's theorem). Reflection and refraction of waves at planar boundaries. Snell's law and total internal reflection. Reflection and refraction from lossy media. Guided waves. Parallel-plate and dielectric-slab waveguides. Hollow wave-guides, cavity resonators, microstrip waveguides, optical fibers. Interaction of fields with matter and particles. Antennas and radiation of electromagnetic energy. Prerequisite: 141 or PHYSICS 120.

3 units, Win (Fraser-Smith, A)

EE 243. Semiconductor Optoelectronic Devices

Semiconductor physics and optical processes in semiconductors. Operating principles and practical device features of semiconductor optoelectronic materials and heterostructures. Devices include:

optical detectors (p-i-n, avalanche, and MSM); light emitting diodes; electroabsorptive modulators (Franz-Keldysh and QCSE), electrorefractive (directional couplers, Mach-Zehnder), switches (SEEDs); and lasers (waveguide and vertical cavity surface emitting). Prerequisites: semiconductor devices and solid state physics such as EE 216 or equivalent.

3 units, Win (Harris, J)

EE 247. Introduction to Optical Fiber Communications

Fibers: single- and multi-mode, attenuation, modal dispersion, group-velocity dispersion, polarization-mode dispersion. Nonlinear effects in fibers: Raman, Brillouin, Kerr. Self- and cross-phase modulation, four-wave mixing. Sources: light-emitting diodes, laser diodes, transverse and longitudinal mode control, modulation, chirp, linewidth, intensity noise. Modulators: electro-optic, electroabsorption. Photodiodes: p-i-n, avalanche, responsivity, capacitance, transit time. Receivers: high-impedance, transimpedance, bandwidth, noise. Digital intensity modulation formats: nonreturn-to-zero, return-to-zero. Receiver performance: Q factor, bit-error ratio, sensitivity, quantum limit. Sensitivity degradations: extinction ratio, intensity noise, jitter, dispersion. Wavelength-division multiplexing. System architectures: local-area, access, metropolitan-area, long-haul. Prerequisites: 102A, 242 or consent of instructor.

3 units, Aut (Kahn, J)

EE 248. Fundamentals of Noise Processes

Fundamentals of statistic, Fourier analysis, statistical and quantum mechanics, and linear and nonlinear circuit theory. Thermal, quantum and 1/f noise in resistors, pn junctions, lasers, and parametric amplifiers. Energy efficiency (bit/photon) and spectral efficiency (bit/s/Hz) in coherent and single photon optical communications. Protocols and security in quantum cryptography. Decoherence of qubits in quantum computation. Prerequisites: elementary device, circuit, and electromagnetic waves to the level of 101A,B and 242.

3 units, Aut (Yamamoto, Y)

EE 252. Antennas for Telecommunications and Remote Sensing

Fundamental properties. Dipoles, loops, reflectors, Yagis, helices, slots, horns, micro-strips. Antennas as transitions between guided and free radiation, ultrasound analogue. Famous antennas. Pattern measurements. Friis and radar equations. Feeds, matching, baluns. Broadbanding. Arrays, aperture synthesis, interferometry, very-long-baseline interferometry. Thermal radiation, antenna temperature, microwave passive remote sensing. Prerequisite: 242 or equivalent.

3 units, not given this year

EE 254. Principles of Radar Systems

Analysis and design. Radar equation and systems parameters, components of radar systems, radar cross-section and target characteristics, signal detection in noise, ambiguity function (with applications to measurement precision, resolution, clutter rejection, and waveform design); pulse compression waveforms, synthetic aperture radar, tracking and scanning radars, HF (OTH) radar, radar environmental and remote sensing, radar astronomy. Prerequisite: senior or graduate standing.

3 units, not given this year

EE 256. Numerical Electromagnetics

Principles and applications of numerical techniques for solving practical electromagnetics problems. Time domain solutions of Maxwell's equations. Finite difference time domain (FDTD) methods. Numerical stability, dispersion, and dissipation. Absorbing boundary conditions. Perfectly matched layer methods. Explicit and implicit methods. FDTD modeling of propagation and scattering in dispersive and anisotropic media. Near-to-far-zone transformations. Computational problems require programming and use of MATLAB and other tools. Prerequisite: 242 or equivalent.

3 units, not given this year

EE 257. Scientific Data Processing

(Same as GEOPHYS 258) Assimilation, processing, and modeling of large observational data sets. Solution of scientific and engineering problems, especially those requiring large amounts of data. Inverse methods and transform domain analysis for indirect measurements, implemented on digital computers using scientific languages. Large-scale computing, including hardware architectures, input/output and data bus bandwidth, programming efficiency, parallel programming techniques. Student projects involve analyzing real data by implementing an observational system such as tomography for medical and Earth observation uses, radar and matched filtering, multispectral/multitemporal studies, or migration processing. Prequisites: Programming with high level language

3-4 units, Win (Zebker, H)

EE 261. The Fourier Transform and Its Applications

The Fourier transform as a tool for solving physical problems. Fourier series, the Fourier transform of continuous and discrete signals and its properties. The Dirac delta, distributions, and generalized transforms. Convolutions and correlations and applications; probability distributions, sampling theory, filters, and analysis of linear systems. The discrete Fourier transform and the FFT algorithm. Multidimensional Fourier transform and use in imaging. Further applications to optics, crystallography. Emphasis is on relating the theoretical principles to solving practical engineering and science problems. Prerequisites: Math through ODEs, Fourier series at the level of 102A, and linear algebra.

3 units, Aut (Osgood, B), Win (Gill, J), Sum (Staff)

EE 262. Two-Dimensional Imaging

Time and frequency representations, two-dimensional auto- and cross-correlation, Fourier spectra, diffraction and antennas, coordinate systems and the Hankel and Abel transforms, line integrals, impulses and sampling, restoration in the presence of noise, reconstruction and tomography, imaging radar. Tomographic reconstruction using projection-slice and layergarm methods. Students create software to form images using these techniques with actual data. Final project consists of design and simulation of an advanced imaging system. Prerequisite: 261. Recommended: 278, 279.

3 units, not given this year

EE 263. Introduction to Linear Dynamical Systems

(Same as CME 263) Applied linear algebra and linear dynamical systems with application to circuits, signal processing, communications, and control systems. Topics: least-squares approximations of over-determined equations and least-norm solutions of underdetermined equations. Symmetric matrices, matrix norm, and singular value decomposition. Eigenvalues, left and right eigenvectors, with dynamical interpretation. Matrix exponential, stability, and asymptotic behavior. Multi-input/multi-output systems, impulse and step matrices; convolution and transfer matrix descriptions. Control, reachability, and state transfer; observability and least-squares state estimation. Prerequisites: linear algebra and matrices as in MATH 103; differential equations and Laplace transforms as in EE 102A.

3 units, Aut (Boyd, S), Spr (Lall, S)

EE 264. Digital Signal Processing

The fundamentals of digital signal processing techniques and their applications. Topics include review of two sided Z-transform, linear time invariant discrete-time systems, and sampling theory; A/D and D/A conversion, rate conversion, and oversampling techniques for ADC and DAC; filter design; quantization in digital filter implementation; discrete Fourier analysis; and parametric signal modeling. Prerequisite: EE102A and EE102B . Recommended: EE261, EE278.

3 units, Win (Schafer, R), Sum (Staff)

EE 265. Digital Signal Processing Laboratory

Applying 102A,B to real-world signal processing applications. Lab exercises use a programmable DSP to implement signal processing tasks. Topics: A/D conversion and quantization, sampling theorem, Z-transform, discrete-time Fourier transform, digital filter design and implementation, spectral analysis, rate conversion, wireless data communication, and OFDM receiver design. Prerequisites: 102A,B. Recommended: 261.

3-4 units, Spr (Meng, T)

EE 268. Introduction to Modern Optics

Geometrical optics: ray matrices, Gaussian beams, optical instruments, and radiometry. Wave nature of light: Maxwell's equations, propagation through media with varying index of refraction (e.g., fibers). Interferometry: basic principles, practical systems, and applications.

3 units, Aut (Byer, R)

EE 271. Introduction to VLSI Systems

Provides a quick introduction to MOS transistors and IC fabrication and then creates abstractions to allow you to create and reason

about complex digital systems. It uses a switch resistor model of a transistor, uses it to model gates, and then shows how gates and physical layout can be synthesized from Verilog or SystemVerilog descriptions. Most of the class will be spent on providing techniques to create designs that can be validated, are low power, provide good performance, and can be completed in finite time. Prerequisites: 101A and 108B; familiarity with transistors, logic design, Verilog, and digital system organization.

3 units, Aut (Horowitz, M)

EE 272. Design Projects in VLSI Systems

Mixed signal design. Student teams create a small mixed-signal VLSI design using a modern design flow and CAD tools. The project involves writing a Verilog model of the chip, creating a testing/debug strategy for the chip, wrapping custom layout to fit into a std cell system, using synthesis and place and route tools to create the layout of your chip, and understanding all the stuff you need to do to tape-out a chip. Useful for those who plan to build a chip in their Ph.D. work. Prerequisites: EE 271 and experience in digital/analog circuit design.

3-4 units, Spr (Horowitz, M)

EE 273. Digital Systems Engineering

Electrical issues in the design of high-performance digital systems, including signaling, timing, synchronization, noise, and power distribution. High-speed signaling methods; noise in digital systems, its effect on signaling, and methods for noise reduction; timing conventions; timing noise (skew and jitter), its effect on systems, and methods for mitigating timing noise; synchronization issues and synchronizer design; clock and power distribution problems and techniques; impact of electrical issues on system architecture and design. Prerequisites: 102B and 108A, or equivalents. Recommended: 214.

3 units, Win (Weaver, J)

EE 276. Introduction to Wireless Personal Communications

Frequency reuse, cellular concepts, cochannel interference, handoff. Radio propagation in and around buildings: Friis equation, multipath, narrow-band and wide-band channels, small scale and large-scale statistics, space and time signal variation. Diversity. Receiver sensitivity, sources of noise, range. Performance statistics: coverage, margin, digital modulation, adjacent channel interference, and digital error rates. Wide band channels: maximum transmission rates. Multi-server queuing and traffic: Erlang formulas. Multiple access: FDMA, TDMA, CDMA; Duplexing: TDD, FDD. Prerequisites: 242 and 278 or equivalent. Corequisite: 279 or equivalent.

3 units, Spr (Cox, D)

EE 278. Introduction to Statistical Signal Processing

Random variables, vectors, and processes; convergence and limit theorems; IID, independent increment, Markov, and Gaussian random processes; stationary random processes; autocorrelation and power spectral density; mean square error estimation, detection, and linear estimation. Prerequisites: 178 or STATS 116, and linear systems and Fourier transforms at the level of 102A,B or 261.

3 units, Aut (Prabhakar, B), Win (Gray, R), Sum (Staff)

EE 279. Introduction to Communication Systems

Analysis and design of communication systems; analog and digital modulation and demodulation, frequency conversion, multiplexing, noise and distortion; spectral and signal-to-noise ratio analysis, probability of error in digital systems, spread spectrum. Prerequisites: 179 or 261, and 178 or 278.

3 units, Win (Cox, D)

EE 282. Computer Systems Architecture

Course focuses on how to build modern computing systems, namely notebooks, smartphones, and data centers, covering primarily their hardware architecture and certain system software aspects. For each system class, we cover the system architecture, processor technology, advanced memory hierarchy and I/O organization, power and energy management, and reliability. We will also cover topics such as interactions with system software, virtualization, solid state storage, and security. The programming assignments allow students to explore performance/energy tradeoffs when using heterogeneous hardware resources on smartphone devices. Prerequisite: EE108B. Recommended: CS 140.

3 units, Spr (Staff)

EE 284. Introduction to Computer Networks

Structure and components of computer networks; functions and services; packet switching; layered architectures; OSI reference model; physical layer; data link layer; error control; window flow control; media access control protocols used in local area networks (Ethernet, Token Ring, FDDI) and satellite networks; network layer (datagram service, virtual circuit service, routing, congestion control, Internet Protocol); transport layer (UDP, TCP); application layer.

3 units, Aut (Tobagi, F)

EE 290A. Curricular Practical Training for Electrical Engineers

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 290B. Curricular Practical Training for Electrical Engineers

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 290C. Curricular Practical Training for Electrical Engineers

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 290D. Curricular Practical Training for Electrical Engineers

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

1 unit, Spr (Staff), Sum (Staff)

EE 292E. Analysis and Control of Markov Chains

Finite-state and countable-state Markov chains. Controlled Markov chains and dynamic programming algorithms. Application to modeling and analysis of engineering systems. Prerequisites: 263, 278.

3 units, not given this year

EE 292G. Switch Mode Power Conversion

Power conversion fundamentals including linear/shunt regulators, charge pumps, Buck, Boost, Buck-Boost, SEPIC, Cuk, and Flyback converters, magnetic components, volt second balance, continuous/discontinuous mode, synchronous/non-synchronous operation, voltage/current mode control, fixed frequency PWM and constant on or off time control, control loop analysis, compensator design, RMS/average value calculations for PWM current waveforms, inductor, capacitor, and MOSFET parasitics, output ripple, transient response, gate drive strategies, efficiency prediction, soft start, current limit, efficiency and power loss plots. Prerequisites: EE114

3 units, Spr (Leman, B)

EE 293A. Fundamentals of Energy Processes

(Same as ENERGY 293A) For seniors and graduate students. Thermodynamics, heat engines, thermoelectics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45

3-4 units, Aut (Brandt, A)

EE 293B. Fundamentals of Energy Processes

(Same as ENERGY 293B) For seniors and graduate students. Fuel cells. Production of hydrogen: electrolytic, chemical, thermolytic, photolytic. Hydrogen storage: hydrides. Photoelectric converters; photo-thermovoltaic converters. Wind turbines. Recommended: EE 293A; MATH 41; PHYSICS 41, 43, 45

3 units, Win (da Rosa, A)

EE 300. Master's Thesis and Thesis Research
Independent work under the direction of a department faculty. Written thesis required for final letter grade. The continuing grade 'N' is given in quarters prior to thesis submission. See 390 if a letter grade is not appropriate.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 302. Biomedical Electronics
Biomedical electronics and instruments based on electrical engineering for diagnostics and therapeutic treatments of biological systems, focusing on the theory and design principles in modern biomedical electronics using electromagnetic properties. Topics include circuit design for implanted medical devices, physics and signal processing for medical imaging systems, techniques for neural measurements and neuro-decoding, and electronics for drug delivery. Prerequisites: EE 214, 264,and 265.
3 units, Win (Poon, A)

EE 303. Autonomous Implantable Systems
How implantable systems can revolutionize health care in the coming decades. Potential applications include implantable sensors and monitoring devices for preventive and post-surgery monitoring; drug delivery systems that can be placed closer to cancer cells and are able to administer dosage automatically; medical robots that perform surgery inside patients with greater precision and less pain; and neural implants for brain-machine interface. Focus is on the analysis and design of remotely-powered, miniature implantable devices for those applications. Prerequisites: EE114
3 units, Spr (Poon, A)

EE 309. Semiconductor Memory Devices and Technology
Focus is on the device physics and operation principles of nanoelectric devices. Topics identified by the International Technology Roadmap for Semiconductors, emerging research devices sec-tion; see http://www.itrs.net. Non-silicon-based devices such as carbon nanotubes, grapheme, semiconductor na-nowires, and molecular devices; and non-FET based devices such as single electron transistors (SET) and resonant tunneling diodes (RTD). Logic and memory devices are covered. Prerequisite: undergra-duate device physics, EE 222, EE 216. Recommended: EE 212, EE 223, EE 228, EE 311, and EE 316 Offered Alternate years. Offered in Spring, 2011 Prerequisite: 216. Recommended: 212, 311, 316.
3 units, alternate years, not given this year

EE 310. Integrated Circuits Technology and Design Seminar
State-of-the-art micro- and nanoelectronics, nanotechnology, advanced materials, and nanoscience for device applications. Prerequisites: EE216, EE316.
1 unit, Win (Nishi, Y; Wong, P; Saraswat, K)

EE 311. Advanced Integrated Circuits Technology
What are the practical and fundamental limits to the evolution of the technology of modern MOS devices and interconnects? How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of MOS devices and back-end (interconnect and contact) processing. What are future device structures and materials to maintain progress in integrated electronics? MOS front-end and back-end process integration. Prerequisites: EE212, EE216 or equivalent.
3 units, Spr (Saraswat, K)

EE 312. Micromachined Sensors and Actuators
Solid-state sensors and actuators, focusing on the use of integrated circuit fabrication technology for their realization. Categories of sensors and actuators include biological, chemical, mechanical, optical, and thermal. Mechanisms of transduction, fabrication techniques, and relative merits of different technologies. Micromachining techniques for monolithic integration of active circuits with sensors or actuators. Directions for future research. Prerequisite: 212 or equivalent.
3 units, Win (Giovangrandi, L)

EE 313. Digital MOS Integrated Circuits
Looks a little more deeply at how digital circuits operate, what makes a gate digital, and how to ""cheat"" to improve performance or power. To aid this analysis we create a number of different models for MOS transistors and choose the simplest one that can explain our the circuit's operation, using both hand and computer analysis. We explore static, dynamic, pulse-mode, and current mode logic, and show how they are are used in SRAM design. Topics include sizing for min delay, noise and noise margins, power dissipation. The class uses memory design (SRAM) as a motivating example. DRAM and EEPROM design issues are also covered. Prerequisites: 101B, 108A. Recommended: 271.
3 units, Win (Staff)

EE 314. RF Integrated Circuit Design
Design of RF integrated circuits for communications systems, primarily in CMOS. Topics: the design of matching networks and low-noise amplifiers at RF, mixers, modulators, and demodulators; review of classical control concepts necessary for oscillator design including PLLs and PLL-based frequency synthesizers. Design of low phase noise oscillators. Design of high-efficiency (e.g., class E, F) RF power amplifiers, coupling networks. Behavior and modeling of passive and active components at RF. Narrowband and broadband amplifiers; noise and distortion measures and mitigation methods. Overview of transceiver architectures. Prerequisite: 214.
3 units, Spr (Lee, T)

EE 315A. VLSI Signal Conditioning Circuits
Design and analysis of integrated circuits for active filters, precision gain stages, and sensor interfaces in CMOS VLSI technology. Operational transconductance amplifiers; sampled-data and continuous-time analog filters. Analysis of noise and amplifier imperfections; compensation techniques such as correlated double sampling. Sensor interfaces for micro-electromechanical and biomedical applications. Layout techniques for analog integrated circuits. Prerequisites: EE214
3 units, Spr (Murmann, B)

EE 315B. VLSI Data Conversion Circuits
Architectural and circuit level design and analysis of integrated analog-to-digital and digital-to-analog interfaces in CMOS VLSI technology. Fundamental circuit elements such as sampling circuits and voltage comparators. Circuits and architectures for Nyquist-rate and oversampling analog-to-digital and digital-to-analog conversion; digital decimation and interpolation filters. Examples of calibration and digital enhancement techniques. Prerequisite: EE 214. Recommended: EE 315A.
3 units, Aut (Murmann, B)

EE 316. Advanced VLSI Devices
In modern VLSI technologies, device electrical characteristics are sensitive to structural details and therefore to fabrication techniques. How are advanced VLSI devices designed and what future changes are likely? What are the implications for device electrical performance caused by fabrication techniques? Physical models for nanometer scale structures, control of electrical characteristics (threshold voltage, short channel effects, ballistic transport) in small structures, and alternative device structures for VLSI. Prerequisites: 212 and 216, or equivalent.
3 units, Win (Wong, P)

EE 317. Micropatterning for Integrated Circuits
The fundamentals of generating submicron patterns in integrated circuit manufacturing. Technologies include the formation of submicron images of ultraviolet light, the resulting exposure of polymeric resists, the subsequent development of resist patterns and their transfer into functional circuit material patterns through plasma etching and other techniques. Use of phase-shifting masks and other wavefront-engineering approaches. Hands-on computer simulations. Prerequisites: 141 or equivalent, 212 or equivalent.
3 units, not given this year

EE 319. Advanced Nanoelectronic Devices and Technology
Recent advances in materials science, device physics and structures, and processing technology, to extend VLS1 device scaling towards atomistic and quantum-mechanical physics boundaries. Topics include: mobility-enhancement techniques; nanomaterial structures including tube, wire, beam, and crystal; conducting polymer; 3D FET; gate-wraparound FET; nonvolatile memory phenomena and devices; self-assembly; flash annealing; plasma doping; and nano pattering. Prerequisites: 216, 316.
3 units, not given this year

EE 320. Nanoelectronics
Focus is on the device physics and operation principles of nanoelectric devices. Topics identified by the International Technology Roadmap for Semiconductors, emerging research devices section; see http://www.itrs.net. Non-silicon-based devices such as carbon nanotubes, grapheme, semiconductor nanowires, and molecular devices; and non-FET based devices such as single electron transistors (SET) and resonant tunneling diodes (RTD). Logic and memory devices. Offered alternative years. Prerequisites: under-

graduate device physics, EE 222, 216. Recommended: EE 223, 228, or 316.

3 units, Spr (Wong, P)

EE 322. Molecular Electronics and Photonics

Physics of charge and energy transfer in molecular systems and connection with traditional mesoscopic transport theories. Analysis of molecular organic light-emitting diodes, photovoltaic cells and transistors. Technology and applications of molecular semiconductors. Prerequisite: 228 or equivalent.

3 units, not given this year

EE 327. Properties of Semiconductor Materials

Modern semiconductor devices and integrated circuits are based on unique energy band, carrier transport, and optical properties of semiconductor materials. How to choose these properties for operation of semiconductor devices. Emphasis is on quantum mechanical foundations of the properties of solids, energy bandgap engineering, semi-classical transport theory, semi-conductor statistics, carrier scattering, electro-magneto transport effects, high field ballistic transport, Boltzmann transport equation, quantum mechanical transitions, optical absorption, and radiative and non-radiative recombination that are the foundations of modern transistors and optoelectronic devices. Prerequisites: EE216 or equivalent.

3 units, Spr (Harris, J)

EE 328. Physics of Advanced Semiconductor Devices

Principles governing the operation of modern semiconductor devices. Assumptions and approximations commonly made in analyzing devices. Emphasis is on the application of semiconductor physics to the development of advanced semiconductor devices such as heterojunctions, HJ-bipolar transistors, HJ-FETs, nanostructures, tunneling, single electron transistor and photonic devices. Use of SENTARUS, a 2-D Poisson solver, for simulation of ultra-small devices. Examples related to state-of-the-art devices and current device research. Prerequisite: 216. Recommended: 316.

3 units, not given this year

EE 329. The Electronic Structure of Surfaces and Interfaces

Physical concepts and phenomena for surface science techniques probing the electronic and chemical structure of surfaces, interfaces and nanomaterials. Microscopic and atomic models of microstructures; applications including semiconductor device technology, catalysis and energy. Physical processes of UV and X¿ray photoemission spectroscopy, Auger electron spectroscopy, surface EXAFS, low energy electron diffraction, electron/photon stimulated ion desorption, scanning tunneling spectroscopy, ion scattering, energy loss spectroscopy and related imaging methods; and experimental aspects of these surface science techniques. Prerequisites: PHYSICS 70 and MATSCI 199/209, or consent of instructor.

3 units, Aut (Pianetta, P)

EE 334. Micro and Nano Optical Device Design

Lecture and project course on design and analysis of optical devices with emphasis on opportunities and challenges created by scaling to the micrometer and nanometer ranges. The emphasis is on fundamentals, combined with some coverage of practical implementations. Prerequisite: 242 or equivalent

3 units, Aut (Solgaard, O)

EE 336. Nanophotonics

(Same as MATSCI 346) Recent developments in micro- and nanophotonic materials and devices. Basic concepts of photonic crystals. Integrated photonic circuits. Photonic crystal fibers. Superprism effects. Optical properties of metallic nanostructures. Subwavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: electromagnetic theory at the level of 242.

3 units, Win (Fan, S; Brongersma, M)

EE 340. Optical micro- and nano-cavities

Optical micro- and nano-cavities and their device applications. Types of optical cavities (microdisks, microspheres, photonic crystal cavities, plasmonic cavities), and their electromagnetic properties, design, and fabrication techniques. Cavity quantum electrodynamics: strong and weak-coupling regime, Purcell factor, spontaneous emission control. Applications of optical cavities, including low-threshold lasers, optical modulators, quantum information processing devices, and bio-chemical sensors. Prerequisites: advanced undergraduate or basic graduate-level knowledge of electromagnetics, quantum mechanics, and physics of semiconductors.

3 units, Spr (Vuckovic, J)

EE 343. Advanced Optoelectronic Devices

Semiconductor quantum well structures; superlattices and coupled quantum wells; optical properties of quantum wells; valence band structure; effects of strain; quantum well lasers; intersubband detectors; excitons in quantum wells; absorption saturation; electroabsorption; quantum well modulators and switches. Prerequisites: 222 or equivalent quantum mechanics, 243. Recommended: 223.

3 units, not given this year

EE 344. High Frequency Laboratory

Lecture/lab emphasizing lab. Techniques in the 1MHz-1GHz range useful in designing and measuring oscillators, amplifiers, and mixers. High frequency measurement techniques including s-parameter measurements, amplifier noise figure, and oscillator phase noise. Guest speakers from Lucent and Hewlett-Packard. Enrollment limited to 25. Prerequisites: transmission lines, Smith charts. Recommended: 314.

3 units, Aut (Scherer, D; Swain, H; Cox, D)

EE 345. Optical Fiber Communication Laboratory

Experimental techniques in optical fiber communications and networking. Experimental investigation of key optical communications components including fibers, lasers, modulators, photodiodes, optical amplifiers, and WDM multiplexers and demultiplexers. Fundamental optical communications systems techniques: eye diagrams, BER measurements, experimental evaluation of nonlinearties. Prerequisites: Undergraduate physics and optics.

3 units, Spr (Kazovsky, L)

EE 346. Introduction to Nonlinear Optics

Wave propagation in anisotropic, nonlinear, and time-varying media. Microscopic and macroscopic description of electric dipole susceptibilities. Free and forced waves-phasematching; slowly varying envelope approximation-dispersion, diffraction, space-time analogy; harmonic generation; frequency conversion; parametric amplification and oscillation; electro-optic light modulation; nonlinear processes in optical fibers. Prerequisites: 141, 242.

3 units, Spr (Fejer, M)

EE 347. Optical Methods in Engineering Science

Design and understanding of modern optical systems. Topics: geometrical optics; aberration theory; systems layout; applications such as microscopes, telescopes, optical processors. Computer ray tracing program as a design tool. Prerequisite: 268 or 366, or equivalent.

3 units, not given this year

EE 348. Advanced Optical Fiber Communications

Optical amplifiers: gain, saturation, noise. Semiconductor amplifiers. Erbium-doped fiber amplifiers. System applications: preamplified receiver performance, amplifier chains. Raman amplifiers, lumped vs. distributed amplification. Group-velocity dispersion management: dispersion-compensating fibers, filters, gratings. Interaction of dispersion and nonlinearity, dispersion maps. Multichannel systems. Wavelength-division multiplexing components: filters, multiplexers. WDM systems, crosstalk. Time, subcarrier, code and polarization-division multiplexing. Comparison of modulation techniques: differential phase-shift keying, phase-shift keying, quadrature-amplitude modulation. Comparison of detection techniques: noncoherent, differentially coherent, coherent. Prerequisite: 247.

3 units, not given this year

EE 349. Nano Optics and Grating Photonics

Coupled wave analysis of periodic structures, gratings structures for optical communcations, wave-matter interactions with periodic media and photonic crystals, applications of periodic structures. Prerequisite: 268 or 366, or equivalent.

3 units, Win (Hesselink, L)

EE 350. STARLab Seminar
Research topics from space physics, planetary exploration, ionospheric and magnetospheric physics, radar and remote sensing of the environment, applied electromagnetics, waves in optical fibers, and information systems with space applications. Applied research areas include wireless personal communications, high bandwidth wired and wireless transmission, optical communication systems, sensor networks, and related underlying and advancing technologies.
1 unit, not given this year

EE 354. Introduction to Radio Wave Scattering
Integral and differential equations of radio wave scattering; exact, approximate, and numerical solutions of single particle scattering for spheres, edges, points, and cylinders. Scattering from rough surfaces with large and small roughness scales, as time permits. Multiple scattering; formulation and solution techniques for equation of transfer in discrete media and scattering by continuous media in weak and strong regimes. Applications to radar, radar astronomy, remote sensing, and biological media. Prerequisites: electromagnetic theory through standard graduate engineering topics; partial differential equations, boundary value problems in rectangular and spherical coordinates; and consent of instructor.
3 units, not given this year

EE 355. Imaging Radar and Applications
(Same as GEOPHYS 265) Radar remote sensing, radar image characteristics, viewing geometry, range coding, synthetic aperture processing, correlation, range migration, range/Doppler algorithms, wave domain algorithms, polar algorithm, polarimetric processing, interferometric measurements. Applications: surfafe deformation, polarimetry and target discrimination, topographic mapping surface displacements, velocities of ice fields. Prerequisites: EE261
3 units, Win (Zebker, H)

EE 356. Elementary Plasma Physics: Principles and Applications
Plasmas in nature and industry. Single particle motions. Plasma kinetic theory. Boltzmann equation and its moments. Cold and warm plasma models. Plasma as a fluid. Magnetohydrodynamics. Plasma conductivity and diffusion. Langmuir oscillations. Debye shielding. Plasma sheath. Waves in cold, magnetized, warm, and hot plasmas. Electron and ion waves. MHD waves. Landau damping. Nonlinear effects. Applications in industry and space science. Prerequisite: 242 or PHYSICS 122.
3 units, not given this year

EE 359. Wireless Communications
This course will cover advanced topics in wireless communications for voice, data, and multimedia. Topics include: an overview of current and future wireless systems; wireless channel models including path loss, shadowing, and statistical multipath channel models; fundamental capacity limits of wireless channels; digital modulation and its performance in fading and intersymbol interference; techniques to combat fading including adaptive modulation, diversity, and multiple antenna systems (MIMO); techniques to combat intersymbol interference including equalization, multicarrier modulation (OFDM), and spread spectrum; and an overview of wireless network design. Prerequisite: 279.
3-4 units, Aut (Goldsmith, A)

EE 363. Linear Dynamic Systems
Continuation of 263. Optimal control and dynamic programming; linear quadratic regulator. Lyapunov theory and methods. Linear estimation and the Kalman filter. Perron-Frobenius theory. Examples and applications from digital filters, circuits, signal processing, and control systems. Prerequisites: 263 or equivalent; basic probability.
3 units, not given this year

EE 364A. Convex Optimization I
(Same as CME 364A) Convex sets, functions, and optimization problems. The basics of convex analysis and theory of convex programming: optimality conditions, duality theory, theorems of alternative, and applications. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems. Applications to signal processing, communications, control, analog and digital circuit design, computational geometry, statistics, machine learning, and mechanical engineering. Prerequisite: linear algebra such as 263.
3 units, Win (Boyd, S)

EE 364B. Convex Optimization II
(Same as CME 364B) Continuation of 364. Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Exploiting problem structure in implementation. Convex relaxations of hard problems. Global optimization via branch and bound. Robust and stochastic optimization. Applications in areas such as control, circuit design, signal processing, and communications. Substantial project. Prerequisite: 364A.
3 units, Spr (Boyd, S)

EE 366. Introduction to Fourier Optics
Applications of Fourier theory to the analysis and synthesis of optical imaging and optical data processing systems. Propagation and diffraction of light, Fresnel and Fraunhofer approximations, Fourier transforming properties of lenses, image formation with coherent and incoherent light, transform functions of imaging systems, optical data processing, and holography. Prerequisite: familiarity with Fourier analysis. Recommended: 261.
3 units, not given this year

EE 368. Digital Image Processing
Image sampling and quantization color, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, eigenimages, multiresolution image processing, wavelets, noise reduction and restoration, feature extraction and recognition tasks, image registration. Emphasis is on the general principles of image processing. Students write and investigate image processing algorithms in Matlab. Term project. Prerequisites: 261, 278.
3 units, Spr (Girod, B)

EE 369A. Medical Imaging Systems I
Imaging internal structures within the body using high-energy radiation studied from a systems viewpoint. Modalities covered: x-ray, computed tomography, and nuclear medicine. Analysis of existing and proposed systems in terms of resolution, frequency response, detection sensitivity, noise, and potential for improved diagnosis. Prerequisite: 261.
3 units, Win (Nishimura, D)

EE 369B. Medical Imaging Systems II
Imaging internal structures within the body using non-ionizing radiation studied from a systems viewpoint. Modalities include ultrasound and magnetic resonance. Analysis of ultrasonic systems including diffraction and noise. Analysis of magnetic resonance systems including physics, Fourier properties of image formation, and noise. Prerequisite: 261.
3 units, Spr (Nishimura, D)

EE 369C. Medical Image Reconstruction
Reconstruction problems from medical imaging, including magnetic resonance imaging (MRI), computed tomography (CT), and positron emission tomography (PET). Problems include reconstruction from non-uniform frequency domain data, automatic deblurring, phase unwrapping, reconstruction from incomplete data, and reconstruction from projections. Prerequisite: 369B.
3 units, not given this year

EE 371. Advanced VLSI Circuit Design
Design of high-performance digital systems, the things that cause them to fail, and how to avoid these problems. Topics will focus on current issues including: wiring resistance and how to deal with it, power and Gnd noise and regulation, clock (or asynchronous) system design and how to minimize clocking overhead, high-speed I/O design, energy minimization including leakage control, and structuring your Verilog code to result in high-performance, low energy systems. Extensive use of modern CAD tools. Prerequisites: 271 and 313, or consent of instructor.
3 units, not given this year

EE 374. Inference in Graphical Models
Probabilistic models with sparse graphical structures, low-complexity inference algorithms, and their analysis. Algorithmic methods: variational inference; message passing algorithms; belief propagation; generalized belief propagation; survey propagation. Learning graphical models, structural learning. Applications/examples include: Gaussian models with sparse inverse covariance; hidden Markov models (Viterbi and BCJR algorithms,

Kalman filter); computer vision (segmentation, tracking, etc); constraint satisfaction problems; machine learning (clustering, classification); communications. Prerequisite: 278, STATS 116, or CS 228. Recommended: 376A or STATS 217/218.

3 units, not given this year

EE 376A. Information Theory

(Same as STATS 376A) The fundamental ideas of information theory. Entropy and intrinsic randomness. Data compression to the entropy limit. Huffman coding. Arithmetic coding. Channel capacity, the communication limit. Gaussian channels. Kolmogorov complexity. Asymptotic equipartition property. Information theory and Kelly gambling. Applications to communication and data compression. Prerequisite: EE178 or EE278 or STATS 116, or equivalent.

3 units, Win (Cover, T)

EE 376B. Information Theory

(Same as STATS 376B) Rate distortion theory and Kolmogorov complexity. Information theory and statistics. Method of types. Stein's lemma. AEP. Information capacity of networks. Slepian-Wolf theorem. Optimal investment and information theory. Universal portfolios and universal data compression. Maximum entropy and Burg's theorem. Prerequisite: EE376A.

3 units, Spr (Cover, T)

EE 378A. Statistical Signal Processing

Random signals in electrical engineering. Discrete-time random processes: stationarity and ergodicity, covariance sequences, power spectral density, parametric models for stationary processes. Fundamentals of linear estimation: minimum mean squared error estimation, optimum linear estimation, orthogonality principle, the Wold decomposition. Causal linear estimation of stationary processes: the causal Wiener filter, Kalman filtering. Parameter estimation: criteria of goodness of estimators, Fisher information, Cramer-Rao inequality, Chapman-Robbins inequality, maximum likelihood estimation, method of moments, consistency, efficiency. ARMA parameter estimation: Yule-Walker equations, Levinson-Durbin algorithm, least squares estimation, moving average parameter estimation, modified Yule-Walker method for model order selection. Spectrum estimation: sample covariances, covariance estimation, Bartlett formula, periodogram, periodogram averaging, windowed periodograms. Prerequisites: EE 278

3 units, Win (Weissman, I)

EE 378B. Inference, Estimation, and Information Processing

Techniques and models for signal, data and information processing, with emphasis on incomplete data, non-ordered index sets and robust low-complexity methods. Linear models; regularization and shrinkage; dimensionality reduction; streaming algorithms; sketching; clustering, search in high dimension; low-rank models; principal component analysis. Applications include: positioning from pairwise distances; distributed sensing; measurement/traffic monitoring in networks; finding communities/clusters in networks; recommendation systems; inverse problems. Prerequisites: EE278 and EE263 or equivalent. Recommended but not required: EE378 A

3 units, Spr (Montanari, A)

EE 379. Digital Communication

Modulation methods and bandwidth requirements, baseband and passband system analysis, minimum-probability-of-error and maximum-likelihood detection, error-probability analysis, intersymbol interference, maximum-likelihood sequence detection, equalization methods, orthogonal frequency-division multiplexing. Prerequisite: EE102B, EE278

3 units, Win (Kahn, J)

EE 380. Colloquium on Computer Systems

Live presentations of current research in the design, implementation, analysis, and applications of computer systems. Topics range over a wide range and are different every quarter. Topics may include fundamental science, mathematics, cryptography, device physics, integrated circuits, computer architecture, programming, programming languages, optimization, applications, simulation, graphics, social implications, venture capital, patent and copyright law, networks, computer security, and other topics of related to computer systems.

1 unit, Aut (Allison, D; Freeman, J), Win (Allison, D; Freeman, J), Spr (Allison, D; Freeman, J), Sum (Allison, D; Freeman, J)

EE 382A. Advanced Processor Architecture

Provides in-depth coverage of fundamental architecture and implementation techniques for modern processor chips. Course covers topics such as advanced pipelining, superscalar execution, out-of-order processing, speculative execution, VLIW, data parallelism, multithreading, graphics processors, and multi-core chips. The students will become familiar with complex trade-offs between performance-power-complexity and the common techniques for addressing the challenges in historical and modern processors. A central part of EE382A is a group project on an open research question. Prerequisites: EE108B, CS140. Recommended: EE282, CS315A

3 units, Aut (Kozyrakis, C)

EE 382C. Interconnection Networks

The architecture and design of interconnection networks used to communicate from processor to memory, from processor to processor, and in switches and routers. Topics: network topology, routing methods, flow control, router microarchitecture, and performance analysis. Enrollment limited to 30. Prerequisite: 282.

3 units, Spr (Dally, W)

EE 382D. Advanced Computer Arithmetic

Number systems, floating point representation, state of the art in arithmetic algorithms, problems in the design of high speed arithmetic units. Prerequisite: 282.

3 units, not given this year

EE 384A. Internet Routing Protocols and Standards

Local area networks addressing and switching; IEEE 802.1 bridging protocols (transparent bridging, virtual LANs). Internet routing protocols: interior gateways (RIP, OSPF) and exterior gateways (BGP); multicast routing; multiprotocol label switching (MPLS). Routing in mobile networks: Mobile IP, Mobile Ad Hoc Networks (MANET), Wireless Mesh Networks. Prerequisite: 284 or CS 144.

3 units, Win (Tobagi, F)

EE 384B. Multimedia Communication over the Internet

Applications and requirements. Traffic generation and characterization: voice encoding (G.711, G.729, G.723); image and video compression (JPEG, H.261, MPEG-2, H.263, H.264), TCP data traffic. Quality impairments and measures. Networking technologies: LAN technologies; home broadband services (ADSL, cable modems, PONs); and wireless LANs (802.11). Network protocols for multimedia applications: resource reservation (ST2+, RSVP); differentiated services (DiffServ); and real-time transport protocol (RTP, RTCP). Audio-video-data conferencing standards: Internet architecture (SDP, SAP, SIP); ITU recommendations (H.320, H.323 and T.120); and real-time streaming protocol (RTSP). Prerequisite: 284 or CS 144. Recommended: 384A.

3 units, not given this year

EE 384C. Wireless Local Area Networks

Characteristics of wireless communication: multipath, noise, and interference. Communications techniques: spread-spectrum, CDMA, and OFDM. IEEE 802.11 physical layer specifications: FHSS, DSSS, IEEE 802.11b (CCK), and 802.11a/g (OFDM). IEEE 802.11 media access control protocols: carrier sense multiple access with collision avoidance (CSMA/CA), point coordination function (PCF), IEEE802.11e for differentiated services. IEEE 802.11 network architecture: ad hoc and infrastructure modes, access point functionality. Management functions: synchronization, power management and association. Current research papers in the open literature. Prerequisite: 284 or CS 244A.

3 units, Spr (Tobagi, F)

EE 384E. Wireless Networking

(Same as CS 244E) Design and implementation of wireless networks and mobile systems. The course will commence with a short retrospective of wireless communication and initially touch on some of the fundamental physical layer properties of various wireless communication technologies. The focus will then shift to design of media access control and routing layers for various wireless systems. The course will also examine adaptations necessary at transport and higher layers to cope with node mobility and error-prone nature of the wireless medium. Finally, it will conclude with a brief overview of other related issues including emerging wireless/mobile applications. Prerequisites: EE 284

3 units, Win (Katti, S; Levis, P)

EE 384M. Network Science
Modern large-scale networks consist of (i) Information Networks, such as the Web and Social Networks, and (ii) Data Centers, which are networks interconnecting computing and storage elements for servicing the users of an Information Network. This course is concerned with the mathematical models and the algorithms used in Information Networks and Data Centers. Prerequisite: 278 or CS 365.

3 units, not given this year

EE 384P. Projects: The Programmable Open Mobile Internet (POMI)
A new Stanford research program in EE and CS to define the next generation of mobile computing: from the handheld device and its operating system to the network, radios, and cloud computing that supports the user. Small student teams prototype part of the next Internet architecture. Emphasis is on how the Internet can support billions of mobile users. Prerequisite: EE 284, CS 244A, CS 144, or equivalents, and programming skills.

3 units, not given this year

EE 384S. Performance Engineering of Computer Systems and Networks
Modeling and control methodologies for high-performance network engineering, including: Markov chains and stochastic modeling, queueing networks and congestion management, dynamic programming and task/processor scheduling, network dimensioning and optimization, and simulation methods. Applications for design of high-performance architectures for wireline/wireless networks and the Internet, including: traffic modeling, admission and congestion control, quality of service support, power control in wireless networks, packet scheduling in switches, video streaming over wireless links, and virus/worm propagation dynamics and countermeasures. Enrollment limited to 30. Prerequisites: basic networking technologies and probability.

3 units, Spr (Bambos, N)

EE 384X. Packet Switch Architectures I
The theory and practice of designing packet switches, such as Internet routers, and Ethernet switches. Introduction: evolution of switches and routers. Output queued switches: motivation and methods for providing bandwidth and delay guarantees. Switching: output queueing, parallelism in switches, distributed shared memory switches, input-queued switches, combined input-output queued switches, how to make fast packet buffers, buffered crossbar switches. Scheduling input queued crossbars: connections with bipartite graph matching, algorithms for 100% throughput, practical algorithms and heuristics. Looking forward: Architectures and switches for data center networks. Prerequisites: EE284 or CS 244A. Recommended: EE 178 or EE 278 or STAT 116.

3 units, not given this year

EE 385A. Robust and Testable Systems Seminar
Student/faculty discussions of research problems in the design of reliable digital systems. Areas: fault-tolerant systems, design for testability, production testing, and system reliability. Emphasis is on student presentations and Ph.D. thesis research. May be repeated for credit. Prerequisite: consent of instructor.

1-4 units, Aut (McCluskey, E; Mitra, S), Win (McCluskey, E; Mitra, S), Spr (McCluskey, E; Mitra, S), Sum (McCluskey, E)

EE 386. Robust System Design
Causes of system malfunctions; techniques for building robust systems that avoid or are resilient to such malfunctions through built-in error detection and correction, prediction, self-test, self-recovery, and self-repair; case studies and new research problems. Prerequisites: 108A,B, 282.

3 units, Spr (Mitra, S)

EE 387. Algebraic Error Control Codes
Theory and implementation of algebraic codes for detection and correction of random and burst errors. Introduction to finite fields. Linear block codes, cyclic codes, Hamming codes, BCH codes, Reed-Solomon codes. Decoding algorithms for BCH and Reed-Solomon codes. Prerequisites: elementary probability, linear algebra.

3 units, Aut (Gill, J)

EE 388. Modern Coding Theory
Tools for analysis and optimization of iterative coding systems. LDPC, turbo and, RA codes. Optimized ensembles, message passing algorithms, density evolution, and analytic techniques. Prerequisite: 376A.

3 units, not given this year

EE 390. Special Studies or Projects in Electrical Engineering
Independent work under the direction of a faculty member. Individual or team activities may involve lab experimentation, design of devices or systems, or directed reading.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 391. Special Studies and Reports in Electrical Engineering
Independent work under the direction of a faculty member; written report or written examination required. Letter grade given on the basis of the report; if not appropriate, student should enroll in 390.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 392J. Digital Video Processing
Spatio-temporal sampling, motion analysis, parametric motion models, motion-compensated filtering, and video processing operations including noise reduction, restoration, superresolution, deinterlacing and video sampling structure conversion, and compression (frame-based and object-based methods). Video segmentation and layered video representations, video streaming, compressed-domain video processing, and digital TV. Prerequisite: 368.

3 units, not given this year

EE 392T. Seminar in Chip Test and Debug
Seminars by industry professionals in digital IC manufacturing test and silicon debug. Topics include yield and binsplit modeling, defect types and detection, debug hardware, physical analysis, and design for test/debug circuits. Case studies of silicon failures. Prerequisite: basic digital IC design (271 or 371).

1 unit, Win (Stinson, J)

EE 392V. Signal Processing in VoIP Systems
VoIP protocols: RTP and SIP. Voice encoding standards: PCM, ADPCM, and LPC. Speech quality measurement: MOS, PESQ, and E-model. Characterization of VoIP impairments: delay, jitter, packet loss, and clock skew. Signal processing algorithms to improve VoIP quality: echo cancellation, adaptive jitter buffering, packet loss concealment, and decoder clock synchronization. Prerequisites: 261 and 278, or equivalents.

3 units, not given this year

EE 395. Electrical Engineering Instruction: Practice Teaching
Open to advanced EE graduate students who plan to make teaching their career. Students conduct a section of an established course taught in parallel by an experienced instructor. Enrollment limited.

1-15 units, Aut (Nishimura, D), Win (Nishimura, D), Spr (Nishimura, D)

EE 398A. Image and Video Compression
Replaces EE398. The principles of source coding for the efficient storage and transmission of still and moving images. Entropy and lossless coding techniques. Run-length coding and fax compression. Arithmetic coding. Rate-distortion limits and quantization. Lossless and lossy predictive coding. Transform coding, JPEG. Subband coding, wavelets, JPEG2000. Motion-compensated coding, MPEG. Students investigate image and video compression algorithms in Matlab or C. Term project. Prerequisites: 261, 278.

3 units, Win (Girod, B)

EE 398B. Video Communication Systems
Explore multimedia networking and communication, with emphasis on systems for video delivery. In-depth discussion of video coding techniques. Standards: MPEG-1, MPEG-2, MPEG-4, ITU-T H.261, H.263, H264. Coder control, rate adaptation, Scalable video. Error resilient coding. Network adaptive video transport. Distributed coding, authentication, watermarking. Videoconferencing, digital TV broadcasting, HDTV, Internet media streaming, IPTV, digital cinema, mobile media systems. Peer-to-peer media delivery. Video summarization and retrieval. Students investigate video coding algorithms in Matlab or C. Term project.Prerequisite: EE 398A.

3 units, not given this year

EE 400. Thesis and Thesis Research
Limited to candidates for the degree of Engineer or Ph.D.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 402A. Topics in International Technology Management
Theme for Autumn 2010 is Asia technology management in energy and cleantech technology and business trends, innovations,

and challenges such as standards, IPR, and differing regulatory regimes in major Asian economies. Implications for US firms and researchers. Distinguished speakers from industry and government.
1 unit, Aut (Dasher, R)

EE 402S. Topics in International Advanced Technology Research
Theme for Spring 2011 is recent approaches to chip-level integration. Survey of advanced research into 3D integration, CMOS on encapsulated MEMS, III-V on Si, multi-processor architectures. Distinguished speakers from industry and universities. May be repeated for credit. Recommended: basic electronics.
1 unit, Spr (Dasher, R)

EE 402T. Entrepreneurship in Asian High Tech Industries
Distinctive patterns and challenges of entrepreneurship in Asia; update of business and technology issues in the creation and growth of start-up companies in major Asian economies. Distinguished speakers from industry, government, and academia.
1 unit, Spr (Dasher, R)

EE 410. Integrated Circuit Fabrication Laboratory
Fabrication, simulation, and testing of a submicron CMOS process. Practical aspects of IC fabrication including silicon wafer cleaning, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, physical sputtering, and electrical testing. Students also simulate the CMOS process using process simulator TSUPREM4 of the structures and electrical parameters that should result from the process flow. Taught in the Stanford Nanofabrication Facility (SNF). Preference to students pursuing doctoral research program requiring SNF facilities. Enrollment limited to 20. Prerequisites: 212, 216, consent of instructor.
3-4 units, Win (Saraswat, K)

EE 412. Advanced Nanofabrication Laboratory
Experimental projects and seminars on integrated circuit fabrication using epitaxial, oxidation, diffusion, evaporation, sputtering, and photolithographic processes with emphasis on techniques for achieving advanced device performance. May be repeated for additional credit. Prerequisites: ENGR341 or EE410 or consent of instructor.
3 units, Aut (Howe, R; Solgaard, O), Win (Pruitt, B)

EE 414. RF Transceiver Design Laboratory
Students design, build, and test GHz transceivers using microstrip construction techniques and discrete components. The design, construction, and experimental characterization of representative transceiver building blocks: low noise amplifiers (LNAs), diode ring mixers, PLL-based frequency synthesizers, voltage-controlled oscillators (VCOs), power amplifiers (PAs), and microstrip filters and patch antennas. The characteristics of passive microstrip components (including interconnect). Emphasis is on a quantitative reconciliation of theoretical predictions and extensive experimental measurements performed with spectrum and network analyzers, time-domain reflectometers (TDRs), noise figure meter and phase noise analyzers. Prerequisites: EE 314, EE 344.
3 units, Win (Lee, T)

EE 418. Topics in Neuroengineering
Neuroscience and electrical engineering, focusing on principles and theory in modern neural prosthetic systems (brain-computer or brain-machine interfaces). Electrical properties of neurons, information encoding, neural measurement techniques and technology, processing electronics, information decoding and estimators, and statistical data analysis. Prerequisites: EE 214, EE 278.
3 units, not given this year

EE 453. Geomagnetically Trapped Radiation
Research on the radiation belts of Earth and other planets. Physical processes which lead to magnetic trapping of electrons and ions. Analytical tools for trapped radiation research. The nature of radiation belts, source and loss mechanisms, and the relation of radiation belts to other geophysical phenomena.
3 units, not given this year

EE 469B. RF Pulse Design for Magnetic Resonance Imaging
Magnetic resonance imaging (MRI) and spectroscopy (MRS) based on the use of radio frequency pulses to manipulate magnetization. Analysis and design of major types of RF pulses in one and multiple dimensions, analysis and design of sequences of RF pulses for fast imaging, and use of RF pulses for the creation of image contrast in MRI. Prerequisite: 369B.
3 units, not given this year

EE 476. Network Information Theory
Network information theory deals with the fundamental limits on information flow in networks and the optimal coding schemes that achieve these limits. It aims to extend Shannon's point-to-point information theory and the Ford-Fulkerson max-flow min-cut theorem to networks with multiple sources and destinations. The course presents the basic results and tools in the field in a simple and unified manner. Topics covered include: multiple access channels, broadcast channels, interference channels, channels with state, distributed source coding, multiple description coding, network coding, relay channels, interactive communication, and noisy network coding. Prerequisites: EE376A or equivalent.
3 units, Aut (El Gamal, A)

EE 477. Universal Schemes in Information Theory
Universal schemes for lossless and lossy compression, channel coding and decoding, prediction, denoising, and filtering. Characterization of performance limitations in the stochastic settting: entropy rate, rate-distortion function, channel capacity, Bayes envelope for prediction, denoising, and filtering. Lempel-Ziv lossless compression, and Lempel-Ziv based schemes for lossy compression, channel coding, prediction, and filtering. Discrete universal denoising. Compression-based approach to denoising. The compound decision problem. Prerequisites: 278, 376A,B.
3 units, Aut (Staff)

EE 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EE 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY RESOURCES ENGINEERING (ENERGY) COURSES

UNDERGRADUATE COURSES IN ENERGY RESOURCES ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ENERGY 24. Making Molehills out of Mountains: Energy and Development in Appalachia
Preparation for Alternative Spring Break trip to examine the past, present, and future role of energy in Appalachia. Positive and negative impacts of energy production; meetings with energy industry leaders, community groups, and policymakers. The larger role of energy development and energy issues in society. May be repeated for credit.
1 unit, not given this year

ENERGY 101. Energy and the Environment
(Same as EARTHSYS 101) Energy use in modern society and the consequences of current and future energy use patterns. Case studies illustrate resource estimation, engineering analysis of energy systems, and options for managing carbon emissions. Focus is on energy definitions, use patterns, resource estimation, pollution. Recommended: MATH 21 or 42, ENGR 30. GER:DB-EngrAppSci
3 units, Win (Kovscek, A; Durlofsky, L)

ENERGY 102. Renewable Energy Sources and Greener Energy Processes
(Same as EARTHSYS 102) The energy sources that power society are rooted in fossil energy although energy from the core of the Earth and the sun is almost inexhaustible; but the rate at which energy can be drawn from them with today's technology is limited. The renewable energy resource base, its conversion to useful forms, and practical methods of energy storage. Geothermal, wind, solar, biomass, and tidal energies; resource extraction and its consequences. Recommended: 101, MATH 21 or 42. GER:DB-EngrAppSci
3 units, Spr (Kovscek, A; Gerritsen, M)

ENERGY 104. Technology in the Greenhouse
Technologies that might be employed to reduce emissions of greenhouse materials, such as carbon dioxide, methane, nitrous

oxide, and black soot, produced by the generation and use of energy. Sources of greenhouse materials in the current energy mix and evidence for global geochemical and climate changes. Advantages and limitations of technologies to reduce emissions. Examples include renewable sources such as wind and solar energy, more efficient use of energy, hydrogen, capture and storage of carbon dioxide, and nuclear power.

3 units, Spr (Benson, S; Krause, M; Brandt, A)

ENERGY 120. Fundamentals of Petroleum Engineering

(Same as ENGR 120) Lectures, problems, field trip. Engineering topics in petroleum recovery; origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media. GER:DB-EngrAppSci

3 units, Aut (Horne, R; Wilcox, J)

ENERGY 121. Fundamentals of Multiphase Flow

(Same as ENERGY 221) Multiphase flow in porous media. Wettability, capillary pressure, imbibition and drainage, Leverett J-function, transition zone, vertical equilibrium. Relative permeabilities, Darcy's law for multiphase flow, fractional flow equation, effects of gravity, Buckley-Leverett theory, recovery predictions, volumetric linear scaling, JBN and Jones-Rozelle determination of relative permeability. Frontal advance equation, Buckley-Leverett equation as frontal advance solution, tracers in multiphase flow, adsorption, three-phase relative permeabilities. GER:DB-EngrAppSci

3 units, Win (Tchelepi, H)

ENERGY 125. Modeling and Simulation for Geoscientists and Engineers

Hands-on. Topics include deterministic and statistical modeling applied to problems such as flow in the subsurface, atmospheric pollution, biological populations, wave propagation, and crustal deformation. Student teams define and present a modeling problem.

3 units, Win (Mukerji, T)

ENERGY 130. Well Log Analysis I

For earth scientists and engineers. Interdisciplinary, providing a practical understanding of the interpretation of well logs. Lectures, problem sets using real field examples: methods for evaluating the presence of hydrocarbons in rock formations penetrated by exploratory and development drilling. The fundamentals of all types of logs, including electric and non-electric logs.

3 units, Aut (Lindblom, R)

ENERGY 141. Seismic Reservoir Characterization

(Same as GEOPHYS 241A, ENERGY 241) (Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112

3-4 units, Spr (Mukerji, T; Jia, B)

ENERGY 146. Reservoir Characterization and Flow Modeling with Outcrop Data

(Same as GES 246, ENERGY 246) Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip.

3 units, Aut (Graham, S; Tchelepi, H; Boucher, A; Stright, L; Kuralkhanov, D)

ENERGY 153. Carbon Capture and Sequestration

(Same as ENERGY 253) CO2 separation from syngas and flue gas for gasification and combustion processes. Transportation of CO2 in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO2. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis.

3-4 units, Aut (Wilcox, J; Benson, S)

ENERGY 155. Undergraduate Report on Energy Industry Training

On-the-job practical training under the guidance of on-site supervisors. Required report detailing work activities, problems, assignments and key results. Prerequisite: written consent of instructor.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 160. Modeling Uncertainty in the Earth Sciences

(Same as ENERGY 260) Whether Earth Science modeling is performed on a local, regional or global scale, for scientific or engineering purposes, uncertainty is inherently present due to lack of data and lack of understanding of the underlying phenomena. This course highlights the various issues, techniques and practical modeling tools available for modeling uncertainty of complex 3D/4D Earth systems. The course focuses on a practical breath rather than theoretical depth. Topics covered are: the process of building models, sources of uncertainty, probabilistic techniques, spatial data analysis and geostatistics, grid and scale, spatio-temporal uncertainty, visualizing uncertainty in large dimensions, Monte Carlo simulation, reducing uncertainty with data, value of information. Applications to both local (reservoir, aquifer) and global (climate) are covered through literature study. Extensive software use with SGEMS and Petrel. Project homework. Prerequisites: algebra (CME 104 or equivalent), introductory stat

3 units, Win (Caers, J; Honarkhah, M)

ENERGY 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics

(Same as EESS 161, EARTHSYS 161) Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools. GER:DB-NatSci

3-4 units, Win (Staff)

ENERGY 167. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties

(Same as ENERGY 267) Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor. GER:DB-EngrAppSci

3 units, Win (Kourt, W; Pande, K)

ENERGY 175. Well Test Analysis

Lectures, problems. Application of solutions of unsteady flow in porous media to transient pressure analysis of oil, gas, water, and geothermal wells. Pressure buildup analysis and drawdown. Design of well tests. Computer-aided interpretation.

3 units, not given this year

ENERGY 180. Oil and Gas Production Engineering

(Same as ENERGY 280) Design and analysis of production systems for oil and gas reservoirs. Topics: well completion, single-phase and multi-phase flow in wells and gathering systems, artificial lift and field processing, well stimulation, inflow performance. Prerequisite: 120. Recommended: 130. GER:DB-EngrAppSci

3 units, not given this year

ENERGY 191. Optimization of Energy Systems

(Same as ENERGY 291) Introductory mathematical programming and optimization using examples from energy industries. Emphasis on problem formulation and solving, secondary coverage of algorithms. Problem topics include optimization of energy investment, production, and transportation; uncertain and intermittent energy resources; energy storage; efficient energy production and conversion. Methods include linear and nonlinear optimization, as well as multi-objective and goal programming. Tools include Microsoft Excel and AMPL mathematical programming language. Prerequisites: MATH 41, MATH 51, or consent of instructor. Programming experience helpful (e.g, CS 106A-B).

3 units, Win (Brandt, A; Ahn, S)

ENERGY 192. Undergraduate Teaching Experience
Leading field trips, preparing lecture notes, quizzes under supervision of the instructor. May be repeated for credit.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 193. Undergraduate Research Problems
Original and guided research problems with comprehensive report. May be repeated for credit.

1-3 units, Aut (Staff), Win (Staff), Spr (Durlofsky, L; Gerritsen, M; Horne, R; Kovscek, A; Tchelepi, H), Sum (Staff)

ENERGY 194. Special Topics in Energy and Mineral Fluids
May be repeated for credit.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 199. Senior Project and Seminar in Energy Resources
Individual or group capstone project in Energy Resources Engineering. Emphasis is on report preparation. May be repeated for credit.

1-4 units, Aut (Staff), Win (Staff), Spr (Kovscek, A; Horne, R), Sum (Staff)

GRADUATE COURSES IN ENERGY RESOURCES ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ENERGY 210. Energy Policy for Scientists and Engineers
Graduate level seminar that addresses energy policy issues through discussion, invited talks and visits/field trips to policy making organizations and industry leaders.

1 unit, Spr (Staff)

ENERGY 211. Computer Programming in C++ for Earth Scientists and Engineers
(Same as CME 211) Computer programming methodology emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and modularity. Fundamental data structures. Time and space complexity analysis. The basic facilities of the programming language C++. Numerical problems from various science and engineering applications.

3 units, Win (Caulfield, E; Aboud, S)

ENERGY 212. Introduction to Large-Scale Computing in Engineering
(Same as CME 212) Advanced programming methodologies for solving fundamental engineering problems using algorithms with pervasive application across disciplines. Overview of computer systems from a programming perspective including processor architectures, memory hierarchies, machine arithmetic, performance tuning techniques. Algorithms include iterative, direct linear solvers, fft, and divide and conquer strategies for n-body problems. Software development; other practical UNIX tools including shell scripting, vi/emacs, gcc, make, gdb, gprof, version control systems and LaTeX. Prerequisites: CME 200/ME 300A, CME 211, and CS 106X or equivalent level of programming in C/C++.

3 units, Spr (Caulfield, E)

ENERGY 221. Fundamentals of Multiphase Flow
(Same as ENERGY 121) Multiphase flow in porous media. Wettability, capillary pressure, imbibition and drainage, Leverett J-function, transition zone, vertical equilibrium. Relative permeabilities, Darcy's law for multiphase flow, fractional flow equation, effects of gravity, Buckley-Leverett theory, recovery predictions, volumetric linear scaling, JBN and Jones-Rozelle determination of relative permeability. Frontal advance equation, Buckley-Leverett equation as frontal advance solution, tracers in multiphase flow, adsorption, three-phase relative permeabilities.

3 units, Win (Tchelepi, H)

ENERGY 222. Advanced Reservoir Engineering
Lectures, problems. General flow equations, tensor permeabilities, steady state radial flow, skin, and succession of steady states. Injectivity during fill-up of a depleted reservoir, injectivity for liquid-filled reservoirs. Flow potential and gravity forces, coning. Displacements in layered reservoirs. Transient radial flow equation, primary drainage of a cylindrical reservoir, line source solution, pseudo-steady state. May be repeated for credit. Prerequisite: 221.

3 units, Spr (Durlofsky, L; Rousset, M)

ENERGY 223. Reservoir Simulation
Fundamentals of petroleum reservoir simulation. Equations for multicomponent, multiphase flow between gridblocks comprising a petroleum reservoir. Relationships between black-oil and compositional models. Techniques for developing black-oil, compositional, thermal, and dual-porosity models. Practical considerations in the use of simulators for predicting reservoir performance. Class project. Prerequisite: 221 and 246, or consent of instructor. Recommended: CME 206.

3-4 units, Win (Durlofsky, L; Tchelepi, H; Gerritsen, M)

ENERGY 224. Advanced Reservoir Simulation
Topics include modeling of complex wells, coupling of surface facilities, compositional modeling, dual porosity models, treatment of full tensor permeability and grid nonorthogonality, local grid refinement, higher order methods, streamline simulation, upscaling, algebraic multigrid solvers, unstructured grid solvers, history matching, other selected topics. Prerequisite: 223 or consent of instructor. May be repeated for credit.

3 units, Aut (Durlofsky, L; Tchelepi, H; Aziz, K)

ENERGY 225. Theory of Gas Injection Processes
Lectures, problems. Theory of multicomponent, multiphase flow in porous media. Miscible displacement: diffusion and dispersion, convection-dispersion equations and its solutions. Method of characteristic calculations of chromatographic transport of multicomponent mixtures. Development of miscibility and interaction of phase behavior with heterogeneity. May be repeated for credit. Prerequisite: CME 200.

3 units, alternate years, not given this year

ENERGY 226. Thermal Recovery Methods
Theory and practice of thermal recovery methods: steam drive, cyclic steam injections, and in situ combustion. Models of combined mass and energy transport. Estimates of heated reservoir volume and oil recovery performance. Wellbore heat losses, recovery production, and field examples.

3 units, alternate years, not given this year

ENERGY 227. Enhanced Oil Recovery
The physics, theories, and methods of evaluating chemical, miscible, and thermal enhanced oil recovery projects. Existing methods and screening techniques, and analytical and simulation based means of evaluating project effectiveness. Dispersion-convection-adsorption equations, coupled heat, and mass balances and phase behavior provide requisite building blocks for evaluation.

3 units, alternate years, not given this year

ENERGY 230. Advanced Topics in Well Logging
State of the art tools and analyses; the technology, rock physical basis, and applications of each measurement. Hands-on computer-based analyses illustrate instructional material. Guest speakers on formation evaluation topics. Prerequisites: 130 or equivalent; basic well logging; and standard practice and application of electric well logs.

3 units, Spr (Lindblom, R; Suman, A)

ENERGY 240. Geostatistics for Spatial Phenomena
(Same as GES 240) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Multiple-point geostatistics and training image-based stochastic imaging of reservoir/field heterogeneities. Introduction to GSLIB and SGEMS software. Case studies from the oil and mining industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, STATS 116, GES 161, or equivalent.

3-4 units, Spr (Staff)

ENERGY 241. Seismic Reservoir Characterization
(Same as GEOPHYS 241A, ENERGY 141) (Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112

3-4 units, Spr (Mukerji, T; Jia, B)

ENERGY 242. Topics in Advanced Geostatistics
(Same as EESS 263) Conditional expectation theory and projections in Hilbert spaces; parametric versus non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, and annealing approaches to stochastic imaging; multiple point statistics inference and reproduction; neural net geostatistics; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, C++/Fortran.

3-4 units, not given this year

ENERGY 246. Reservoir Characterization and Flow Modeling with Outcrop Data
(Same as GES 246, ENERGY 146) Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip.

3 units, Aut (Graham, S; Tchelepi, H; Boucher, A; Stright, L; Kuralkhanov, D)

ENERGY 247. Stochastic Simulation
Characterization and inference of statistical properties of spatial random function models; how they average over volumes, expected fluctuations, and implementation issues. Models include point processes (Cox, Poisson), random sets (Boolean, truncated Gaussian), and mixture of Gaussian random functions. Prerequisite: 240.

3 units, not given this year

ENERGY 251. Thermodynamics of Equilibria
Lectures, problems. The volumetric behavior of fluids at high pressure. Equation of state representation of volumetric behavior. Thermodynamic functions and conditions of equilibrium, Gibbs and Helmholtz energy, chemical potential, fugacity. Phase diagrams for binary and multicomponent systems. Calculation of phase compositions from volumetric behavior for multicomponent mixtures. Experimental techniques for phase-equilibrium measurements. May be repeated for credit.

3 units, Aut (Kovscek, A)

ENERGY 252. Chemical Kinetics and Modeling
Fundamentals of chemical reaction kinetics in homogeneous and heterogeneous reaction systems from a molecular perspective. Development and application of the theory of chemical kinetics, including collision, transition state, and surface reactivity approaches. Relationships between thermodynamics and kinetics to overall mechanism predictions. Introduction to Gaussian 03. Lab involves chemical modeling including ab initio electronic structure calculations (Hartree-Fock, configuration interaction, coupled cluster, and many-body pertrubation theory) and thermodynamic predictions.

3 units, Spr (Wilcox, J; Sasmaz, E)

ENERGY 253. Carbon Capture and Sequestration
(Same as ENERGY 153) CO2 separation from syngas and flue gas for gasification and combustion processes. Transportation of CO2 in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO2. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis.

3-4 units, Aut (Wilcox, J; Benson, S)

ENERGY 255. Master's Report on Energy Industry Training
On-the-job training for master's degree students under the guidance of on-site supervisors. Students submit a report detailing work activities, problems, assignments, and key results. May be repeated for credit. Prerequisite: consent of adviser.

1-3 units, Sum (Staff)

ENERGY 259. Presentation Skills
For teaching assistants in Energy Resources Engineering. Five two-hour sessions in the first half of the quarter. Awareness of different learning styles, grading philosophies, fair and efficient grading, text design; presentation and teaching skills, PowerPoint slide design; presentation practice in small groups. Taught in collaboration with the Center for Teaching and Learning.

1 unit, Spr (Gerritsen, M)

ENERGY 260. Modeling Uncertainty in the Earth Sciences
(Same as ENERGY 160) Whether Earth Science modeling is performed on a local, regional or global scale, for scientific or engineering purposes, uncertainty is inherently present due to lack of data and lack of understanding of the underlying phenomena. This course highlights the various issues, techniques and practical modeling tools available for modeling uncertainty of complex 3D/4D Earth systems. The course focuses on a practical breath rather than theoretical depth. Topics covered are: the process of building models, sources of uncertainty, probabilistic techniques, spatial data analysis and geostatistics, grid and scale, spatio-temporal uncertainty, visualizing uncertainty in large dimensions, Monte Carlo simulation, reducing uncertainty with data, value of information. Applications to both local (reservoir, aquifer) and global (climate) are covered through literature study. Extensive software use with SGEMS and Petrel. Project homework. Prerequisites: algebra (CME 104 or equivalent), introductory stat

3 units, Win (Caers, J; Honarkhah, M)

ENERGY 267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties
(Same as ENERGY 167) Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor.

3 units, Win (Kourt, W; Pande, K)

ENERGY 269. Geothermal Reservoir Engineering
Conceptual models of heat and mass flows within geothermal reservoirs. The fundamentals of fluid/heat flow in porous media; convective/conductive regimes, dispersion of solutes, reactions in porous media, stability of fluid interfaces, liquid and vapor flows. Interpretation of geochemical, geological, and well data to determine reservoir properties/characteristics. Geothermal plants and the integrated geothermal system.

3 units, not given this year

ENERGY 273. Special Topics in Petroleum Engineering

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 280. Oil and Gas Production Engineering
(Same as ENERGY 180) Design and analysis of production systems for oil and gas reservoirs. Topics: well completion, single-phase and multi-phase flow in wells and gathering systems, artificial lift and field processing, well stimulation, inflow performance. Prerequisite: 120. Recommended: 130.

3 units, not given this year

ENERGY 281. Applied Mathematics in Reservoir Engineering
The philosophy of the solution of engineering problems. Methods of solution of partial differential equations: Laplace transforms, Fourier transforms, wavelet transforms, Green¿s functions, and boundary element methods. Prerequisites: CME 204 or MATH 131, and consent of instructor.

3 units, alternate years, not given this year

ENERGY 284. Optimization: Deterministic and Stochastic Approaches
Deterministic and stochastic methods for optimization in earth sciences and engineering. Linear and nonlinear regression, classification and pattern recognition using neural networks, simulated annealing and genetic algorithms. Deterministic optimization using non-gradient-based methods (simplex) and gradient-based methods (conjugated gradient, steepest descent, Levenberg-Marquardt, Gauss-Newton), eigenvalue and singular value decomposition. Applications in petroleum engineering, geostatistics, and geophysics. Prerequisite: CME 200 or consent of instructor.

3 units, Aut (Caers, J)

ENERGY 285A. SUPRI-A Research Seminar: Enhanced Oil Recovery
Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-A group. May be repeated for credit. Prerequisite: consent of instructor.

1 unit, Aut (Staff)

ENERGY 285B. SUPRI-B Research Seminar: Reservoir Simulation
Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in SUPRI-B (reservoir simulation) program. May be repeated for credit. Prerequisite: consent of instructor.
1 unit, Aut (Staff), Win (Staff)

ENERGY 285C. SUPRI-C Research Seminar: Gas Injection Processes
Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-D well test analysis group. May be repeated for credit. Prerequisite: consent of instructor.
1 unit, Aut (Staff), Win (Staff)

ENERGY 285D. SUPRI-D Research Seminar: Well Test Analysis
Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-D well test analysis group. May be repeaqted for credit. Prerequisite: consent of instructor. (Horne)
1 unit, Aut (Staff), Win (Staff)

ENERGY 285F. SCRF Research Seminar: Geostatistics and Reservoir Forecasting
Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SCRF (Stanford Center for Reservoir Forecasting) program. Prerequisite: consent of instructor.
1 unit, Aut (Staff), Win (Staff)

ENERGY 285G. Geothermal Reservoir Engineering Research Seminar
Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the geothermal energy group. Presentation required for credit. Prerequisite: consent of instructor.
1 unit, Aut (Staff), Win (Staff)

ENERGY 285H. SUPRI-HW Research Seminar: Horizontal Well Technology
Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in SUPRI-HW (productivity and injectivity of horizontal wells) program. Prerequisite: consent of instructor.
1 unit, Aut (Staff), Win (Staff)

ENERGY 290. Numerical Modeling of Fluid Flow in Heterogeneous Porous Media
How to mathematically model and solve elliptic partial differential equations with variable and discontinuous coefficients describing flow in highly heterogeneous porous media. Topics include finite difference and finite volume approaches on structured grids, efficient solvers for the resulting system of equations, Krylov space methods, preconditioning, multi-grid solvers, grid adaptivity and adaptivity criteria, multiscale approaches, and effects of anistropy on solver efficiency and accuracy. MATLAB programming and application of commercial or public domain simulation packages. Prerequisite: CME 200, 201, and 202, or equivalents with consent of instructor.
3 units, not given this year

ENERGY 291. OPTIMIZATION OF ENERGY SYSTEMS
(Same as ENERGY 191) Introductory mathematical programming and optimization using examples from energy industries. Emphasis on problem formulation and solving, secondary coverage of algorithms. Problem topics include optimization of energy investment, production, and transportation; uncertain and intermittent energy resources; energy storage; efficient energy production and conversion. Methods include linear and nonlinear optimization, as well as multi-objective and goal programming. Tools include Microsoft Excel and AMPL mathematical programming language. Prerequisites: MATH 41, MATH 51, or consent of instructor. Programming experience helpful (e.g, CS 106A-B).
3 units, Win (Brandt, A; Ahn, S)

ENERGY 293A. Fundamentals of Energy Processes
(Same as EE 293A) For seniors and graduate students. Thermodynamics, heat engines, thermoelectics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45
3-4 units, Aut (Brandt, A)

ENERGY 293B. Fundamentals of Energy Processes
(Same as EE 293B) For seniors and graduate students. Fuel cells. Production of hydrogen: electrolytic, chemical, thermolytic, photolytic. Hydrogen storage: hydrides. Photoelectric converters; photothermovoltaic converters. Wind turbines. Recommended: EE 293A; MATH 41; PHYSICS 41, 43, 45
3 units, Win (da Rosa, A)

ENERGY 301. The Energy Seminar
(Same as CEE 301) Interdisciplinary exploration of current energy challenges and opportunities, with talks by faculty, visitors, and students. May be repeated for credit.
1 unit, Aut (Benson, S), Win (Benson, S), Spr (Benson, S)

ENERGY 355. Doctoral Report on Energy Industry Training
On-the-job training for doctoral students under the guidance of on-site supervisors. Students submit a report on work activities, problems, assignments, and results. May be repeated for credit. Prerequisite: consent of adviser.
1-3 units, Sum (Staff)

ENERGY 359. Teaching Experience in Energy Resources Engineering
For TAs in Energy Resources Engineering. Course and lecture design and preparation; lecturing practice in small groups. Classroom teaching practice in an Energy Resources Engineering course for which the participant is the TA (may be in a later quarter). Taught in collaboration with the Center for Teaching and Learning.
1 unit, Spr (Gerritsen, M)

ENERGY 360. Advanced Research Work in Energy Resources Engineering
Graduate-level work in experimental, computational, or theoretical research. Special research not included in graduate degree program. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 361. Master's Degree Research in Energy Resources Engineering
Experimental, computational, or theoretical research. Advanced technical report writing. Limited to 6 units total. (Staff)
1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 362. Engineer's Degree Research in Energy Resources Engineering
Graduate-level work in experimental, computational, or theoretical research for Engineer students. Advanced technical report writing. Limited to 15 units total, or 9 units total if 6 units of 361 were previously credited.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 363. Doctoral Degree Research in Energy Resources Engineering
Graduate-level work in experimental, computational, or theoretical research for Ph.D. students. Advanced technical report writing.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 365. Special Research Topics in Energy Resources Engineering
Graduate-level research work not related to report, thesis, or dissertation. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 369. Practical Energy Studies
Students work on realistic industrial reservoir engineering problems. Focus is on optimization of production scenarios using secondary or tertiary recovery techniques. When possible, projects are conducted in direct collaboration with industry. May be repeated for credit.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGINEERING (ENGR) COURSES

UNDERGRADUATE COURSES IN ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ENGR 10. Introduction to Engineering Analysis
Integrated approach to the fundamental scientific principles that are the cornerstones of engineering analysis: conservation of mass, atomic species, charge, momentum, angular momentum, energy, production of entropy expressed in the form of balance equations on carefully defined systems, and incorporating simple physical models. Emphasis is on setting up analysis problems arising in engineering. Topics: simple analytical solutions, numerical solutions of linear algebraic equations, and laboratory experiences. Provides the foundation and tools for subsequent engineering courses. GER:DB-EngrAppSci
4 units, Win (Cappelli, M)

ENGR 14. Applied Mechanics: Statics
The mechanics of particles, rigid bodies, trusses, frames, and machines in static equilibrium emphasizing the use of free-body diagrams. Frictional effects and internal forces in structural members. Lab in Autumn; no lab in Spring. Prerequisite: PHYSICS 41 or consent of instructor. GER:DB-EngrAppSci
3 units, Aut (Sheppard, S), Spr (Kuhl, E)

ENGR 15. Dynamics
The application of Newton's Laws to solve static and dynamic problems, particle and rigid body dynamics, freebody diagrams, and writing equations of motion. 2-D and 3-D cases including gyroscopes, spacecraft, and rotating machinery. Solution of equations of motion and dynamic response of simple mechanical systems. Prerequisites: MATH 23 or 43, PHYSICS 41. GER:DB-EngrAppSci
3 units, Aut (Mitiguy, P), Spr (Lew, A)

ENGR 20. Introduction to Chemical Engineering
(Same as CHEMENG 20) Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balances, concepts of rate processes, energy and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, energy, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. GER:DB-EngrAppSci
3 units, Spr (Hwang, L; Khosla, C)

ENGR 25B. Biotechnology
(Same as CHEMENG 25B) Biology and chemistry fundamentals, genetic engineering, cell culture, protein production, pharmaceuticals, genomics, viruses, gene therapy, evolution, immunology, antibodies, vaccines, transgenic animals, cloning, stem cells, intellectual property, governmental regulations, and ethics. Prerequisites: CHEM 31 and MATH 41 or equivalent courage. GER:DB-EngrAppSci
3 units, Spr (Wang, C)

ENGR 25E. Energy: Chemical Transformations for Production, Storage, and Use
(Same as CHEMENG 25E) An introduction and overview to the challenges and opportunities of energy supply and consumption. Emphasis on energy technologies where chemistry and engineering play key roles. Review of energy fundamentals along with historical energy perspectives and current energy production technologies. In depth analysises of solar thermal systems, biofuels, photovoltaics and electrochemical devices (batteries and fuel cells). Prerequisites: high school chemistry or equivalent. GER:DB-EngrAppSci
3 units, Win (Robertson, C; Bent, S)

ENGR 30. Engineering Thermodynamics
Concepts of energy and entropy from elementary considerations of the microscopic nature of matter. Use of basic thermodynamic concepts in the solution of engineering problems. Methods and problems in socially responsible economic generation and utilization of energy in central power stations, solar systems, gas turbine engines, refrigeration devices, and automobile engines. Prerequisites: MATH 19, 20, 21, or 41, 42, and PHYSICS 45 (formerly 51) or equivalent high school physics. GER:DB-EngrAppSci
3 units, Aut (Zheng, X), Win (Mitchell, R)

ENGR 31. Chemical Principles with Application to Nanoscale Science and Technology
Preparation for engineering disciplines emphasizing modern technological applications of solid state chemistry. Topics include: crystallography; chemical kinetics and equilibria; thermodynamics of phase changes and reaction; quantum mechanics of chemical bonding, molecular orbital theory, and electronic band structure of crystals; and the materials science of basic electronic and photonic devices. Prerequisite: high school or college chemistry background in stoichiometry, periodicity, Lewis and VSEPR structures, dissolution/precipitation and acid/base reactions, gas laws, and phase behavior. GER:DB-NatSci
4 units, Aut (McIntyre, P)

ENGR 40. Introductory Electronics
Overview of electronic circuits and applications. Electrical quantities and their measurement, including operation of the oscilloscope. Basic models of electronic components including resistors, capacitors, inductors, and the operational amplifier. Frequency response of linear circuits, including basic filters, using phasor analysis. Digital logic fundamentals, logic gates, and basic combinatorial logic blocks. Lab assignments. Enrollment limited to 200. Lab. Prerequisite: PHYSICS 43. GER:DB-EngrAppSci
5 units, Aut (Lee, T), Spr (Howe, R)

ENGR 50. Introduction to Materials Science, Nanotechnology Emphasis
The structure, bonding, and atomic arrangements in materials leading to their properties and applications. Topics include electronic and mechanical behavior, emphasizing nanotechnology, solid state devices, and advanced structural and composite materials. GER:DB-EngrAppSci
4 units, Spr (Sinclair, R)

ENGR 50E. Introduction to Materials Science - Energy Emphasis
Materials structure, bonding and atomic arrangements leading to their properties and applications. Topics include electronic, thermal and mechanical behavior; emphasizing energy related materials and challenges.
4 units, Win (Melosh, N)

ENGR 50M. Introduction to Materials Science, Biomaterials Emphasis
Topics include: the relationship between atomic structure and macroscopic properties of man-made and natural materials; mechanical and thermodynamic behavior of surgical implants including alloys, ceramics, and polymers; and materials selection for biotechnology applications such as contact lenses, artificial joints, and cardiovascular stents. No prerequisite. GER:DB-EngrAppSci
4 units, Aut (Heilshorn, S)

ENGR 60. Engineering Economy
Fundamentals of economic analysis. Interest rates, present value, and internal rate of return. Applications to personal and corporate financial decisions. Mortgage evaluation, insurance decision, hedging/risk reduction, project selection, capital budgeting, and investment valuation. Decisions under uncertainty and utility theory. Prerequisite: MATH 41 or equivalent. Recommended: sophomore or higher class standing; knowledge of elementary probability. GER:DB-EngrAppSci
3 units, Aut (Chiu, S), Win (Weber, T)

ENGR 62. Introduction to Optimization
(Same as MS&E 111) Formulation and analysis of linear optimization problems. Solution using Excel solver. Polyhedral geometry and duality theory. Applications to contingent claims analysis, production scheduling, pattern recognition, two-player zero-sum games, and network flows. Prerequisite: MATH 51. GER:DB-EngrAppSci
4 units, Aut (Van Roy, B), Spr (Goel, A)

ENGR 70A. Programming Methodology
(Same as CS 106A) Introduction to the engineering of computer applications emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and testing. Uses the Java programming language. Emphasis is on

good programming style and the built-in facilities of the Java language. No prior programming experience required. GER:DB-EngrAppSci

3-5 units, Aut (Sahami, M), Win (Roberts, E), Spr (Cain, G), Sum (Staff)

ENGR 70B. Programming Abstractions

(Same as CS 106B) Abstraction and its relation to programming. Software engineering principles of data abstraction and modularity. Object-oriented programming, fundamental data structures (such as stacks, queues, sets) and data-directed design. Recursion and recursive data structures (linked lists, trees, graphs). Introduction to time and space complexity analysis. Uses the programming language C++ covering its basic facilities. Prerequisite: 106A or equivalent. GER:DB-EngrAppSci

3-5 units, Aut (Cain, G), Win (Roberts, E), Spr (Cain, G), Sum (Staff)

ENGR 70X. Programming Abstractions (Accelerated)

(Same as CS 106X) Intensive version of 106B for students with a strong programming background interested in a rigorous treatment of the topics at an accelerated pace. Additional advanced material and more challenging projects. Prerequisite: excellence in 106A or equivalent, or consent of instructor. GER:DB-EngrAppSci

3-5 units, Aut (Cain, G), Win (Cain, G)

ENGR 80. Introduction to Bioengineering

(Same as BIOE 80) Overview of biological engineering focused on engineering analysis and design of biological processes. Topics include overall material and energy balances, rates of biochemical reactions and processes, genetic programming of biological systems, links between information and function, and technologies to probe and manipulate biological systems. Applications of these concepts to areas of current technological importance, including biotechnology, biosynthesis, molecular/cellular therapeutics, and personalized medicine and gene therapy. GER:DB-EngrAppSci

4 units, Spr (Smolke, C)

ENGR 100. Teaching Public Speaking

The theory and practice of teaching public speaking and presentation development. Lectures/discussions on developing an instructional plan, using audiovisual equipment for instruction, devising tutoring techniques, and teaching delivery, organization, audience analysis, visual aids, and unique speaking situations. Weekly practice speaking. Students serve as apprentice speech tutors. Those completing course may become paid speech instructors in the Technical Communications Program. Prerequisite: consent of instructor.

5 units, Aut (Eisele, M), Win (Eisele, M), Spr (Eisele, M)

ENGR 102E. Technical/Professional Writing for Electrical Engineers

Required of Electrical Engineering majors. The process of writing technical/professional documents. Lectures, writing assignments, individual conferences. Prerequisies: freshman English. Corequisite for WIM: EE 108A.

1 unit, Aut (McDevitt, M), Win (McDevitt, M)

ENGR 102M. Technical/Professional Writing for Mechanical Engineers

Required of Mechanical Engineering majors. The process of writing technical/professional documents. Lecture, writing assignments, individual conferences. Corequisite for WIM: ME 203.

1 unit, Aut (Sullivan, E), Win (Sullivan, E)

ENGR 103. Public Speaking

Priority to Engineering students. Introduction to speaking activities, from impromptu talks to carefully rehearsed formal professional presentations. How to organize and write speeches, analyze audiences, create and use visual aids, combat nervousness, and deliver informative and persuasive speeches effectively. Weekly class practice, rehearsals in one-on-one tutorials, videotaped feedback. Limited enrollment.

3 units, Aut (Eisele, M), Win (Eisele, M), Spr (Eisele, M)

ENGR 105. Feedback Control Design

Design of linear feedback control systems for command-following error, stability, and dynamic response specifications. Root-locus and frequency response design techniques. Examples from a variety of fields. Some use of computer aided design with MATLAB. Prerequisite: EE 102, ME 161, or equivalent. GER:DB-EngrAppSci

3 units, Win (Gerdes, C), Sum (Emami-Naeini, A)

ENGR 110. Perspectives in Assistive Technology

(Same as ENGR 210) Seminar and student team project. Medical, social, psychological, and technical challenges surrounding the design, development, and use of assistive technologies to improve the lives of people with disabilities. Guest speakers include professionals, clinicians, and individuals with disabilities. 1 unit for seminar attendance only. 3 units for students who pursue a team-based assistive technology project. Projects can be continued in ME113 or CS194 or as independent study in Spring Quarter. See http://www.stanford.edu/class/engr110. Service Learning Course (certified by Haas Center).

1-3 units, Win (Jaffe, D; Nelson, D)

ENGR 115. Design the Tech Challenge

(Same as ENGR 215) Students work with Tech Museum of San Jose staff to design the Tech Challenge, a yearly engineering competition for 6-12th grade students. Brainstorming, field trips to the museum, prototyping, coaching, and presentations to the Tech Challenge advisory board. See at http://techchallenge.thetech.org. May be repeated for credit.

2 units, Win (Sheppard, S)

ENGR 120. Fundamentals of Petroleum Engineering

(Same as ENERGY 120) Lectures, problems, field trip. Engineering topics in petroleum recovery; origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media. GER:DB-EngrAppSci

3 units, Aut (Horne, R; Wilcox, J)

ENGR 130. Science, Technology, and Contemporary Society

(Same as STS 101, STS 201) Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as socio-technical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. GER:DB-SocSci

4-5 units, Aut (McGinn, R)

ENGR 131. Ethical Issues in Engineering

(Same as STS 115) Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment. GER:DB-Hum

4 units, Spr (McGinn, R)

ENGR 140A. Leadership of Technology Ventures

First of three-part sequence for students selected to the Mayfield Fellows Program. Management and leadership within high technology startups, focusing on entrepreneurial skills related to product and market strategy, venture financing and cash flow management, team recruiting and organizational development, and the challenges of managing growth and handling adversity in emerging ventures. Other engineering faculty, founders, and venture capitalists participate as appropriate. Recommended: accounting or finance course (MS&E 140, ECON 90, or ENGR 60).

3-4 units, Spr (Byers, T)

ENGR 140B. Leadership of Technology Ventures

Open to Mayfield Fellows only; taken during the summer internship at a technology startup. Students exchange experiences and continue the formal learning process. Activities journal. Credit given following quarter.

1-2 units, Aut (Byers, T)

ENGR 140C. Leadership of Technology Ventures

Open to Mayfield Fellows only. Capstone to the 140 sequence. Students, faculty, employers, and venture capitalists share recent internship experiences and analytical frameworks. Students develop living case studies and integrative project reports.

2-3 units, Aut (Byers, T)

ENGR 145. Technology Entrepreneurship
How do you create a successful start-up? What is entrepreneurial leadership in a large firm? What are the differences between an idea and true opportunity? How does an entrepreneur form a team and gather the resources necessary to create a great enterprise? This class mixes mentor-guided team projects, in-depth case studies, research on the entrepreneurial process, and the opportunity to network and ask questions of Silicon Valley's top entrepreneurs and venture capitalists. For undergraduates of all majors who seek to understand the formation and growth of high-impact start-ups in areas such as information, green/clean, medical and consumer technologies. No prerequisites. Limited enrollment. GER:DB-SocSci

4 units, Aut (Byers, T), Win (Eesley, C), Sum (Kosnik, T)

ENGR 150. Social Innovation and Entrepreneurship
(Same as ENGR 250) (Graduate students register for 250.) The art of innovation and entrepreneurship for social benefit. Project team develops, tests, and iteratively improves technology-based social innovation and business plan to deploy it. Feedback and coaching from domain experts, product designers, and successful social entrepreneurs. Limited enrollment; application required. See http://sie.stanford.edu.

1-6 units, Aut (Behrman, W), Win (Behrman, W), Spr (Behrman, W)

ENGR 154. Vector Calculus for Engineers
(Same as CME 100) Computation and visualization using MATLAB. Differential vector calculus: analytic geometry in space, functions of several variables, partial derivatives, gradient, unconstrained maxima and minima, Lagrange multipliers. Integral vector calculus: multiple integrals in Cartesian, cylindrical, and spherical coordinates, line integrals, scalar potential, surface integrals, Green's, divergence, and Stokes' theorems. Examples and applications drawn from various engineering fields. Prerequisites: MATH 41 and 42, or 10 units AP credit. GER:DB-Math

5 units, Aut (Khayms, V)

ENGR 155A. Ordinary Differential Equations for Engineers
(Same as CME 102) Analytical and numerical methods for solving ordinary differential equations arising in engineering applications: Solution of initial and boundary value problems, series solutions, Laplace transforms, and non-linear equations; numerical methods for solving ordinary differential equations, accuracy of numerical methods, linear stability theory, finite differences. Introduction to MATLAB programming as a basic tool kit for computations. Problems from various engineering fields. Prerequisite: CME 100/ENGR 154 or MATH 51. GER:DB-Math

5 units, Win (Darve, E)

ENGR 155B. Linear Algebra and Partial Differential Equations for Engineers
(Same as CME 104) Linear algebra: matrix operations, systems of algebraic equations, Gaussian elimination, undertermined and overdetermined systems, coupled systems of ordinary differential equations, eigensystem analysis, normal modes. Fourier series with applications, partial differential equations arising in science and engineering, analytical solutions of partial differential equations. Numerical methods for solution of partial differential equations: iterative techniques, stability and convergence, time advancement, implicit methods, von Neumann stability analysis. Examples and applications from various engineering fields. Prerequisite: CME 102/ENGR 155A. GER:DB-Math

5 units, Spr (Khayms, V)

ENGR 155C. Introduction to Probability and Statistics for Engineers
(Same as CME 106) Probability: random variables, independence, and conditional probability; discrete and continuous distributions, moments, distributions of several random variables. Topics in mathematical statistics: random sampling, point estimation, confidence intervals, hypothesis testing, non-parametric tests, regression and correlation analyses; applications in engineering, industrial manufacturing, medicine, biology, and other fields. Prerequisite: CME 100/ENGR154 or MATH 51. GER:DB-Math

3-4 units, Win (Khayms, V), Sum (Khayms, V)

ENGR 159Q. Japanese Companies and Japanese Society
(Stanford Introductory Seminar) (Same as MATSCI 159Q) Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course. GER:DB-SocSci

3 units, Spr (Sinclair, R)

ENGR 192. Engineering Public Service Project
Volunteer work on a public service project with a technical engineering component. Project requires a faculty sponsor and a community partner such as a nonprofit organization, school, or individual. Required report. See http://soe.stanford.edu/publicservice. May be repeated for credit. Prerequisite: consent of instructor.

1-2 units, Aut (Staff), Spr (Staff), Sum (Sheppard, S)

ENGR 199. Special Studies in Engineering
Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the section number corresponding to the particular faculty member. May be repeated for credit. Prerequisite: consent of instructor.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

ENGR 199W. Writing of Original Research for Engineers
Technical writing in science and engineering. Students produce a substantial document describing their research, methods, and results. Prerequisite: completion of freshman writing requirements; prior or concurrent in 2 units of research in the major department; and consent of instructor. WIM for BioMedical Computation.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ENGR 202S. Writing: Special Projects
Writing tutorial for students working on non-course projects such as theses, journal articles, and conference papers. Weekly individual conferences.

1-3 units, Aut (Reichard, C), Win (Reichard, C), Spr (Reichard)

ENGR 202W. Technical Writing
How to write clear, concise, and well-ordered technical prose. Principles of editing for structure and style. Applications to a variety of genres in engineering and science.

3 units, Aut (Reichard, C), Win (Reichard, C), Spr (Reichard, C)

ENGR 204. Research Ethics for Engineers and Scientists
Ethical responsibilities of engineering and science researchers in relation to laboratory safety, data acquisition and management, experiment and product design, collaborative research, authorship and peer review, mentorship, human subjects research, funding applications and funded research, media accounts of research, and new and emerging technologies such as in nanotechnology and bioengineering. Responsibilities of researchers toward society at large, and Stanford and government policies regarding the conduct of engineering and science research. Lectures, discussion, guest researchers, and real case studies. Primarily for graduate students and postdoctoral researchers in engineering and science. Limited enrollment.

1-2 units, Spr (McGinn, R)

ENGR 205. Introduction to Control Design Techniques
Review of root-locus and frequency response techniques for control system analysis and synthesis. State-space techniques for modeling, full-state feedback regulator design, pole placement, and observer design. Combined observer and regulator design. Lab experiments on computers connected to mechanical systems. Prerequisites: 105, MATH 103, 113. Recommended: Matlab.

3 units, Aut (Rock, S)

ENGR 206. Control System Design
Design and construction of a control system and working plant. Topics include: linearity, actuator saturation, sensor placement, controller and model order; linearization by differential actuation and sensing; analog op-amp circuit implementation. Emphasis is on qualitative aspects of analysis and synthesis, generation of candidate design, and engineering tradeoffs in system selection. Large team-based project. Limited enrollment. Prerequisite: 105.

3-4 units, not given this year

ENGR 207A. Linear Control Systems I
Introduction to control of discrete-time linear systems. State-space models. Controllability and observability. The linear quadratic regulator. Prerequisite: 105 or 205.
3 units, not given this year

ENGR 207B. Linear Control Systems II
Probabilistic methods for control and estimation. Statistical inference for discrete and continuous random variables. Linear estimation with Gaussian noise. The Kalman filter. Prerequisite: EE 263.
3 units, Win (Lall, S)

ENGR 207C. Linear Control Systems III
Continuation of 207B. Introduction to stochastic control. Markov decision processes and stochastic dynamic programming. Separation of control and estimator design. Stochastic optimal control. Prerequisite: 207B.
3 units, Aut (Lall, S)

ENGR 209A. Analysis and Control of Nonlinear Systems
Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Describing functions. Lyapunov stability theory. SISO feedback linearization, sliding mode control. Design examples. Prerequisite: 205.
3 units, Win (Rock, S)

ENGR 210. Perspectives in Assistive Technology
(Same as ENGR 110) Seminar and student team project. Medical, social, psychological, and technical challenges surrounding the design, development, and use of assistive technologies to improve the lives of people with disabilities. Guest speakers include professionals, clinicians, and individuals with disabilities. 1 unit for seminar attendance only. 3 units for students who pursue a team-based assistive technology project. Projects can be continued in ME113 or CS194 or as independent study in Spring Quarter. See http://www.stanford.edu/class/engr110. Service Learning Course (certified by Haas Center).
1-3 units, Win (Jaffe, D; Nelson, D)

ENGR 210A. Robust Control
Analysis and design techniques for multivariable feedback systems. Stability and robustness of feedback loops, passivity, and the small-gain theorem. Prerequisite: 207A or EE 263.
3 units, not given this year

ENGR 210B. Advanced Topics in Computation for Control
Recent developments in computational techniques for feedback control systems. The use of convex optimization to solve problems in control. Prerequisites: Background in convex optimization, such as EE 364, and background in control, such as ENGR 207B.
3 units, not given this year

ENGR 215. Design the Tech Challenge
(Same as ENGR 115) Students work with Tech Museum of San Jose staff to design the Tech Challenge, a yearly engineering competition for 6-12th grade students. Brainstorming, field trips to the museum, prototyping, coaching, and presentations to the Tech Challenge advisory board. See at http://techchallenge.thetech.org. May be repeated for credit.
2 units, Win (Sheppard, S)

ENGR 222. ADVANCED DYNAMICS
0-60 units

ENGR 231. Transformative Design
(Same as ANTHRO 332) Project-based. How interactive technologies can be designed to encourage behavioral transformation. Topics such as self-efficacy, social support, and mechanism of cultural change in domains such as weight-loss, energy conservation, or safe driving. Lab familiarizes students with hardware and software tools for interaction prototyping. Students teams create functional prototypes for self-selected problem domains. Prerequisite: consent of instructor.
3-5 units, not given this year

ENGR 240. Introduction to Micro and Nano Electromechanical Systems
Miniaturization technologies now have important roles in materials, mechanical, and biomedical engineering practice, in addition to being the foundation for information technology. This course will target an audience of first-year engineering graduate students and motivated senior-level undergraduates, with the goal of providing an introduction to M/NEMS fabrication techniques, selected device applications, and the design tradeoffs in developing systems. The course has no specific prerequisites, other than graduate or senior standing in engineering; otherwise, students will require permission of the instructors.
3 units, Aut (Howe, R), Spr (Pruitt, B)

ENGR 245. Technology Entrepreneurship and Lean Startups
Students teams apply emerging entrepreneurship principles including the popular lean startups and customer development frameworks to prototype, test, and iterate their products while discovering if they have a profitable business model. Proposal required during first week of the quarter. Proposals can be software, physical good, or service of any kind. Projects are treated as real startups.
3-4 units, Win (Blank, S; Miura-Ko, R)

ENGR 250. Social Innovation and Entrepreneurship
(Same as ENGR 150) (Graduate students register for 250.) The art of innovation and entrepreneurship for social benefit. Project team develops, tests, and iteratively improves technology-based social innovation and business plan to deploy it. Feedback and coaching from domain experts, product designers, and successful social entrepreneurs. Limited enrollment; application required. See http://sie.stanford.edu.
1-6 units, Aut (Behrman, W), Win (Behrman, W), Spr (Behrman, W)

ENGR 251. Work Seminar
Students participate in the Creating Research Examples Across the Teaching Enterprise (CREATE) writing program. Goal is for students to produce, through a peer reviewed process, 1,000 word statements describing their research in ways that are understandable and compelling to undergraduates and other novices in the field. Unit credit when the final approved statements appear on the CREATE web site.
1 unit, not given this year

ENGR 280. From Play to Innovation
Project-based and team-centered. Enhancing the innovation process with playfulness. The human state of play and its principal attributes and importance to creative thinking. Play behavior, and its development and biological basis. Students apply those principles through design thinking to promote innovation in the corporate world with real-world partners on design projects with widespread application.
2-4 units, Spr (Boyle, B; Brown, S; Thompson, S)

ENGR 281. Designing Media that Matters
Design practicum; project-based. The shift from a consumer culture to a creative society as old media institutions are collapsing while participatory media frameworks are emerging. Opportunity and responsibility for media designers to make this change positive. Frameworks of the new media landscape; applications to design media experiences that have a positive social impact. Topics include: roots of social media, game design, communication design, and digital design.
3 units, Spr (Doorley, S; Baggeroer, D)

ENGR 290. Graduate Environment of Support
For course assistants (CAs) and tutors in the School of Engineering tutorial and learning program. Interactive training for effective academic assistance. Pedagogy, developing course material, tutoring, and advising. Sources include video, readings, projects, and role playing.
1 unit, Aut (Osgood, B; Lozano, N)

ENGR 298. Seminar in Fluid Mechanics
Interdepartmental. Problems in all branches of fluid mechanics, with talks by visitors, faculty, and students. Graduate students may register for 1 unit, without letter grade; a letter grade is given for talks. May be repeated for credit.
1 unit, Aut (Lele, S), Win (Koseff, J), Spr (Alonso, J)

ENGR 299. Special Studies in Engineering
Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the corresponding section. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGR 310B. Project-Based Engineering Design, Innovation, and Development
(Same as ME 310B) Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.
4 units, not given this year

ENGR 311A. Women's Perspectives
Master's and Ph.D. seminar series driven by student interests. Possible topics: time management, career choices, health and family, diversity, professional development, and personal values. Guest speakers from academia and industry, student presentations with an emphasis on group discussion. Graduate students share experiences and examine scientific research in these areas. May be repeated for credit.
1 unit, Win (Sheppard, S)

ENGR 311B. Designing the Professional: Inventing Your Life
Continuation of ENGR 311A.
1 unit, Spr (Sheppard, S; Evans, D)

ENGR 312. Science and Engineering Course Design
(Same as CTL 312) For students interested in an academic career and who anticipate designing science courses at the undergraduate or graduate level. Goal is to apply research on science learning to the design of effective course materials. Topics include syllabus design, course content and format decisions, assessment planning and grading, and strategies for teaching improvement.
2-3 units, Win (Wright-Dunbar, R; Sheppard, S)

ENGR 313. Topics in Engineering Education
Master's and Ph.D. seminar series driven by student interests.Weekly group discussions of engineering education literature led by students.Possible topics include: fostering engagement, misconceptions, retention, theories on how people learn, and assessment, all in an engineering context.May be repeated for credit.
1 unit, Spr (Sheppard, S)

ENGR 341. Micro/Nano Systems Design and Fabrication
Laboratory course in micro and nano fabrication technology that combines lectures on theory and fundamentals with hands-on training in the Stanford Nanofabrication Facility. Prerequisite: ENGR 240 or equivalent.
3-5 units, not given this year

ENGR 342. MEMS Laboratory II
Emphasis is on implementation of fabricated N/MEMS-based solutions. Student teams collaborate to develop, fabricate and test N/MEMS solutions proposed in E341. Design alternatives fabricated and tested in SNF with emphasis on manufacturability, assembly, test, and design. Limited enrollment. Prerequisite: ENGR 341.
3-4 units, Aut (Pruitt, B)

ENGLISH (ENGLISH) COURSES

UNDERGRADUATE COURSES IN ENGLISH

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ENGLISH 14Q. Tis All in Pieces: John Donne and the Early Modern World
(Stanford Introductory Seminar) One of the most innovative and dramatic poets in literary history, John Donne¿s writing bears the marks of the profound changes that were occurring on the threshold of the modern world, in such areas as science, astronomy, religion, exploration, theatre, and art. Donne¿s dramatic realism exerted a shaping influence on such modern poets as Browning, Eliot, and Rich; on contemporary composers such as Bob Dylan, Van Morrison, and Benjamin Britten; and on Pulitzer Prize-winning playwright: Margaret Edson. Topics include Donne's work within the vibrant historical and cultural milieu of the early modern world and related developments in early modern art and theatre. GER:DB-Hum
2-3 units, Win (Brooks, H)

ENGLISH 19SI. Science Fiction for Writers
A survey of several genres of fantasy and science fiction (soft or social science fiction, cyberpunk, dystopian fiction, new wave, zombies, etc.) with an eye towards exploring techniques for imbuing stories thematic depth and complex imaginings. Students will compose their own story for end-of-quarter workshop. Readings (may) include: Jonathan Lethem, Philip K. Dick, Adam Johnson, Neil Gaiman, William Gibson, Tzvetan Todorov, film.
1-2 units, Aut (Greene, R)

ENGLISH 21. Masterpieces of American Literature
(Same as AMSTUD 121, ENGLISH 121) (English majors and others taking 5 units, register for 121.) A survey of some of the definitive texts of American writing, such as Leaves of Grass, Benito Cereno, Adventures of Huckleberry Finn, The Waste Land, The Sun Also Rises, The Golden Apples, and The Crying of Lot 49. GER:DB-Hum
3-5 units, Spr (Rampersad, A)

ENGLISH 22N. Virginia Woolf: Art and Politics
(Stanford Introductory Seminar) Introduction to Woolf's diverse oeuvres: her novels, essays, short stories, diaries, and letters focusing on how she devised an art form shaped by political consciousness but not subordinate to it. How, for Woolf, were art and politics, the private and the public, the artist and the activist conjoined. Navigation of the multiple intersections of Woolf's artistic experimentation and sociopolitical consciousness from 1917 to 1941. GER:DB-Hum
3 units, Aut (Staveley, A)

ENGLISH 43. Introduction to African American Literature
(Same as AFRICAAM 43, AMSTUD 143, ENGLISH 143) (English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. The defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history. GER:DB-Hum, EC-AmerCul
3-5 units, Aut (Rasberry, G)

ENGLISH 43A. American Indian Mythology, Legend, and Lore
(Same as NATIVEAM 143A, ENGLISH 143A) (English majors and others taking 5 units, register for 143A.)Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, Black Elk Speaks. GER:DB-Hum
3-5 units, Aut (Fields, K)

ENGLISH 47. Masterpieces of Contemporary Literature
(Same as ENGLISH 147) Examination of seven predominately twentieth-century novels juxtaposed to interrogate the contemporary moment. How do novelists understand the present by representing the past? How and why do novelists rewrite, reinvent, or renounce the plotlines of influential forebears? Narrative forms include Realism, Romance, Modernism, Postmodernism, Utopia/Dystopia. Topics include narrative voice, intertextuality, social satire, politics and war, time and memory, gender and race in novels by Charlotte Bronte, Jean Rhys, George Orwell, Margaret Atwood, Virginia Woolf, Michael Cunningham and Ian McEwan. Relevant clips from recent film adaptations. GER:DB-Hum
3-5 units, Aut (Staveley, A)

ENGLISH 62N. Eros in Modern American Poetry
(Stanford Introductory Seminar) Preference to freshmen. Anne Carson, treating love from Sappho to Socrates, shows how the Greeks derived their philosophy from the erotic poetic tradition.

Readings include: Carson's poetry which locates erotic desire in the larger context of the desire for knowledge; classic Japanese haiku masters such as Basho; and William Carlos Williams, Louise Bogan, and C.K. Williams. GER:DB-Hum

3 units, Spr (Fields, K)

ENGLISH 65N. Contemporary Women Fiction Writers

(Stanford Introductory Seminar) Preference to freshmen. Novels and story collections by women writers whose work explores: domestic and global politics; love, sexuality, and orientation; and spirituality and its meanings. Readings includes Dandicant, Eisenberg, Munro, Morrison, O'Brien, and Erdrich. GER:DB-Hum

3 units, Aut (Tallent, E)

ENGLISH 73N. Conflict and Resolution in the Novel

(Stanford Introductory Seminar) Preference to freshmen. The social work of the novel, its strategies for articulating difference, and its capacity to objectify points of view and posit resolutions to ideological disputes. The novel as an artistic device, part of material history, and style of social consciousness. Its relationship to language and cultural systems of representation. Readings from Franz Kafka, Milan Kundera, Toni Morrison, Umberto Eco, and John Coetzee. GER:DB-Hum

3 units, Aut (Shloss, C)

ENGLISH 74N. Race and Ethnicity in Contemporary American Fiction: Boundaries and Border Crossings

(Stanford Introductory Seminar) (Same as ASNAMST 74N) The question of place and locality in studies of identity and racial formation. Goal is to engage and examine texts with a critical eye both toward the social contexts represented and to the imaginative aesthetic techniques that American writers of color offer to bring their fictional worlds to life. Theme of border hopping and boundary crossing in works by authors including Charles Johnson, Toni Morrison, Alejandro Morales, Julie Otsuka, Stephen Graham Jones, and Lan Samantha Chang. GER:DB-Hum

3 units, Win (Sohn, S)

ENGLISH 77N. Living in the Past: Italy in the Anglo-American Imagination

(Stanford Introductory Seminar) Preference to freshmen. Italy as metaphor, in depictions by British and American writers from Shakespeare and Byron to D.H.Lawrence and Robert Hellenga. GER:DB-Hum

3 units, Win (Evans, M)

ENGLISH 81. Philosophy and Literature

(Same as CLASSGEN 81, COMPLIT 181, FRENGEN 181, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum

4-5 units, Win (Anderson, L; Landy, J)

ENGLISH 81N. Lyric Voice

(Stanford Introductory Seminar) Preference to freshmen. Lyric poetry asks its reader to imagine a speaking voice. But whose voice inhabits the lyric poem? How have historical developments such as new printing technologies, the rise of liberal individualism, or the emergence of sound recording, influenced a sense of how a lyric should sound? Treatment of poems from a variety of historical periods while stressing the crucial role of the poetry of British Romanticism in shaping the modern sense of the lyric voice. GER:DB-Hum

3 units, Spr (Rovee, C)

ENGLISH 82Q. Shakespeare's Plays

(Stanford Introductory Seminar) Preference to sophomores. Eight representative plays; sonnets. Student papers provide topics for discussion. Students direct and perform scenes from the plays studied. GER:DB-Hum

5 units, Aut (Rebholz, R)

ENGLISH 90. Fiction Writing

The elements of fiction writing: narration, description, and dialogue. Students write complete stories and participate in story workshops. May be repeated for credit. Prerequisite: PWR 1 (waived in summer quarter).

5 units, Aut (Clark, H), Win (Clark, H), Spr (Kealey, T), Sum (Tanaka, S)

ENGLISH 91. Creative Nonfiction

(Formerly 94A.) Historical and contemporary as a broad genre including travel and nature writing, memoir, biography, journalism, and the personal essay. Students use creative means to express factual content.

5 units, Aut (Hummel, M), Win (Michas-Martin, S), Spr (Antopol-Johnson, M)

ENGLISH 92. Reading and Writing Poetry

Prerequisite: PWR 1. Issues of poetic craft. How elements of form, music, structure, and content work together to create meaning and experience in a poem. May be repeated for credit.

5 units, Aut (Evans, J), Win (Evans, J), Spr (Michas-Martin, S)

ENGLISH 94. Writing Across Genres

For minors in creative writing. The forms and conventions of the contemporary short story and poem. How form, technique, and content combine to make stories and poems organic. Prerequisite: 90, 91, or 92.

5 units, Win (Ekiss, K), Spr (Ekiss, K)

ENGLISH 100A. Literary History I

First in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas, and aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes. GER:DB-Hum

5 units, Aut (Greene, R; Summit, J)

ENGLISH 100B. Literary History II

Second in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas as well as aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes. GER:DB-Hum

5 units, Win (Gigante, D; Hoxby, B; Richardson, J)

ENGLISH 100C. Literary History III

Third in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas as well as aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes. GER:DB-Hum

5 units, Spr (Heise, U; Jenkins, N; Moretti, F)

ENGLISH 103Q. Reading and Writing Poetry about Science

(Stanford Introductory Seminar) (Same as STS 103Q) Preference to sophomores. Recent poetry inspired by the phenomena and history of the sciences in order to write such poems themselves. These poems bring sensuous human experience to bear on biology, ecology, neuroscience, physics, astronomy, and geology, as well as on technological advances and missteps. Poets such as Mark Doty, Jody Gladding, Albert Goldbarth, Jorie Graham, Sarah Lindsay, Adrienne Rich, W.S. Merwin, and C. K. Williams. Grounding in poetics, research in individually chosen areas of science, weekly analytical and creative writing. Enrollment limited to 12.

4 units, Win (Roberts, E; Rusk, L)

ENGLISH 105H. Medievalism

The medievalism of 19th-century British writers, their adoption of medieval subjects and themes, within the context of medieval literature. Leading questions cluster around three topics: romance, nation, and space. Readings include Marie de France's Lais, Sir Gawain and the Green Knight, Malory's Morte D'Arthure, Chaucer's House of Fame, Spenser's Faerie Queene, Scott's Ivanhoe, poems by Morris, R. Browning, D. G. Rossetti, and Hopkins, criti-

cism by Arnold and Ruskin, and selections from Tennyson's Idylls of the Kings. GER:DB-Hum

5 units, Aut (Karnes, M; Jarvis, C)

ENGLISH 111. Age of Chaucer

Survey of late-medieval English literature. Major authors include Chaucer, Langland, Margery Kempe, and the Pearl-poet. Genres include dream vision, romance, and lyric. Issues include the politics of writing in Middle English, the Christianization of Arthurian romance, and the construction of social class. GER:DB-Hum

5 units, Win (Karnes, M)

ENGLISH 112. Literature and ....

A study of the relationship between literary texts ranging from Boccaccio's Decameron and Montaigne's Essays to T.S.Eliot's Murder in the Cathedral and such issues as morality, politics, religion, and nationality. GER:DB-Hum

5 units, Win (Evans, M)

ENGLISH 114B. Renaissance Poetry and Drama

Major playwrights who were also major poets; the relation both between the drama and the non-dramatic poetry, and between text and performance, manuscript, and publication. Both stage history and the history of the texts. Plays include Doctor Faustus, the three texts of Hamlet and the two of Troilus and Cressida, and Volpone and The Alchemist. Poetry includes Venus and Adonis and Lucrece, the Shakespeare sonnets, poems of Jonson's, and Marlowe's Hero and Leander. GER:DB-Hum

5 units, Aut (Orgel, S)

ENGLISH 115A. Shakespeare and Modern Critical Developments

Approaches include gender studies and feminism, race studies, Shakespeare's geographies in relation to the field of cultural geography, and the importance of religion in the period. GER:DB-Hum

5 units, Spr (Parker, P)

ENGLISH 116A. The Poetry of John Milton

Milton did not just write Paradise Lost. Living through one of England's most turbulent periods, which saw him defending the right of free speech, liberty of conscience, divorce, and even regicide, Milton wrote examples of almost every genre (sacred hymn, masque, pastoral elegy, epic, brief epic, and tragedy), often blending the biblical and the classical. Readings include the major poems and selected prose, paying close attention to literary form and historical context. GER:DB-Hum

5 units, Spr (Hoxby, B)

ENGLISH 121. Masterpieces of American Literature

(Same as AMSTUD 121, ENGLISH 21) (English majors and others taking 5 units, register for 121.) A survey of some of the definitive texts of American writing, such as Leaves of Grass, Benito Cereno, Adventures of Huckleberry Finn, The Waste Land, The Sun Also Rises, The Golden Apples, and The Crying of Lot 49. GER:DB-Hum

3-5 units, Spr (Rampersad, A)

ENGLISH 122A. Austen and Woolf

Reading of three novels by Jane Austen, arguably the most influential and gifted of British female novelists,and three novels by Virginia Woolf, whose debt to Austen was immense. Topics include the relationship between women writers and the evolution of the English novel; the predominance of the marriage plot in Austen's fiction, and the various transformations Woolf works on it; and each novelist's relationship to the cultural and social milieu in which she wrote. GER:DB-Hum

5 units, not given this year

ENGLISH 123. American Literature and Culture to 1855

(Same as AMSTUD 150) Sources include histories, poetry, autobiography, captivity and slave narratives, drama, and fiction. Authors include Mather, Bradstreet, Rowlandson, Franklin, Brockden Brown, Emerson, Douglass, Hawthorne, and Melville. GER:DB-Hum, EC-AmerCul

5 units, Spr (Richardson, J)

ENGLISH 123D. American Literature, 1855 to World War I

(Same as AMSTUD 123D) A survey of American writers from Whitman to T.S. Eliot, including Emily Dickinson, Mark Twain, Stephen Crane, Frank Norris, Kate Chopin, Theodore Dreiser, and Henry James. Topics include the tension between romance and realism, the impact of naturalism and modernism, as well as race, gender, and the literary evolution of the American language. GER:DB-Hum

5 units, Aut (Rampersad, A)

ENGLISH 126B. The Major Victorian Novel

The Victorian novel was a hugely influential cultural form, not unlike serial television dramas or role playing video games today. Examination of key Victorian novels with an eye to contextualizing themes, categorizing technical achievements and tracing each novel's position in the development of this major literary form. GER:DB-Hum

5 units, Win (Jarvis, C)

ENGLISH 126D. Victorian Sex

How can we make sense of a culture of extraordinary sexual repression that nevertheless seemed fully preoccupied with sex? Examination of the depictions of sex in Victorian literary and cultural texts. Authors include: Collins, Braddon, the Brownings, Swinburne, Stoker and Wilde. GER:DB-Hum

5 units, Win (Jarvis, C)

ENGLISH 131. Representations of Women in 18th-Century British Literature

Literary incarnations of the 18th-century woman: virgin, harlot, matron, monster, feminist. Topics include representations of women in the 18th- century satiric tradition, in the poetry of Pope and Swift, and visual works such as Hogarth's Harlot's Progress and Marriage à la Mode. Emphasis on fictional representations, and the complex revolutionary heroines of Richardson, Cleland, Burney, and Wollstonecraft. GER:DB-Hum

5 units, Spr (Castle, T)

ENGLISH 134. The Marriage Plot

The marriage plot in British fiction. Novels include Pamela, Pride and Prejudice, Middlemarch, Jude the Obscure and Mrs. Dalloway. GER:DB-Hum

5 units, Aut (Jarvis, C)

ENGLISH 136D. Wordsworth and Hopkins

Comparative survey of the works of William Wordsworth and Gerard Manley Hopkins, who helped shape modern poetry. Emphasis on their innovative approaches to poetics, distinctive but profound spiritualism, idiosyncratic conceptions of masculinity, and pioneering writing about the natural environment. GER:DB-Hum

5 units, Aut (Rovee, C)

ENGLISH 140A. Creative Resistance and the Holocaust

(Same as JEWISHST 150A) Creative resistance, a little-known phenomenon and a new term, emerges during times of devastation. Under the Nazis, it took form in graffiti, diaries, chronicles, poems, paintings, photos, and music. How did a human spirit of creativity arise from such duress, and to what end? Why would acts of imagination, incapable of stopping destruction, count as resistance? Guests include a string quartet playing music by a prisoner; and a guest speaker who was a survivor of seven camps. Works include Goya's counter-Napoleon etchings, poems from WW I and Iraq, and contemporary examples. GER:DB-Hum

5 units, Win (Felstiner, J; Felstiner, M)

ENGLISH 141A. British Literary Culture, 1900-1922

The first two decades of the twentieth century were a period of unparalleled social, political, and cultural change in Britain, beginning in the last year of Queen Victoria's reign, through the Great War of 1914-18, and ending in 1922, the year when The Waste Land and Ulysses were published. How did writers and readers get from the Victorian novel to the modernist one, from metered verse to experiments in free verse? Themes include: violence and resistance (aesthetic and actual); the inner life and outer life; shifting relations between classes, genders, and generations; and the relationship between literary form and historical process. GER:DB-Hum

5 units, Spr (Sullivan, H)

ENGLISH 143. Introduction to African American Literature

(Same as AFRICAAM 43, AMSTUD 143, ENGLISH 43) (English majors and others taking 5 units, register for 143.) African Ameri-

can literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. The defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history. GER:DB-Hum, EC-AmerCul

3-5 units, Aut (Rasberry, G)

ENGLISH 143A. American Indian Mythology, Legend, and Lore

(Same as NATIVEAM 143A, ENGLISH 43A) (English majors and others taking 5 units, register for 143A.)Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, Black Elk Speaks. GER:DB-Hum

3-5 units, Aut (Fields, K)

ENGLISH 144. British Modernism, 1890-1950

The history and theory of modernism, with particular focus on literature written in Britain from 1890 to 1950. Major authors include James, Conrad, Yeats, Joyce, Woolf, Eliot, Pound, and Beckett. Why was it necessary to ""make it new""? What were the ambitions, strategies, and limitations of modernism as a project? GER:DB-Hum

5 units, Spr (Sullivan, H)

ENGLISH 144B. Contemporary British Fiction

How do British novelists chart the dramatic changes in culture, class, gender and race relations, economy, and nation that followed the end of the Second World War? Particular focus on writers who came of age during this period and the generation who succeeded them, including some of today¿s most internationally acclaimed authors. What political, cultural, and historical concerns shape the narrative poetics of works by Margaret Drabble, Martin Amis, AS Byatt, Julian Barnes, Kazuo Ishiguro, Salman Rushdie, Zadie Smith, and Ian McEwan. GER:DB-Hum

5 units, Spr (Staveley, A)

ENGLISH 146. Development of the Short Story: Continuity and Innovation

The dual concepts of continuity and innovation. The illumination of love, death, desire, violence, and empathy. Texts include Maupassant, Babel, Chopin, D.H. Lawrence, Woolf, and Flannery O'Connor. Required for Creative Writing emphasis. GER:DB-Hum

5 units, Spr (Tallent, E)

ENGLISH 147. Masterpieces of Contemporary Literature

(Same as ENGLISH 47) Examination of seven predominately 20th-century novels juxtaposed to interrogate the contemporary moment. How do novelists understand the present by representing the past? How and why do novelists rewrite, reinvent, or renounce the plotlines of influential forebears? Narrative forms include realism, romance, modernism, postmodernism, utopia/dystopia. Topics include narrative voice, intertextuality, social satire, politics and war, time and memory, gender and race in novels by Charlotte Bronte, Jean Rhys, George Orwell, Margaret Atwood, Virginia Woolf, Michael Cunningham and Ian McEwan. Relevant clips from recent film adaptations. GER:DB-Hum

3-5 units, Aut (Staveley, A)

ENGLISH 150. Modern Poetry and the Visual Arts

The relationship between photography, painting, and sculpture, and poetry in the 20th century. GER:DB-Hum

5 units, Win (Di Piero, S)

ENGLISH 151A. T. S. Eliot and 20th Century Poetry

Introduction to the full range of Eliot's work in poetry, prose, and drama. The formal properties of Eliot's writing including his metrics, syntax, use of allusion, and wit, alongside its recurring preoccupation with history, landscape, death, and redemption. How and why did he become the most influential poet-critic of the 20th century? GER:DB-Hum

5 units, Aut (Sullivan, H)

ENGLISH 151B. John Berryman's Dream Songs and His Archive

When John Berryman published the first volume of this Dream Songs in 1964, readers were baffled and intrigued by this stylistically radical work. Even his friend Robert Lowell was angered by the difficulty of this powerful, eccentric book, which won the Pulitzer Prize that year. Readings include The Dream Songs and works of some of the writers that formed Berryman's archive: Shakespeare, Freud, Hopkins, Yeats, Rilke, Frost, Hemingway, Williams, Lowell, Plath. GER:DB-Hum

5 units, Spr (Fields, K)

ENGLISH 152A. Mutually Assured Destruction: American Culture and the Cold War

(Same as AMSTUD 152A) The temperature of the early Cold War years via readings of Soviet and U.S. propaganda; documentary film and film noir; fiction by Bellow, Ellison, O'Connor, and Mailer; social theory by Arendt, the New York Intellectuals, and the Frankfurt School; and political texts such as Kennan's Sources of Soviet Conduct, the Truman Doctrine speech, and the National Security Council Report 68. Major themes include the discourse of totalitarianism, MacCarthyism, strategies of containment, the nuclear threat, the figure of the outsider and the counterculture, and the cultural shift from sociological to psychological idioms. GER:DB-Hum

5 units, Aut (Rasberry, G)

ENGLISH 152G. Global Harlem Renaissance

(Same as AFRICAAM 152G, AMSTUD 152G) The explosion of African American artistic expression during 20s and 30s New York known as the Harlem Renaissance. Amiri Baraka once referred to the Renaissance as a kind of vicious modernism, as a BangClash, that impacted and was impacted by political, cultural, and aesthetic changes in the U.S., Europe, the Caribbean, and Latin America. Focus is on the literature, graphic arts, and the music of the era in this global context. GER:DB-Hum, EC-AmerCul

5 units, Aut (Elam, M)

ENGLISH 153F. The Moment in Modernism

Examines modernist obsession with time (looking at texts by Bergson, Benjamin, Ricoeur, Doane, and Mulvey) and emergence of moments of epiphany and revelation as pressing category in modernist texts (by Joyce, Woolf, Proust, Rilke, Wittgenstein) and their precursors (Wordsworth, Kant) and attends to the relationship among cinematic, photographic and literary representations of the moment and its role in the ethical and aesthetic projects of modernism. GER:DB-Hum

5 units, Spr (Zumhagen-Yekple, K)

ENGLISH 154B. Everything but Modernism: Low to Middling Genres

Since the era of modernism (circa 1890-1945), scholars have learned to distinguish between high literature (difficult, serious, advanced) and low, popular, or even bourgeois literature. Some have tended to think only the Joyce's, Woolf's, and Eliot's worthy of study. But what about that great discarded mass of other kinds of writing? Survey of works from the early 1900s in the modes scorned by the modernists, exploring the ancestry of the ever-popular but still-stigmatized realm of genre fiction. Genres include: mystery, dialect poetry, early scifi, melodrama, sentimental lyric, the arrière-garde realist novel. Knowledge of modernism not required. GER:DB-Hum

5 units, Aut (Goldstone, A)

ENGLISH 154C. Modern British Poetry

Poets include Thomas Hardy, G. M. Hopkins, Thom Gunn, and W. S. Graham. GER:DB-Hum

5 units, Win (Di Piero, S)

ENGLISH 154E. Twentieth-Century Irish Literature

Plays, poems, short stories, and novels. Writers include James Joyce, William Yeats, Mary Lavin, Kate O'Brien,William Trevor, Seamus Heaney, and Samuel Beckett. How the writer can sustain imaginative freedom and literary experiment in the face of a turbulent history. GER:DB-Hum

5 units, Win (Boland, E)

ENGLISH 156A. The Poetry of Wallace Stevens

One of the most challenging 20th-century poets, Wallace Stevens, from his early, playful lyrics to his monumental meditative sequences of the 40s and 50s. Topics include: modernism 1910-1955, abstraction, literary politics in the 30s, poetry and war, the

late-Romantic lyric, philosophical poetry, the sequence form, poetic sound, humor, late style, concluding with a survey of Stevens's influence on later poets. GER:DB-Hum

5 units, Win (Goldstone, A)

ENGLISH 160. Poetry and Poetics

Introduction to the reading of poetry, with emphasis on how the sense of poems is shaped through diction, imagery, and technical elements of verse. GER:DB-Hum, WIM

5 units, Aut (Greene, R), Win (Jenkins, N), Spr (Rovee, C)

ENGLISH 161. Narrative and Narrative Theory

An introduction to stories and storytelling--that is, to narrative. What is narrative? When is narrative fictional and when nonfictional? How is it done, word by word, sentence by sentence? Must it be in prose? Can it be in pictures? How has storytelling changed over time? Focus on various forms, genres, structures, and characteristics of narrative. GER:DB-Hum

5 units, Aut (Sohn, S), Win (Bender, J), Spr (Moya, P)

ENGLISH 162. Critical Methods

Introduction to the different intellectual models which help us explain and interpret literary texts, genres, and movements.

5 units, Aut (Sullivan, H), Win (Majumdar, S), Spr (Evans, M)

ENGLISH 163. Shakespeare

GER:DB-Hum

5 units, Win (Orgel, S)

ENGLISH 170H. Textual Selves

A survey of the way in which human identity has been constructed in a variety of different literary texts ranging from Augustine's Confessions and Dante's Divine Comedy to Thomas Hardy's Mayor of Casterbridge and Graham Greene's The Quiet American. GER:DB-Hum

5 units, Spr (Evans, M)

ENGLISH 172. Modern Indian Literature

Engagement with the various vernacular and Anglophone literary traditions of modern India. What is gained, and what is lost for the large and complex phenomenon of modern Indian literature, when its most visible representative, Anglophone fiction, threatens to overshadow the rest and sits easy with the new image of rise and growth that engulfs the nation and its diaspora today? Texts by Dutt, Chatterjee, Tagore, Devi, Premchand, Verma, Sobti, Manto, Murthy, Ambai, Narayan, Rao, Ezekiel, Lal, Ghosh, Rushdie, and others. GER:DB-Hum

5 units, Spr (Majumdar, S)

ENGLISH 172D. Introduction to Comparative Studies in Race and Ethnicity

(Same as CSRE 196C, PSYCH 155, SOC 146) How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. GER:DB-SocSci, EC-AmerCul

5 units, Win (Markus, H; Moya, P)

ENGLISH 172E. The Literature of the Americas

(Same as COMPLIT 142) The intellectual and aesthetic problems of inter-American literature conceived as an entirety. Emphasis is on continuities and crises relevant to N., Central, and S. American literatures. Issues such as the encounters between world views, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, 20th-century avant gardes, and distinctive modern episodes such as the Harlem Renaissance, the Beats, magical realism, and Noigandres in comparative perspective. GER:DB-Hum, EC-AmerCul

5 units, Spr (Greene, R; Saldivar, R)

ENGLISH 174H. The Triumph of the Normal: The English Novel from Bunyan to Orwell

Unlike French, Russian, North and Latin American novels, with their often oppositional or marginal heroes, the English novel has given a central role to the figure of the normal hero/ine, viewed as both normative and common. Focus is on uncovering the social logic behind this choice, and following the parallel evolution of novelistic style towards normal language. GER:DB-Hum

5 units, Win (Moretti, F)

ENGLISH 180. The Bible as Literature

English literature abounds with references to the Bible that register not only the cultural and religious significance of the text but also its power and beauty as literature. Focus on its literary qualities, reading selections from the Hebrew Bible and the New Testament. Study of the text's form, style, structure, and themes, as well as the historical circumstances of the text's composition. No prior knowledge of the Bible is necessary. GER:DB-Hum

5 units, Aut (Karnes, M)

ENGLISH 183C. Feminism and American Literature

(Same as AMSTUD 183C, JEWISHST 153C) How writers have endeavored to enlarge the canvas on which women can paint their lives. Fiction, journalism, and poetry engaging how women come to understand who they might become; women's role in the home and outside the home; motherhood, marriage, work; etc. Writing by Euro-American, African-American, Asian-American and Latino writers. Particular focus on feminists' use of humor to undercut demeaning assumptions, stereotypes and texts. Readings will include feminist parodies of advice manuals, cookbooks, literary criticism and fairy tales. GER:DB-Hum, EC-Gender

5 units, Spr (Fishkin, S)

ENGLISH 183E. First Person: Autobiography and Memoir

Study of classic literary autobiographies and memoirs, including Gertrude Stein's Autobiography Of Alice B. Toklas; Ernest Hemingway's A Moveable Feast; and J.R. Ackerley's My Father And Myself, plus various more recent autobiographical experiments---e.g., graphic memoirs (Art Spiegelman's Maus and Alison Bechdel's Fun Home) as well as certain recent autobiographical films such as Capturing The Friedmans. GER:DB-Hum

5 units, not given this year

ENGLISH 184B. Text and Context in Humanities: Oedipus and His Vicissitudes

(Same as HUMNTIES 100) Tales of Modernity from Sophocles, Freud, Chekhov, Babel, and Woolf. Introduction to cross-disciplinary approach in humanities through foundational texts in the modern tradition. The main focus is on Sigmund Freud's Totem and Taboo (1913), alongside his ancillary writings. Contemporary social thought and historical scholarship provide the context (Georg Simmel, Norbert Elias, Karl Schorske, John Murray Cuddihy) while works of imaginative literature (Sophocles, Anton Chekhov, Isaac Babel, and Virginia Woolf) illuminate the significance of the Oedipus myth for understanding the inter-generational conflict in antiquity and modernity. GER:DB-Hum

3 units, not given this year

ENGLISH 185. Sex, Sacrifice, and Civilization: Baroque Opera and Tragedy

The revival of ancient tragedy in the Baroque opera house. The central mysteries of tragedy: knowledge of suffering, necessity of sacrifice, pleasure of pathos. How tragic drama and opera used poetry, dance, and music to sway the passions and prompt reflection. Greek myths of Medea, Iphigenia, Alceste, Idomeneo. Plays by Euripides and Racine; operas by Mozart, Gluck, and Charpentier. GER:DB-Hum

4-5 units, not given this year

ENGLISH 185A. The Trauma Narrative

It's expected that literary characters grow and change. It's accepted that characters value insight and discovery and are willing to face conflict, overcome obstacles and make meaningful choices on their paths toward satisfying deeply held desires. But what of characters whose stories are of loss, dislocation and marginalization? What shapes and structures are organic to painful stories? By combining a critical and creative approach, this seminar will examine essays, short stories and novels to reveal how trauma narratives make special use of architecture, temporality and narrative strategy to produce forms that challenge traditional conventions and reader's expectations.

5 units, Win (Johnson, A)

ENGLISH 185B. Mammy-Made Right Here at Home: Twain, Hemingway, Faulkner, Ellison

Examination of four novels, Twain's Huckleberry Finn, Hemingway's The Sun Also Rises, Faulkner's Absalom, Absalom and Ellison's Invisible Man, each centrally motivated by the complex and ongoing literary project of describing and creating the concept of Americanness. Each of the four authors uses the novel genre to explore complex configurations of culture, race and class through distinct (and distinctive) masculinist narrative modes that ventriloquize the fantasies and realities of the American Hero they speak into being. Careful readings of these four rich and difficult texts

alongside significant critical responses and with an emphasis on historical context. GER:DB-Hum

5 units, Spr (Heard, D; Zumhagen-Yekple, K)

ENGLISH 185J. Creative Non-Fiction: A Form for Our Times

In the early decades of the novel, relatively few questioned what the form was and how it came into fashion. Examination of creative non-fiction, a genre that has appeared, Athena-like, armed with verisimilitude, emotional truth and narrative drive. Readings across the genre, a survey of its influences and an attempt at definition. Topics include personal and critical writing in the hopes that students will better appreciate this mode of discourse not only as a rare glimpse at a genre forming itself, but as a powerful tool for creative expression.

5 units, Spr (Johnson, A)

ENGLISH 186. Tales of Three Cities: New York, Chicago, Los Angeles

(Same as AMSTUD 186) How urban form and experience shape literary texts and how literary texts participate in the creation of place, through the literature of three American cities as they ascended to cultural and iconographical prominence: New York in the early to mid 19th century; Chicago in the late 19th and early 20th centuries; and Los Angeles in the mid to late 20th century. GER:DB-Hum

5 units, Win (Richardson, J)

ENGLISH 187J. Lady Sings the Blues: Blues, Literature, and Black Feminism

(Formally ENGLISH 187H) Examination of a long tradition of feminist articulations in black women's blues expressed in sound and literature over the course of the twentieth century. Familiarity with the recurrent tropes of black women's blues and how these coalesce in a feminism based on the intersections of race, gender, class, and sexuality by bringing together black women writers, thinkers, and songstresses such as Gayl Jones, Bessie Smith, Zora Neale Hurston, Alice Walker, Nina Simone, and Billie Holiday. Supplemental readings from cultural theorists such as Angela Davis, Hazel Carby, Farah Jasmine Griffin, and others in order to build a critical framework for interpreting, historicizing, and theorizing black women's blues. GER:DB-Hum, EC-Gender

5 units, Win (Heard, D)

ENGLISH 187P. Updike, Cheever and Roth

Close reading and discussion of fiction by John Updike, John Cheever, and Philip Roth, closely connected writers whose work has altered the course of American fiction. Primary focus will be style, as will questions of craft in general: approach will be writerly rather than theoretical. Texts include short stories, essays, letters, interviews, and novels including Updike's Centaur and Rabbit, Run, Cheever's short stories and his novel Falconer, Roth's Ghost Writer and The Dying Animal. GER:DB-Hum

5 units, Win (Tallent, E)

ENGLISH 190. Intermediate Fiction Writing

May be taken twice for credit. Lottery. Priority to last quarter/year in school, majors in English with Creative Writing emphasis, and Creative Writing minors. Prerequisite: 90 or 91.

5 units, Aut (Horack, B), Win (Horack, B), Spr (Clark, H)

ENGLISH 190F. Fiction into Film

Workshop. For screenwriting students. Story craft, structure, and dialogue. Assignments include short scene creation, character development, and a long story. How fictional works are adapted to screenplays, and how each form uses elements of conflict, time, summary, and scene. Priority to seniors and Film Studies majors. Prerequisite: 90.

5 units, Win (Tanaka, S)

ENGLISH 190G. The Graphic Novel

Interdisciplinary. Evolution, subject matter, form, conventions, possibilities, and future of the graphic novel genre. Guest lectures. Collaborative creation of a graphic novel by a team of writers, illustrators, and designers. Prerequisite: consent of instructor.

5 units, not given this year

ENGLISH 190T. Special Topics in Intermediate Fiction Writing

Focus on a particular topic or process. Work includes aspects of reading short stories and novels, writing at least 30-50 pages of fiction, and responding to peers' work in workshop. May be repeated for credit. Prerequisite: 91 or 90.

5 units, Aut (Kealey, T; Hutchins, S), Spr (Antopol-Johnson, M; Horack, B)

ENGLISH 190V. Reading for Writers

Taught by the Stein Visiting Fiction Writer. Prerequisite: 90.

5 units, Spr (Baxter, C)

ENGLISH 191. Intermediate Creative Nonfiction

Continuation of 91. Workshop. The application of advanced storytelling techniques to fact-based personal narratives, emphasizing organic writing, discovering audience, and publication. Guest lecturers, collaborative writing, and publication of the final project in print, audio, or web formats. Prerequisite: 91 or 90.

5 units, Aut (Antopol-Johnson, M), Win (Frisch, S), Spr (Frisch, S)

ENGLISH 191T. Special Topics in Intermediate Creative Nonfiction

Workshop. Continuation of 91. Focus is on forms of the essay. Works from across time and nationality for their craft and technique; experimentation with writing exercises. Students read and respond to each other's longer nonfiction projects. May be repeated for credit. Prerequisite: 91 or 90.

5 units, Win (Antopol-Johnson, M), Spr (Hummel, M)

ENGLISH 192. Intermediate Poetry Writing

May be taken twice. Lottery. Priority to last quarter/year in school, majors in English with Creative Writing emphasis, and Creative Writing minors. Prerequisite: 92.

5 units, Aut (Hummel, M), Win (Hummel, M), Spr (Evans, J)

ENGLISH 192V. The Occasions of Poetry

Taught by the Mohr Visiting Poet. Prerequisite: 92.

5 units, Win (Dobyns, S)

ENGLISH 194. Individual Research

See section above on Undergraduate Programs, Opportunities for Advanced Work, Individual Research.

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH 195W. Writing Center Peer Tutor Seminar

(Same as PWR 195) For students selected to serve as peer writing tutors in the Stanford Writing Center and/or at other campus sites. Readings on and reflection about writing processes, the dynamics of writing and tutoring situations, tutoring techniques, learning styles, diversity, and ethics. Observation of tutoring sessions, written responses to readings, and other written work.

3 units, Spr (Lunsford, A)

ENGLISH 196A. Honors Seminar: Critical Approaches to Literature

Required of students in the English honors program. Reading and writing advanced literary criticism. Critical writings and approaches. Goal is to support the development of students' honors theses.

3 units, Aut (Rovee, C)

ENGLISH 196B. Honors Essay Workshop

Required of English honors students.

2 units, Aut (Obenzinger, H)

ENGLISH 197. Seniors Honors Essay

In two quarters.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

ENGLISH 198. Individual Work

Undergraduates who wish to study a subject or area not covered by regular courses may, with consent, enroll for individual work under the supervision of a member of the department. 198 may not be used to fulfill departmental area or elective requirements without consent. Group seminars are not appropriate for 198.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH 198L. Individual Work: Levinthal Tutorial

Undergraduate writers work individually with visiting Stegner Fellows in poetry, fiction, and if available, nonfiction. Students design their own curriculum; Stegner Fellows act as writing mentors and advisers. Prerequisites: 90, 91, or 92; submitted manuscript.

5 units, Win (Staff), Spr (Staff)

ENGLISH 199. Senior Independent Essay
Open, with department approval, to seniors majoring in non-Honors English who wish to work throughout the year on a 10,000 word critical or scholarly essay. Applicants submit a sample of their expository prose, proposed topic, and bibliography to the Director of Undergraduate Studies before preregistration in May of the junior year. Each student accepted is responsible for finding a department faculty adviser. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

ENGLISH 233. Baroque and Neobaroque
(Same as COMPLIT 233, SPANLIT 293E) The literary, cultural, and political implications of the 17th-century phenomenon formed in response to the conditions of the 16th century including humanism, absolutism, and early capitalism, and dispersed through Europe, the Americas, and Asia. If the Baroque is a universal code of this period, how do its vehicles, such as tragic drama, Ciceronian prose, and metaphysical poetry, converse with one another? The neobaroque as a complex reaction to the remains of the baroque in Latin American cultures, with attention to the mode in recent Brazilian literary theory and Mexican poetry.
5 units, not given this year

ENGLISH 253. Literary Studies and the Digital Library
Ways of reading, interpreting, and understanding literature at the macro scale as an aggregate system. Theoretical issues; landmark essays in the field; how digital libraries and literary corpora invite new types of literary research that challenge conventional approaches.
5 units, Aut (Jockers, M)

ENGLISH 260G. Century's End: Race, Gender, and Ethnicity at the Turn of the Century
(Same as AMSTUD 260G, JEWISHST 250G) How race, gender and ethnicity were constructed and construed in American culture from 1890 to 1914. Readings include stories, poetry, drama, and journalism by Euro-American, African-American, Asian-American, Jewish-American and Native American writers that illuminate how race, gender and ethnicity inflected such issues as the performance of identity, the purpose of education, the uses of dialect, and the dynamics of violence during this period. GER:EC-AmerCul
5 units, Win (Fishkin, S)

ENGLISH 290. Advanced Fiction Writing
Workshop critique of original short stories or novel. Prerequisites: manuscript, consent of instructor, and 190-level fiction workshop.
5 units, Aut (MacDonald, D), Win (Kealey, T)

ENGLISH 292. Advanced Poetry Writing
Focus is on generation and discussion of student poems, and seeking published models for the work.
5 units, Spr (Hummel, M)

GRADUATE COURSES IN ENGLISH

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ENGLISH 201. The Bible and Literature
Differences in translations of the Bible into English. Recognizing and interpreting biblical allusion in texts from the medieval to modern periods. Readings from the Bible and from British, Canadian, American, and African American, and African literature in English.
5 units, Win (Parker, P)

ENGLISH 202. History of the Book
The book as developing concept and material object, from scroll to codex, manuscript to print, cold type to electronic medium. Bibliographical and paleographical techniques. History and theory. The use of books; the history of reading practices, including marginalia and other marks of ownership. Students develop individual projects from Stanford's rare book collection.
5 units, Win (Orgel, S)

ENGLISH 214. Three modern epics: Paradise Lost, The Prelude, Don Juan
To speak of a modern epic is something of a paradox because epic is the oldest genre in the Western poetic tradition and the one with the most imposing ancient exemplars. And yet the genre proves an irresistible challenge to poets even after the rise of the novel, a genre which might seem more appropriate to a mercantile class and to philosophies of individualism. How Milton, Wordsworth, and Byron respond to the conditions and challenges of modernity through and against epic conventions; and how the genre itself is transformed as a result.
5 units, Win (Halmi, N)

ENGLISH 227. Melville's Moby-Dick
A close reading of Melville's 1850 masterpiece, Moby-Dick; or, The Whale. Focus on the novel's 19th-century literary-historical context and on 20th- and 21st-century critical, literary-theoretical, and political-theoretical readings of Moby-Dick.
5 units, Spr (Ruttenburg, N)

ENGLISH 257. Journalism and Imaginative Writing in America
(Same as AMSTUD 257, COMM 278) Walt Whitman spent twenty-five years as a journalist before publishing his first book of poems. Mark Twain was a journalist for twenty years before publishing his first novel. Topics include examination of how writers¿ backgrounds in journalism shaped the poetry or fiction for which they are best known; study of recent controversies surrounding writers who blurred the line between journalism and fiction. Writers include Whitman, Fanny Fern, Twain, Pauline Hopkins, Theodore Dreiser, Charlotte Perkins Gilman, Ernest Hemingway, Meridel LeSueur.
5 units, Spr (Fishkin, S)

ENGLISH 261A. Geography, Time, and Trauma in Asian American Literature
(Same as AMSTUD 261A, ASNAMST 187) The notion that homes can be stable locations for cultural, racial, ethnic, and similarly situated identity categories. Tthe possibility that there really is no place like home for Asian American subjects. How geography, landscape, and time situate traumas within fictional Asian American narratives.
5 units, Aut (Sohn, S)

ENGLISH 261E. Mixed Race Literature in the U.S. and South Africa
(Same as AFRICAAM 261E, AMSTUD 261E) As scholar Werner Sollors recently suggested, novels, poems, stories about interracial contacts and mixed race constitute an orphan literature belonging to no clear ethnic or national tradition. Yet the theme of mixed race is at the center of many national self-definitions, even in the U.S. post-civil rights and South Africa's post-Apartheid era. Aesthetic engagements with mixed race politics in these trans- and post-national dialogues, beginning in the 1700s and focusing on the 20th and 21st centuries.
5 units, Win (Elam, M; Parker, G)

ENGLISH 261F. Gender and Sexuality in Asian American Literature
(Same as AMSTUD 261F, ASNAMST 188) How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings include literary criticism, and feminist and queer theory.
5 units, Win (Sohn, S)

ENGLISH 262C. African American Literature and the Retreat of Jim Crow
(Same as AMSTUD 262C) After the unprecedented carnage of WWII, the postwar era witnessed the slow decline of the segregated Jim Crow order and the onset of landmark civil rights legislation. What role did African American literature and culture play in this historical process? What does this shift in racial theory and praxis mean for black literary production, a tradition constituted by the experience of slavery and racial oppression? Focus on these questions against the backdrop of contemporaneous developments: the onset of the Cold War, decolonization and the formation of the Third World, and the emergence of the new liberalism.
5 units, Spr (Rasberry, G)

ENGLISH 262D. African American Poetics
(Same as AFRICAAM 262D, AMSTUD 262D) Examination of African American poetic expressive forms from the 1700s to the 2000s, considering the central role of the genre--from sonnets to

spoken word, from blues poetry to new media performance--in defining an evolving literary tradition and cultural identity.

5 units, Win (Elam, M)

ENGLISH 271B. Chaucer

An introduction to Chaucer's writings, including the Canterbury Tales, the Book of the Duchess, and the Parliament of Fowls. Readings in Middle English. No prior knowledge of Middle English or medieval literature is expected.

5 units, Win (Karnes, M)

ENGLISH 279D. James Joyce and Ulysses

Close reading of Ulysses as one of the most significant literary works of modernism and 20th-century literary history. The nature and variety of its significance, and the meanings that Joyce's epic of modernism generates.

5 units, Win (Shloss, C)

ENGLISH 293. Literary Translation

An overview of translation theories and practices over time. The aesthetic, ethical, and political questions raised by the act and art of translation and how these pertain to the translator's tasks. Discussion of particular translation challenges and the decision processes taken to address these issues. Coursework includes assigned theoretical readings, comparative translations, and the undertaking of an individual translation project.

3-5 units, Spr (Santana, C)

ENGLISH 303. Experiment and the Novel

A double exploration of experiment in the novel from 1750 into the 19th century. Taking off from Zola's The Experimental Novel, consideration of the novel's aspect as scientific instrument. Taking the idea of experimental fiction in the usual sense of departures from standard practice, consideration of works that seem to break away from techniques of realism devised prior to 1750. Possible texts by: Lennox, Sterne, Walpole, Goldsmith, Godwin, Lewis, Shelley, Hogg, Emily Bronte, and Diderot.

5 units, Aut (Bender, J)

ENGLISH 303D. Thinking in Fiction

(Same as COMPLIT 303D) Narrative and cognition in 18th-century fictional, philosophical, scientific, and cultural texts. Probable readings: Hobbes, Locke, Newton, Swift, Defoe, Hume, Lennox, Sterne, Adam Smith, Wollstonecraft, and Bentham.

5 units, not given this year

ENGLISH 310. The Transatlantic Renaissance

(Same as COMPLIT 332) The emergence of early modern transatlantic culture, emphasizing how canonical works of the Renaissance may be reimagined in a colonial context and how the productions of the colonial Americas make sense as Renaissance works. Topics: mestizaje and creole identity, gender and sexuality, law, religion and the church, mining, commerce, and government. European and American authors: Thomas More, Philip Sidney, Thomas Lodge, William Shakespeare, the Inca Garcilaso de la Vega, and lesser known figures.

5 units, not given this year

ENGLISH 311. Female Modernists: Women Writers in Paris Between the Wars

Focus on expatriate women writers, American and British, who lived and wrote in Paris between the wars including Edith Wharton, Stein and Toklas, Djuna Barnes, Margaret Anderson, Janet Flanner, Natalie Barney, Kay Boyle, Mina Loy, Romaine Brooks, Mary Butts, Radclyffe Hall, Colette, and Jean Rhys. Central theme will be Paris as a lure and inspiration for bohemian female modernists, and the various alternative and emancipatory literary communities they created.

5 units, Aut (Castle, T)

ENGLISH 314. Epic and Empire

(Same as COMPLIT 320A) Focus is on Virgil's Aeneid and its influence, tracing the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) to New World discovery and mercantile expansion in the early modern period.

5 units, Spr (Staff)

ENGLISH 314D. Late 17th Century English Literature

From the preface to Gondibert to Pope¿s Dunciad, English literature produced a frenzied series of epic experiments, some in rhyme, some in blank verse, some even written for the stage. Survey of the literary landscape of the late seventeenth-century through a single lens: the problem posed by the imperative to write in the heroic vein. Genres will include panegyric, epic, heroic play, tragedy, and opera. Authors will include Davenant, Dennis, Dryden, Marvell, Milton, Rochester, and Addison.

5 units, Spr (Hoxby, B)

ENGLISH 334B. Concepts of Modernity 2: Aesthetics and the Public Sphere

(Same as MTL 334B) A selection of 20th-century theory focusing on the relation of aesthetics and the public sphere. Themes include the conceptualization of the public sphere, the debates over the relation of art and politics, aesthetics as form of public rhetoric, the social mission of literature and other arts. Readings from Habermas, Adorno, Horkheimer, Arendt, Lukacs, Bloch, Brecht, Jameson, Negt and Kluge, Kristeva, Spivak, Appiah, Coetzee.

5 units, Win (Majumdar, S)

ENGLISH 336. Victorian Literature and Photography

The theoretical implications of photography; its relationship to concepts such as realism and surrealism, and to the study of material culture and book history; its conceptual emergence in Romantic (pre-photographic) writing and its expression in Victorian writing; its peculiar literariness (including its significance for our study of literature); and the lively, surprising culture of early photography.

5 units, Aut (Rovee, C)

ENGLISH 360. North American Literature in Comparative Context: Revolution

Tracing the articulation of a new transatlantic symbolic order in political-theoretical and literary texts written in the age of democratic revolutions. How insights or convictions related to the political and social realm are translated into fictional forms, and the ways in which literature, insofar as it figures the excess of revolutionary change, supplements its other, whether historiography or political philosophy.

5 units, Win (Ruttenburg, N)

ENGLISH 360B. The Theory of the Novel

Topics will include: theories of the novel¿s origin; novelistic subjectivity; voice and text; body and text; the problem of the quotidian; democracy, revolution and novelistic form; and the peculiar dynamic of the novelistic trinity (author, character, reader).

5 units, Spr (Ruttenburg, N)

ENGLISH 363. The Bourgeois

(Same as COMPLIT 330) Goal is to define the ruling class of modern times. Social history (Weber, Hirschmann, Marx); literary texts (Defoe, Goethe, Gaskell); and Henrik Ibsen who produced an intransigent criticism of the bourgeois ethos.

5 units, Spr (Moretti, F)

ENGLISH 366G. Poetics Now and Then

The fundamental issues and recent problems in poetics. Exploration of both classic statements and current scholarship to obtain an overview of a field in the process of renewal. Topics may include the nature of the poetic; figurative language; technical, social and historical approaches; poetological accounts of major periods and movements (e.g. the baroque, classicism, symbolism, modernism, Language poetry); and recent experiments in poetry that respond to developments in poetics. Both the scholarship and the poems under consideration come from multiple traditions, national and ideological. Readings include works by Auerbach, Jakobson, De Man, Paz, Hartman, Forrest-Thomson, and Agamben.

5 units, Spr (Greene, R; Jenkins, N)

ENGLISH 373C. Text of Shakespeare

The nature and history of the Shakespearean text from its beginnings, from script and performance to quartos, to the folios, to the multitude of editions, and constantly back to script and performance. What, historically, has constituted a good text of Shakespeare, and what is bad about bad quartos? What have been, historically, the ethics and politics of editing, and what has been the relation of editorial practice to stage practice on the one hand, and to what we want Shakespeare to be on the other? Plays with multiple original texts studied, (such as Romeo and Juliet, Hamlet, King Lear) through the lenses of theatrical history, bibliography, and editorial theory.

5 units, Aut (Orgel, S)

ENGLISH 373D. Shakespeare, Islam, and Others

(Same as COMPLIT 311) Shakespeare and other early modern writers in relation to new work on Islam and the Ottoman Turk in early modern studies. Othello, Twelfth Night, Titus Andronicus, The Merchant of Venice, and other Shakespeare plays. Kyd's

Solyman and Perseda, Daborne's A Christian Turned Turk, Massinger's The Renegado, Marlowe's The Jew of Malta, and literary and historical materials.

5 units, not given this year

ENGLISH 381B. Theories of Race and Ethnicity

Race theory in the humanities is a heterogeneous field with diverse theoretical frameworks deriving from poststructuralism, postcolonialism, historical materialism, psychoanalysis, and realism. Various theorizations of race and ethnicity as they have developed in literary and cultural studies, performance studies, visual studies, and philosophy. How they illuminate issues under current debate: subjectivity, identity, biological difference, racial representation, and political activism. Theorists may include Alcoff, Appiah, Bogues, DuBois, Elam, Fanon, Flores, Gilroy, Goldberg, Gordon, Hames-Garcia, Hartman, Haslanger, Lugones, Mendieta, Mercer, Ong, Shelby, Taylor, Wallis, West, Wiegman, Wynter, and Zack.

5 units, Aut (Moya, P)

ENGLISH 382. Race, Formalisms, & Narrative Theory

Concerned with understanding how the traditional forms of the novel are altered in the context of the contemporary drive to represent a new stage in global and hemispheric race relations. How do modern versions of literary realism change to represent the experiences of decolonization, modernization, and postmodernity? Addresses the poetics of genre and the generative power of generic hybridity in classic narrative forms in order to examine how aesthetics and conceptions of history are fundamentally reshaped by modernization and globalization.

5 units, Win (Saldivar, R)

ENGLISH 389. Modernism's Everyday

An approach to literary modernism's commitment to the motifs of everyday life. Topics include newer aesthetic meanings of the ordinary, its relationship with late 19th- and early 20th-century developments in ethnography, art, emergent landscapes of urban modernity, flanerie and the poetics of space, advertising, consumerism and the quotidian embodiment of imperialist ideologies, gender relations, representations of domesticity and boredom. Texts include James Joyce, Virginia Woolf, William Carlos Williams, T.S. Eliot, Katherine Mansfield, Michel De Certeau, Bronislaw Malinowski, Alice Kaplan, Kristin Ross, Henry Lefebvre, Erving Goffman, Patricia Meyer Spacks, Stanley Cavell, Elizabeth Goodstein.

5 units, Spr (Majumdar, S)

ENGLISH 389B. Beckett

(Same as DRAMA 152, DRAMA 358C) Beckett's plays and late writing, which have been described as proto-performance art. Recent Beckett scholarship, including new work about his analysis with Bion.

3-5 units, Spr (Phelan, M)

ENGLISH 390. Graduate Fiction Workshop

For Stegner fellows in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Aut (Tallent, E), Win (Johnson, A), Spr (Wolff, T)

ENGLISH 392. Graduate Poetry Workshop

For Stegner fellows in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

3 units, Aut (Fields, K), Win (Boland, E), Spr (Di Piero, S)

ENGLISH 394. Independent Study

Preparation for first-year Ph.D. qualifying examination.

1-10 units, Sum (Staff)

ENGLISH 395. Ad Hoc Graduate Seminar

Three or more graduate students who wish in the following quarter to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a member of the department to supervise it.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ENGLISH 396. Introduction to Graduate Study for Ph.D. Students

For incoming Ph.D. students. The major historical, professional, and methodological approaches to the study of literature in English.

5 units, Aut (Saldivar, R)

ENGLISH 396L. Pedagogy Seminar I

(Same as COMPLIT 396L) Required for first-year Ph.D students in English, Modern Thought and Literature, and Comparative Literature. Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers.

2 units, Aut (Bender, J)

ENGLISH 397A. Pedagogy Seminar II

Apprenticeship for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature who teach in the Program in Writing and Rhetoric. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, and holding conferences. Meetings explore rhetoric, theories and philosophies of composition, and the teaching of writing. Each student designs a syllabus in preparation for teaching PWR 1.

1 unit, Aut (Lunsford, A; Diogenes, M)

ENGLISH 397W. What is the Future of English Studies?

The origins of English departments from the 19th century to the present, attempting to answer not only MLA President William Riley Parker's 1967 question, where do English departments come from, but the more pressing, where are English departments going in the future, and what does that trajectory suggest for graduate students preparing to enter the profession? Readings from Bourdieu, Graff, Guillory, Berlin, Elbow, Hutcheon, Menand. Colloquium planned around this set of questions, with guest speakers.

3-5 units, Aut (Lunsford, A)

ENGLISH 397X. The Teaching of Literature: How We Teach & Why

(Same as EDUC 405X) This course is designed for graduate students in English and English Education who are interested in questions surrounding the teaching of literature at both the secondary and collegiate level. The course weaves together theoretical considerations of the purposes for teaching literature, including assumptions about the kinds of readings and readers literature teachers are trying to create, with investigation of pedagogical practices.

2-4 units, not given this year

ENGLISH 398. Research Course

A special subject of investigation under supervision of a member of the department. Thesis work is not registered under this number.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH 398L. Literary Lab

Gathering and analyzing data, constructing hypotheses and designing experiments to test them, writing programs [if needed], preparing visuals and texts for articles or conferences. Requires a yearlong participation in the activities of the Lab.

5 units, Aut (Moretti, F; Jockers, M), Win (Moretti, F; Jockers, M), Spr (Moretti, F; Jockers, M)

ENGLISH 398R. Revision and Development of a Paper

Students revise and develop a paper under the supervision of a faculty member with a view to possible publication.

4-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH 398W. Orals, Publication and Dissertation Workshop

For third- and fourth-year graduate students in English. Strategies for studying for and passing the oral examination, publishing articles, and for writing and researching dissertations and dissertation proposals. May be repeated for credit.

2 units, Aut (Bender, J), Win (Bender, J), Spr (Bender, J)

ENGLISH 399. Thesis

For M.A. students only. Regular meetings with thesis advisers required.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVIRONMENT AND RESOURCES (ENVRES) COURSES

GRADUATE COURSES IN ENVIRONMENT AND RESOURCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ENVRES 200. Sustaining Action: Research, Analysis and Writing for the Public
Preference to graduate students and senior undergraduates in environmental, natural and social sciences, engineering, journalism. Students help produce and publish SAGE, an eco advice column, by choosing, researching, and answering questions about sustainable living submitted by Stanford alumni. Prerequisite: admission by application, available from instructor, thayden@stanford.edu, and due 9/15/10.
3 units, Aut (Hayden, T), Spr (Hayden, T)

ENVRES 210. Communication and Leadership Skills
(Same as BIO 388) Focus is on delivering information to policy makers and the lay public. How to speak to the media, Congress, and the general public; how to write op-eds and articles; how to package ideas including titles, abstracts, and CVs; how to survive peer review, the promotion process, and give a job talk; and how to be a responsible science advocate.
2 units, not given this year

ENVRES 220. Special Topics Seminar
For E-IPER Ph.D. and Joint M.S. students; other graduate students with consent of instructor. Challenges of interdisciplinary research; collaborations across disciplines. Topical or methodological focus depending on faculty and student interests. May not be offered every quarter. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 220A. Special Topics Seminar
For E-IPER Ph.D. and Joint M.S. students; other graduate students with consent of instructor. Challenges of interdisciplinary research; collaborations across disciplines. Topical or methodological focus depending on faculty and student interests. May not be offered every quarter. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 220B. Special Topics Seminar
For E-IPER Ph.D. and Joint M.S. students; other graduate students with consent of instructor. Challenges of interdisciplinary research; collaborations across disciplines. Topical or methodological focus depending on faculty and student interests. May not be offered every quarter. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 220C. Special Topics Seminar
For E-IPER Ph.D. and Joint M.S. students; other graduate students with consent of instructor. Challenges of interdisciplinary research; collaborations across disciplines. Topical or methodological focus depending on faculty and student interests. May not be offered every quarter. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 225. E-IPER Current Topics Seminar
For E-IPER Ph.D and Joint M.S. students only. Weekly presentations of E-IPER students' research and other program-related projects. Occasional guest speakers. Active participation including individual or team presentation and attendance required for credit. May be repeated once for credit. Grading C/NC only.
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

ENVRES 242. Negotiating Sustainable Development
(Same as CEE 142A, CEE 242A) How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multi-party processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.
3 units, Win (Christensen, S)

ENVRES 243. Energy and Environmental Policy Analysis
(Same as MS&E 243) Concepts, methods, and applications. Energy/environmental policy issues such as automobile fuel economy regulation, global climate change, research and development policy, and environmental benefit assessment. Group project. Prerequisite: MS&E 241 or ECON 50, 51.
3 units, Spr (Sweeney, J)

ENVRES 270. Graduate Practicum in Environment and Resources
Opportunity for E-IPER students to pursue areas of specialization in an institutional setting such as a laboratory, clinic, research institute, governmental agency, non-governmental organization, or multilateral organization. Meets US CIS requirements for off-campus employment with endorsement from designated school official.
1-9 units, Aut (Vitousek, P), Win (Vitousek, P), Spr (Vitousek, P), Sum (Vitousek, P)

ENVRES 277C. Specialized Writing and Reporting: Environmental Journalism
(Same as COMM 177C, COMM 277C) (Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: 104 or consent of instructor.
4-5 units, Spr (Hayden, T)

ENVRES 290. Capstone Project Seminar in Environment and Resources
Required for E-IPER Joint M.S. students; optional for E-IPER Ph.D. students. Propose, conduct and publicly present final individual or team projects demonstrating the integration of professional (M.B.A., J.D., or M.D.) and M.S. in Environment and Resources degrees. Presentation and submission of final product required.
1-3 units, Aut (Vitousek, P; Phillips, K), Win (Vitousek, P; Phillips, K), Spr (Vitousek, P; Phillips, K)

ENVRES 310. Environmental Forum Seminar
Required core course for first year E-IPER Ph.D. students and all Joint M.S. students, other than Joint M.B.A./M.S. students; optional for joint M.B.A./M.S. students and other graduate students with consent of instructor. Conceptual frameworks, analytical approaches, validity of conclusions from an interdisciplinary perspective. Participants attend various environmentally-focused seminars on campus selected by faculty and students, followed by student-facilitated discussions.
1-2 units, Aut (Staff)

ENVRES 315. Environmental Research Design Seminar
Required core course for first year E-IPER Ph.D. students; optional for Joint M.S. students; other graduate students with instructor's permission. Series of faculty presentations and student-led discussions on interdisciplinary research design as exemplars of the research design theories discussed in ENVRES 320. Designing Environmental Research. Topics parallel the ENVRES 320 syllabus. Corequisite: ENVRES 320.
1-2 units, Win (Christensen, J)

ENVRES 320. Designing Environmental Research
Required core course restricted to first year E-IPER Ph.D. students. Research design options for environmentally related research. Major philosophies of knowledge and how they relate to

research objectives and design choices. Evaluation of strengths and weaknesses of alternative research designs, emphasizing methods, data, and argument. Development of individual research design proposals, including description and justification understandable to a non-specialist.

3-4 units, Win (Davis, J)

ENVRES 330. Research Approaches for Environmental Problem Solving

Required core course for first year E-IPER Ph.D. students. How to develop and implement interdisciplinary research in environment and resources. Assignments include development of research questions, a preliminary literature review, and a summer funding proposal. Course is structured on peer critique and student presentations of work in progress. Corequisite: ENVRES 398 with a faculty member chosen to explore a possible dissertation topic.

3 units, Spr (Vitousek, P; Ardoin, N)

ENVRES 336. Environmental Innovation, Sustainability, And Entrepreneurship

Conceptual frameworks and practical approaches to better understand innovation and entrepreneurship focused on environmental and sustainability issues such as increasing awareness by businesses, consumers and policy makers that the scope and scale of economic activity is altering the dynamics of natural systems in historically unprecedented ways. Course explores ways in which sustainability innovation is being integrated into routine operation, product design and corporate strategy. Case studies, books and chapters, reports, in-class and homework exercises, videos, and guests, and a final project.

4 units, Aut (Reichelstein, S; Larson, A)

ENVRES 338. Environmental Science for Managers and Policy Makers

(Same as LAW 608, OIT 338.) Fundamental science of ecosystems, climate and energy systems by building decision-support models for managing these systems, development of widely-applicable skills in model representation in a spreadsheet, optimization, and Monte Carlo simulation. This course is open only to students in the E-IPER PhD program or Joint M.S. in Environment and Resources program and is required for Joint M.B.A. with M.S. in Environment and Resources students. ENVRES 338 does not assume knowledge of environment science or proficiency in quantitative analysis beyond admission requirements for the MBA program. GSB students should register under OIT 338. GSB students students planning to apply to the E-IPER joint M.S. program should take either OIT 338 or 339 in their first year.

4 units, Win (Plambeck, E)

ENVRES 339. Advanced Environmental Science for Managers and Policy Makers

(Same as LAW 619 and OIT 339.) Fundamental science of ecosystems, climate and energy. Spreadsheet modeling, optimization, and Monte Carlo simulation applied to resource management and environmental policy. Accelerated version of ENVRES 338 for students with background in modeling. Allocates more class time to environmental/energy science and implications for management and policy, and less class time to fundamentals of modeling/optimization/simulation. This course is open only to students in the E-IPER Ph.D. program or Joint M.S. in Environment and Resources program. ENVRES 339 does not assume knowledge of environmental science or proficiency in quantitative analysis beyond admission requirements for the MBA program. GSB students should register under OIT 339. GSB students planning to apply to the E-IPER joint M.S. program should take either OIT 338 or 399 in their first year.

4 units, Win (Plambeck, E)

ENVRES 398. Directed Individual Study in Environment and Resources

Under supervision of an E-IPER affiliated faculty member on a subject of mutual interest. Joint M.S. students must submit an Independent Study Agreement for approval.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 399. Directed Research in Environment and Resources

For advanced graduate students. Under supervision of an E-IPER affiliated faculty member. Joint M.S. students must submit an Independent Study Agreement for approval.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 410. Ph.D. Qualifying Tutorial

For Ph.D. students only. Under supervision of an E-IPER affiliated faculty member.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 460. Proposal Writing Tutorial

Practical training in proposal writing methods. Students draft research proposals relevant to individual interests with supervision from E-IPER affiliated faculty member.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 480. Dissertation Writing Tutorial in Environment and Resources

For students who have completed the oral qualifying examination. Under supervision of an E-IPER affiliated faculty member. May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENVRES 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENGLISH FOR FOREIGN STUDENTS (EFSLANG) COURSES

UNDERGRADUATE COURSES IN ENGLISH FOR FOREIGN STUDENTS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EFSLANG 197. Directed Study

1-3 units, Aut (Hubbard, P), Win (Staff), Spr (Staff), Sum (Staff)

EFSLANG 683S. Workshop in Oral Communication for International Students

Provides support in the development of listening and speaking skills in English, including academic listening, small group discussion, oral presentation, and intercultural communication. Weekly classroom sessions with individual or small group tutorials. Limited to visiting undergraduates and students in the High School Summer College program.

1-2 units, Sum (Mawson, C)

EFSLANG 683W. Workshop in Written Communication for International Students

Provides support in the development of English reading and writing skills and vocabulary development for non-natives. Writing assignments are negotiated with the instructor and may include practice in composition, SAT or TOEFL writing, and writing university application essays and statements of purpose. Weekly classroom sessions with individual or small group tutorials. Limited to visiting undergraduates and students in the High School Summer College program

1-2 units, Sum (Hubbard, P)

GRADUATE COURSES IN ENGLISH FOR FOREIGN STUDENTS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EFSLANG 397. Directed Study

1-3 units, Aut (Hubbard, P), Win (Staff), Spr (Staff), Sum (Staff)

EFSLANG 688V. Intensive English and Academic Orientation for Stanford Visiting Scholars

Goal is to improve English proficiency and introduce the university environment. Writing, pronunciation, listening, discussion, oral presentation, and spoken usage. Enrollment limited to 14.

5 units, Sum (Rylance, C)

EFSLANG 689E. Learning English on Your Own

Independent English language learning. Learning strategies and objectives, setting and maintaining practice schedules, and evaluating progress. Focus is on exploiting web-based resources. Individual meetings.

1 unit, Sum (Hubbard, P)

EFSLANG 689H. American Humor
Analysis of jokes, humorous stories, and situations through modern media. Practice in advanced listening comprehension and English idioms.

1 unit, Sum (Streichler, S)

EFSLANG 689L. Living in the USA
Life and relationships outside the University classroom. Goal is to familiarize international students with the cultural expectations and forms of language use in a variety of situations in the University community and in other social situations. Enrollment limited to 14.

1 unit, Sum (McPherron, P)

EFSLANG 689P. Pronunciation
The sounds of English, and stress, intonation, and rhythm patterns important to natural-sounding speech. Enrollment limited to 14.

2 units, Sum (Mawson, C)

EFSLANG 689T. Interacting in California's Vineyard Culture
Focuses on communicative skills in the context of California's renowned wine culture. Emphasis on the language of wine using appropriate terminology, and interacting knowledgeably with restaurant and retail wine staff. Topics include learning the fundamentals of vineyard techniques, varietal characteristics, tasting techniques, drinking and ordering etiquette. Course is co-taught by a wine expert and an ESL instructor. Class consists of a short interactive lecture, a communicative activity such as role playing, and a tasting of four specially selected wines. Participants must be at least 21 years old. Fee.

1 unit, Sum (Staff)

EFSLANG 689V. Vocabulary and Idiom
Building vocabulary for academic success. Idiomatic language, and what idioms and metaphors reflect about American culture. Enrollment limited to 14.

1 unit, Sum (Hubbard, P)

EFSLANG 689W. Working in the USA
The language and culture of the workplace. Goal is to familiarize international students with the cultural expectations of situations in the business setting and in social situations related to business.

1 unit, Sum (Kevech, A)

EFSLANG 690A. Interacting in English
Strategies for communicating effectively in social and academic settings. Informal and formal language used in campus settings, including starting and maintaining conversations, asking questions, making complaints, and contributing ideas and opinions. Simulations and discussions, with feedback on pronunciation, grammar, and usage. Enrollment limited to 14.

1-3 units, Aut (Streichler, S), Win (Lockwood, R), Spr (Lockwood, R)

EFSLANG 690B. Academic Discussion
Skills for effective participation in classroom settings, seminars, and research group meetings. Pronunciation, grammar, and appropriateness for specific tasks. Feedback on language and communication style. Enrollment limited to 14. May be repeated once for credit. Prerequisite: 690A or consent of instructor.

1-3 units, Aut (Rylance, C), Win (Rylance, C), Spr (Lockwood, R)

EFSLANG 690C. Advanced Interacting in English
Communication skills for extended discourse such as storytelling and presenting supported arguments. Development of interactive listening facility and overall intelligibility and accuracy. Goal is advanced fluency in classroom, professional and social settings. Identification of and attention to individual patterned errors. May be repeated once for credit. Prerequisite: 690B or consent of instructor. Enrollment limited to 14.

1-3 units, Spr (Streichler, S)

EFSLANG 691. Oral Presentation
For advanced graduate students. Practice in academic presentation skills; strategy, design, organization, and use of visual aids. Focus is on improving fluency and delivery style, with videotaping for feedback on language accuracy and usage. Enrollment limited to 14. May be repeated once for credit.

1-3 units, Aut (Oman, A), Win (Streichler, S), Spr (Streichler, S), Sum (Shabrami, C)

EFSLANG 692. Speaking and Teaching in English
For non-native speakers who must teach in English. Focus is on developing clarity, intelligibility, and effectiveness through weekly presentations simulating actual teaching assistant responsibilities. Enrollment limited to 14. May be repeated once for credit.

1-3 units, Aut (Rylance, C), Win (Mawson, C), Spr (Rylance, C)

EFSLANG 693A. Listening Comprehension
Strategies for effective listening in an academic setting, focusing on identifying key ideas in lectures. Practice in understanding words and phrases commonly encountered in classroom settings. Computer-based exercises for comprehension of rapid, natural speech. Enrollment limited to 14.

1-3 units, Aut (Lockwood, R)

EFSLANG 693B. Advanced Listening Comprehension, and Vocabulary Development
Listening strategies and vocabulary for understanding English in academic and non-academic contexts. Discussion and interpretation of communicative intent. Computer-based and video exercises across a range of genres; individual project. May be repeated once for credit. Prerequisite: 693A or consent of instructor.

1-3 units, Aut (Hubbard, P), Win (Romeo, K), Spr (Hubbard, P)

EFSLANG 694. Communication Strategies in Professional Life
For advanced graduate students. Task-based practice of language appropriate for professional settings in industry and related teamwork. Simulation of the roles of manager, applicant, subordinate, and coworker. Prerequisite: 693A, or consent of instructor. Enrollment limited to 14.

1-3 units, Aut (Rylance, C), Spr (Rylance, C)

EFSLANG 695A. Pronunciation and Intonation
Recognition and practice of American English sounds, stress, and intonation patterns for greater comprehension and intelligibility. Analysis of problem areas. Biweekly tape assignments and tutorials. May be repeated once for credit. Enrollment limted to 14.

1-3 units, Aut (Mawson, C), Win (Mawson, C), Spr (Mawson, C), Sum (Mawson, C)

EFSLANG 695B. Advanced Pronunciation and Intonation
Continuation of 695A, focusing on American English sounds, stress, rhythm, and intonation patterns. Emphasis is on self-monitoring, integrated with short presentations. Biweekly tape assignments and tutorials. Enrollment limited to 14. May be repeated for credit three times. Prerequisite: 695A.

1-3 units, Aut (Mawson, C), Win (Mawson, C), Spr (Mawson, C)

EFSLANG 696. Understanding American Humor
Recognizing rhetorical devices, jokes, and character types common to spoken humor in film and television programs. Crosscultural discussion. Prerequisites: 690B, 693B or consent of the instructor. Enrollment limited to 14.

1-3 units, Spr (Streichler, S)

EFSLANG 697. Writing Fundamentals
Focus is on improving grammatical accuracy and vocabulary, building fluency, and learning the structure and conventions of English correspondence, reports, and short academic papers. Enrollment limited to 14.

1-3 units, Aut (Rylance, C), Win (Lockwood, R), Spr (Lockwood, R)

EFSLANG 698A. Writing Academic English
Strategies and conventions for graduate writing. Emphasis is on fluency, organization, documentation, and appropriateness for writing tasks required in course work. Enrollment limited to 14. May be repeated once for credit.

1-3 units, Aut (Kevech, A), Win (Streichler, S), Spr (Rylance, C), Sum (Streichler, S)

EFSLANG 698B. Advanced Graduate Writing
Focus on clarity, accuracy, and appropriate style. For graduate students experienced in English writing and currently required to write for courses and research. Class meetings and individual conferences. Prerequisite: 698A. Enrollment limited to 14. May be repeated once for credit.

1-3 units, Aut (Hubbard, P), Win (Rylance, C), Spr (Streichler, S), Sum (Shabrami, C)

ENVIRONMENTAL EARTH SYSTEM SCIENCE (EESS) COURSES

UNDERGRADUATE COURSES IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

EESS 2. Earth System History
(Same as EARTHSYS 2) The evolution of Earth's systems from formation to the present. Couplings and relationships among biosphere, lithosphere, hydrosphere, and atmosphere. Topics include the evolution of life, origin of the oceans, atmosphere and continents, and changes in climate. Modern climate change and anthropogenic effects. GER:DB-NatSci
3 units, Win (Chamberlain, P)

EESS 8. The Oceans: An Introduction to the Marine Environment
(Same as EARTHSYS 8) For non-majors and majors in earth science or environmental science. The major ocean ecosystems and how they function both naturally and under the influence of human activities. Emphasis on the dominant organisms of each ecosystem and how they interact with each other and their physical and chemical environment. The types of ecosystems include coral reefs, deep-sea hydrothermal vents, coastal upwelling systems, blue-water oceans, estuaries, near-shore dead zones. Lectures, multimedia presentations, and group activities.
4 units, Spr (Arrigo, K)

EESS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration
(Stanford Introductory Seminar) (Same as EARTHSYS 38N, GES 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci
3 units, Win (Dunbar, R)

EESS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough
(Stanford Introductory Seminar) (Same as EARTHSYS 46N) Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's Changes in a California Estuary: A Profile of Elkhorn Slough. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.
3 units, Spr (Francis, C)

EESS 57Q. Climate Change from the Past to the Future
(Stanford Introductory Seminar) (Same as EARTHSYS 57Q) Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.
3 units, Aut (Chamberlain, P)

EESS 101. Environmental and Geological Field Studies in the Rocky Mountains
(Same as EARTHSYS 100, GES 101) Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.
3 units, Aut (Chamberlain, P)

EESS 105. Food and Community: New Visions for a Sustainable Future
(Same as EARTHSYS 105) Service and research focused on providing healthy and environmentally friendly food for the under served in our community. Hands-on collaboration with the Stanford Glean student group, the Stanford Community Garden, and San Francisco nonprofits. Coverage of the broad spectrum from garden development to food dispersal to the needy. Design and implementation of projects that address an aspect of food and social justice, such as urban farming in low-income communities and sustainable food networks for the elderly. Service Learning Course (certified by Haas Center).
3-5 units, Aut (Chamberlain, P), Win (Chamberlain, P), Spr (Chamberlain, P), Sum (Staff)

EESS 111. Biology and Global Change
(Same as BIO 117, EARTHSYS 111) The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing. GER:DB-NatSci
4 units, Win (Vitousek, P; Arrigo, K)

EESS 112. Human Society and Environmental Change
(Same as EARTHSYS 112, HISTORY 103D) Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A
4 units, Aut (Naylor, R; Frank, Z; Pizarro Gariazzo, R)

EESS 117. Earth Sciences of the Hawaiian Islands
(Same as EARTHSCI 117, EARTHSYS 117) Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production rates, and measuring biogeochemical processes are covered throughout the course. This course is restricted to students accepted into the Earth Systems of Hawaii Program.
4 units, Aut (Fendorf, S), alternate years, not given next year

EESS 131. Communicating Environmental Research Using Narratives and Stories
(Same as EESS 231, EARTHSYS 131, EARTHSYS 231) Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.
1 unit, not given this year

EESS 134. Stable Isotopes in Biogeochemistry
(Same as EESS 234, EARTHSYS 134, EARTHSYS 234) Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation

of light isotopes in the atmosphere, hydrosphere, and rocks and minerals. GER:DB-NatSci

3 units, Spr (Chamberlain, P)

EESS 141. Remote Sensing of the Oceans

(Same as EESS 241, EARTHSYS 141, EARTHSYS 241) How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features. GER:DB-NatSci

3-4 units, Win (Arrigo, K)

EESS 143. Marine Biogeochemistry

(Same as EESS 243, EARTHSYS 143, EARTHSYS 243) (Graduate students register for 243.) Processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Processes at the air-sea interface, production of organic matter in the upper ocean, remineralization of organic matter in the water column, and processing of organic matter in the sediments. Cycles of carbon, oxygen, and nutrients; the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget. GER:DB-NatSci

3-4 units, alternate years, not given this year

EESS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

(Same as EARTHSYS 146A, EARTHSYS 246A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

3 units, Win (Thomas, L; Diffenbaugh, N)

EESS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation

(Same as EARTHSYS 146B, EARTHSYS 246B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.

3 units, Spr (Thomas, L; Diffenbaugh, N)

EESS 155. Science of Soils

(Same as EARTHSYS 155) Physical, chemical, and biological processes within soil systems. Emphasis is on factors governing nutrient availability, plant growth and production, land-resource management, and pollution within soils. How to classify soils and assess nutrient cycling and contaminant fate. Recommended: introductory chemistry and biology. GER:DB-NatSci

4 units, Spr (Fendorf, S)

EESS 156. Soil and Water Chemistry

(Same as EESS 256, EARTHSYS 156, EARTHSYS 256) (Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology. GER:DB-NatSci

1-4 units, alternate years, not given this year

EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction

(Same as EARTHSYS 160) Extracting information from data using statistical summaries and graphical visualization, statistical measures of association and correlation, distribution models, sampling, error estimation and confidence intervals, linear models and regression analysis, introduction to time-series and spatial data with geostatistics, applications including environmental monitoring, natural hazards, and experimental design. GER:DB-Math

3 units, not given this year

EESS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics

(Same as EARTHSYS 161, ENERGY 161) Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools. GER:DB-NatSci

3-4 units, Win (Staff)

EESS 162. Remote Sensing of Land

(Same as EARTHSYS 142, EARTHSYS 242) The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

4 units, Win (Lambin, E)

EESS 164. Fundamentals of Geographic Information Science (GIS)

(Same as EARTHSYS 144) Survey of geographic information including maps, satellite imagery, and census data, approaches to spatial data, and tools for integrating and examining spatially-explicit data. Emphasis is on fundamental concepts of geographic information science and associated technologies. Topics include geographic data structure, cartography, remotely sensed data, statistical analysis of geographic data, spatial analysis, map design, and geographic information system software. Computer lab assignments. GER:DB-NatSci

4 units, Aut (Nickel, B)

EESS 173. Aquaculture and the Environment: Science, History, and Policy

(Same as EARTHSYS 173, EARTHSYS 273, EESS 273) Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures.

3 units, alternate years, not given this year

EESS 180. Fundamentals of Sustainable Agriculture

(Same as EARTHSYS 180, EARTHSYS 280, EESS 280) Ecological, economic, and social dimensions of sustainable agriculture in the context of a growing world population. Focus is on management and technological approaches, and historical content of agricultural growth and change, organic agriculture, soil and water resource management, nutrient and pest management, biotechnology, ecosystem services, and climate change. GER:DB-NatSci

3 units, not given this year

EESS 180B. Principles and Practices of Sustainable Agriculture

(Same as EARTHSYS 180B) Field-based training in ecologically sound agricultural practices at the Stanford Community Farm. Weekly lessons, field work, and group projects. Field trips to educational farms in the area. Topics include: soils, composting, irrigation techniques, IPM, basic plant anatomy and physiology, weeds, greenhouse management, and marketing.

3-4 units, Aut (Wiederkehr, S), Spr (Wiederkehr, S)

EESS 181. Concepts of Urban Agriculture

(Same as EARTHSYS 181, EARTHSYS 281, EESS 281) For advanced undergraduates and graduate students from all fields. Seminar. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use plan-

ning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips to nearby cities; guest lectures; case studies; group projects. Enrollment limited.

3 units, not given this year

EESS 182. Current Issues in Sustainable Agriculture
(Same as EARTHSYS 182, EARTHSYS 282, EESS 282) Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

2 units, Win (Wiederkehr, S)

EESS 183. Food Matters: Agriculture in Film
(Same as EARTHSYS 183, EARTHSYS 283, EESS 283) Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

1 unit, Win (Wiederkehr, S)

EESS 184. Climate and Agriculture
(Same as EARTHSYS 184, EARTHSYS 284, EESS 284) The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

3-4 units, alternate years, not given this year

EESS 189. Field Studies in Earth Systems
(Same as BIO 206, EARTHSYS 189) For advanced upper-division undergraduates and graduate students. Field-based, focusing on the components and processes by which terrestrial ecosystems function. Topics from biology, chemistry, ecology, geology, and soil science. Lecture, field, and lab studies emphasize standard field techniques, experimental design, analysis of data, and written and oral presentation. Small team projects test the original questions in the functioning of natural ecosystems. Admission by application; see Axess. Prerequisites: BIO 141 or EESS 160 (formerly GES 160), or equivalent. GER:DB-NatSci

5 units, not given this year

EESS 241. Remote Sensing of the Oceans
(Same as EESS 141, EARTHSYS 141, EARTHSYS 241) How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features. GER:DB-NatSci

3-4 units, Win (Arrigo, K)

GRADUATE COURSES IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EESS 253S. Hopkins Microbiology Course
(Same as BIO 274S, BIOHOPK 274, CEE 274S) (Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

9-12 units, Sum (Spormann, A; Francis, C)

EESS 323. Stanford at Sea
(Same as BIOHOPK 182H, BIOHOPK 323H, EARTHSYS 323) (Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

16 units, Spr (Block, B; Dunbar, R), alternate years, not given next year

EESS 158. Geomicrobiology
(Same as EESS 258, EARTHSYS 158, EARTHSYS 258) How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

3 units, given next year

EESS 211. Fundamentals of Modeling
(Same as EARTHSYS 211) Simulation models are a powerful tool for environmental research, if used properly. The major concepts and techniques for building and evaluating models. Topics include model calibration, model selection, uncertainty and sensitivity analysis, and Monte Carlo and bootstrap methods. Emphasis is on gaining hands-on experience using the R programming language. Prerequisite: asic knowledge of statistics.

3 units, Aut (Lobell, D)

EESS 213. Spatial Statistics and Analysis for Environmental Data
Introduction to common algorithms and concepts of data analysis and spatial statistics as used in environmental sciences. Methods usually performed on remote sensing data set such as clustering, classification, and landscape fragmentation. Spatial statistics such as, variogram, kriging estimators and change of support models. Each algorithm is coded using the python language with an emphasis on programming styles and designs to foster a collaborative research environment. No programming experience is required. Undergraduates require consent of instructor.

3-4 units, Win (Staff)

EESS 215. Earth System Dynamics
Qualitative understanding of key components of the earth system (lithosphere, hydrosphere/oceans, biogeochemistry, biosphere, atmosphere, humans, climate change) at the regional-to-global scale, and the mass, energy, and momentum transport processes that govern dynamics with and between these system components. Governing equations presented but a qualitative process understanding and graduate-level Earth System literacy emphasized. Potential for regional to global scale integrative projects rising from the skills developed in EESS 211 and 213.

4 units, Spr (Diffenbaugh, N; Lambin, E; Field, C)

EESS 216. Terrestrial Biogeochemistry
(Same as BIO 216) Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.

3 units, Spr (Vitousek, P), alternate years, not given next year

EESS 217. Climate of the Cenozoic
For upper-division undergraduate and graduate students. The paleoclimate of the Cenozoic and how climate changes in the past link to the carbon cycle. Topics include long- and short-term records of climate on continents and oceans, evidence for and causes of hyperthermal events, how the Earth's climate has responded in increased carbon dioxide in the atmosphere. Guest speakers, student presentations.

3 units, not given this year

EESS 220. Physical Hydrogeology
(Same as CEE 260A) (Formerly GES 230.) Theory of underground water occurrence and flow, analysis of field data and aquifer tests, geologic groundwater environments, solution of field problems,

and groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus.

4 units, Aut (Gorelick, S)

EESS 221. Contaminant Hydrogeology

(Same as CEE 260C) (Formerly GES 231.) For earth scientists and engineers. Environmental and water resource problems involving contaminated groundwater. The processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Prerequisite: GES 230 or CEE 260A or equivalent.

4 units, Spr (Gorelick, S)

EESS 231. Communicating Environmental Research Using Narratives and Stories

(Same as EESS 131, EARTHSYS 131, EARTHSYS 231) Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

1 unit, not given this year

EESS 234. Stable Isotopes in Biogeochemistry

(Same as EESS 134, EARTHSYS 134, EARTHSYS 234) Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

3 units, Spr (Chamberlain, P)

EESS 240. Advanced Oceanography

For upper-division undergraduates and graduate students in the earth, biologic, and environmental sciences. Topical issues in marine science/oceanography. Topics vary each year following or anticipating research trends in oceanographic research. Focus is on links between the circulation and physics of the ocean with climate in the N. Pacific region, and marine ecologic responses. Participation by marine scientists from research groups and organizations including the Monterey Bay Aquarium Research Institute.

3 units, Aut (Dunbar, R)

EESS 242. Antarctic Marine Geology

(Same as EARTHSYS 272) For upper-division undergraduates and graduate students. Intermediate and advanced topics in marine geology and geophysics, focusing on examples from the Antarctic continental margin and adjacent Southern Ocean. Topics: glaciers, icebergs, and sea ice as geologic agents (glacial and glacial marine sedimentology, Southern Ocean current systems and deep ocean sedimentation), Antarctic biostratigraphy and chronostratigraphy (continental margin evolution). Students interpret seismic lines and sediment core/well log data. Examples from a recent scientific drilling expedition to Prydz Bay, Antarctica. Up to two students may have an opportunity to study at sea in Antarctica during Winter Quarter.

3 units, Aut (Staff), alternate years, not given this year

EESS 243. Marine Biogeochemistry

(Same as EESS 143, EARTHSYS 143, EARTHSYS 243) (Graduate students register for 243.) Processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Processes at the air-sea interface, production of organic matter in the upper ocean, remineralization of organic matter in the water column, and processing of organic matter in the sediments. Cycles of carbon, oxygen, and nutrients; the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget.

3-4 units, alternate years, not given this year

EESS 244. Marine Ecosystem Modeling

Practical background necessary to construct and implement a 2-dimensional (space and time) numerical model of a simple marine ecosystem. Computer programming, model design and parameterization, and model evaluation. Students develop and refine their own multi-component marine ecosystem model.

3 units, Aut (Arrigo, K)

EESS 245. Advanced Biological Oceanography

For upper-division undergraduates and graduate students. Themes vary annually but include topics such as marine bio-optics, marine ecological modeling, and phytoplankton primary production. Hands-on laboratory and computer activities, and field trips into local waters. May be repeated for credit.

3-4 units, not given this year

EESS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

(Same as EARTHSYS 146A, EARTHSYS 246A, EESS 146A, GEOPHYS 146A, GEOPHYS 246A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

3 units, Win (Thomas, L; Diffenbaugh, N)

EESS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation

(Same as EARTHSYS 146B, EARTHSYS 246B, EESS 146B, GEOPHYS 146B, GEOPHYS 246B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.

3 units, Spr (Thomas, L; Diffenbaugh, N)

EESS 250. Elkhorn Slough Microbiology

(Formerly GES 270.) The microbial ecology and biogeochemistry of Elkhorn Slough, an agriculturally-impacted coastal estuary draining into Monterey Bay. The diversity of microbial lifestyles associated with estuarine physical/chemical gradients, and the influence of microbial activity on the geochemistry of the Slough, including the cycling of carbon, nitrogen, sulfur, and metals. Labs and field work. Location: Hopkins Marine Station.

3 units, Sum (Staff)

EESS 256. Soil and Water Chemistry

(Same as EESS 156, EARTHSYS 156, EARTHSYS 256) (Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

1-4 units, alternate years, not given this year

EESS 258. Geomicrobiology

(Same as EESS 158, EARTHSYS 158, EARTHSYS 258) How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

3 units, given next year

EESS 259. Environmental Microbial Genomics
The application of molecular and environmental genomic approaches to the study of biogeochemically-important microorganisms in the environment without the need for cultivation. Emphasis is on genomic analysis of microorganisms by direct extraction and cloning of DNA from natural microbial assemblages. Topics include microbial energy generation and nutrient cycling, genome structure, gene function, physiology, phylogenetic and functional diversity, evolution, and population dynamics of uncultured communities.
1-3 units, Win (Francis, C)

EESS 263. Topics in Advanced Geostatistics
(Same as ENERGY 242) Conditional expectation theory and projections in Hilbert spaces; parametric versus non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, and annealing approaches to stochastic imaging; multiple point statistics inference and reproduction; neural net geostatistics; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, C++/Fortran.
3-4 units, not given this year

EESS 273. Aquaculture and the Environment: Science, History, and Policy
(Same as EARTHSYS 173, EARTHSYS 273, EESS 173) Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures.
3 units, alternate years, not given this year

EESS 280. Fundamentals of Sustainable Agriculture
(Same as EARTHSYS 180, EARTHSYS 280, EESS 180) Ecological, economic, and social dimensions of sustainable agriculture in the context of a growing world population. Focus is on management and technological approaches, and historical content of agricultural growth and change, organic agriculture, soil and water resource management, nutrient and pest management, biotechnology, ecosystem services, and climate change.
3 units, not given this year

EESS 281. Concepts of Urban Agriculture
(Same as EARTHSYS 181, EARTHSYS 281, EESS 181) For advanced undergraduates and graduate students from all fields. Seminar. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips to nearby cities; guest lectures; case studies; group projects. Enrollment is limited.
3 units, not given this year

EESS 282. Current Issues in Sustainable Agriculture
(Same as EARTHSYS 182, EARTHSYS 282, EESS 182) Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.
2 units, Win (Wiederkehr, S)

EESS 283. Food Matters: Agriculture in Film
(Same as EARTHSYS 183, EARTHSYS 283, EESS 183) Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.
1 unit, Win (Wiederkehr, S)

EESS 284. Climate and Agriculture
(Same as EARTHSYS 184, EARTHSYS 284, EESS 184) The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.
3-4 units, alternate years, not given this year

EESS 301. Topics in Environmental Earth System Science
Current topics, issues, and research related to interactions that link the oceans, atmosphere, land surfaces and freshwater systems. May be repeated for credit.
1 unit, Aut (Lobell, D), Win (Staff), Spr (Staff)

EESS 322A. Seminar in Hydrogeology
Current topics. May be repeated for credit. Autumn Quarter has open enrollment, For Winter Quarter, consent of instructor is required.
1 unit, not given this year

EESS 322B. Seminar in Hydrogeology
Current topics. May be repeated for credit. Prerequisite: consent of instructor.
1 unit, Win (Gorelick, S)

EESS 330. Advanced Topics in Hydrogeology
Topics: questioning classic explanations of physical processes; coupled physical, chemical, and biological processes affecting heat and solute transport. May be repeated for credit.
1-2 units, Win (Staff)

EESS 342. Geostatistics
Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.
1-2 units, Aut (Staff)

EESS 342B. Geostatistics
Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.
1-2 units, not given this year

EESS 342C. Geostatistics
Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.
1-2 units, not given this year

EESS 363F. Oceanic Fluid Dynamics
(Same as CEE 363F) Dynamics of rotating stratified fluids with application to oceanic flows. Topics include: inertia-gravity waves; geostrophic and cyclogeostrophic balance; vorticity and potential vorticity dynamics; quasi-geostrophic motions; planetary and topographic Rossby waves; inertial, symmetric, barotropic and baroclinic instability; Ekman layers; and the frictional spin-down of geostrophic flows. Prerequisite: CEE 262A or a graduate class in fluid mechanics.
3 units, Spr (Thomas, L)

EESS 385. Practical Experience in the Geosciences
On-the-job training, that may include summer internship, in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets USCIS requirements for F-1 curricular practical training. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EESS 398. Current Topics in Ecosystem Modeling
1-2 units, not given this year

EESS 400. Graduate Research
May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EESS 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EESS 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ETHICS IN SOCIETY (ETHICSOC) COURSES

UNDERGRADUATE COURSES IN ETHICS IN SOCIETY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ETHICSOC 10. Ethics in Theory and Practice
(Same as PHIL 22) Weekly talks by Stanford faculty on important questions of ethics that arise in private and public life. These questions arise in all disciplines and are central to many of the main problems confronting humanity today. Such questions include: what is our obligation to future generations; are there any human

rights; what is the appropriate role of religion in politics; is capital punishment ever justified?; what are the ethical obligations of a researcher; should the university teach moral values?; what principles of justice should govern the distribution of K-12 education?

1 unit, Aut (Reich, R), Win (Reich, R), Spr (Reich, R)

ETHICSOC 20. Introduction to Moral Philosophy

(Same as PHIL 2) What is the basis of moral judgment? What makes right actions right and wrong actions wrong? What makes a state of affairs good or worth promoting? What is it to have a good or virtuous character? Answers to classic questions in ethics through the works of traditional and contemporary authors. Fulfills the Philosophy ethical reasoning requirement. GER:DB-Hum

5 units, Aut (Schapiro, T)

ETHICSOC 132X. Theories of Civil Society, Philanthropy, and the Nonprofit Sector

(Same as POLISCI 132S, POLISCI 132X, POLISCI 332S) Students taking this course for a WIM, register for POLISCI 132S. The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? Readings in political philosophy, political sociology, and public policy.

5 units, Spr (Sievers, B; Reich, R)

ETHICSOC 133. Ethics and Politics of Public Service

(Same as HUMBIO 178, PHIL 175A, PHIL 275A, POLISCI 133, PUBLPOL 103D) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford. GER:DB-SocSci

5 units, not given this year

ETHICSOC 136R. Introduction to Global Justice

(Same as INTNLREL 136R, PHIL 76, POLISCI 136R, POLISCI 336) Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

5 units, Spr (Oberman, K)

ETHICSOC 137R. Justice at Home and Abroad: Civil Rights in the 21st Century

(Same as EDUC 261X, POLISCI 137R, POLISCI 337R) Focus is on theories of justice. How the core ideals of freedom, equality, and security animate theories which John Rawls considers the first virtue of social institutions. Topics include the U.S. Constitution as a legal framework for the operation of these ideals, civil rights legislation and litigation as the arena of tensions between those ideals, and how ideas of justice function both at home and abroad to impact civil liberties in today's war on terror.

5 units, Win (Reich, R; Steyer, J; Karlan, P)

ETHICSOC 157. Moral Foundations of Capitalism

Preference to sophomores and juniors. An interdisciplinary examination of alternative and largely incompatible 20th-century defenses of the morality of capitalism, with a concentration on economic, objectivist, and Christian arguments, considered historically, economically, politically, and philosophically. Readings from Adam Smith, Karl Marx, authors for and against slavery, John Maynard Keynes, Theodore Roosevelt, Herbert Hoover, Austrian School economists, Milton Friedman, Dinesh D'Souza, and George Gilder. A reading of Ayn Rand's Atlas Shrugged. A concluding application of studied theories to a few recent public policy issues. GER:DB-Hum

5 units, Win (McCaskey, J)

ETHICSOC 170. Ethical Theory

(Same as PHIL 170) Major strands in contemporary ethical theory. Readings include Bentham, Mill, Kant, and contemporary authors. GER:DB-Hum, EC-EthicReas

4 units, Spr (Schapiro, T)

ETHICSOC 171. Justice

(Same as IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas

4-5 units, Aut (Cohen, J)

ETHICSOC 174A. Moral Limits of the Market

(Same as PHIL 174A, PHIL 274A) Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases. GER:DB-Hum

4 units, not given this year

ETHICSOC 175M. The Ethics of War

(Same as PHIL 90B) Issues both in contemporary just war theory and political philosophy. Relevant questions include: Can conscription ever be justified? If not, is there anything wrong with targeting poor people as part of efforts to recruit a 'volunteer' military? If, during war itself, combatants act in ways prohibited by the moral requirements governing war's conduct, then does it make any moral difference whether they were acting as ordered? And how do we identify these moral requirements in the first place? For example, what distinguishes a legitimate target from an illegitimate one? What determines whether military action is disproportionate? What, if anything, is morally distinctive about terrorism? Explores the complexities behind these questions and others, with a view to evaluating the potential answers to them.

4 units, Win (Halliday, D)

ETHICSOC 177M. Human Rights and Moral Questions

(Same as ETHICSOC 277M, PHIL 177M, PHIL 277M) The proliferation of human rights in the discourse of international justice has raised questions in both moral and legal theory such as: What are human rights? How should they be conceptualized? Who ought to bear the duties associated with them? Can their protection justify military interventions into sovereign states? Course focus is on topics in moral and legal theory surrounding human rights including: the question of what these rights are; the various substantive moral justifications for the protection of human rights; the moral issues raised by the dominance of human rights in international law and relations; can any rights be universal? How are these rights to be framed in the light of crosscultural values and claims about cultural dominance? The connections between these questions.

5 units, Aut (Thomas, J)

ETHICSOC 178M. ENVIRONMENTAL JUSTICE

(Same as ETHICSOC 278M, PHIL 178M, PHIL 278M, POLISCI 134L) Explores the normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

4 units, Win (Staff)

ETHICSOC 185M. Contemporary Moral Problems

(Same as PHIL 72) As individuals and as members of societies, we make choices that can be evaluated from a moral point of view. What choices should we make, and how should we justify these choices? For example, can we justify buying expensive sunglasses or MP3 players when the money could instead be given to provide others with basic nutrition? Does a preference for the taste of meat

over that of other proteins justify killing animals? Focus is on our obligations to aid, and to avoid harming. Topics include aid and its allocation, abortion, animal rights and euthanasia. GER:EC-EthicReas

4 units, Win (Staff)

ETHICSOC 190. Ethics in Society Honors Seminar
(Same as PHIL 178) For students planning honors in Ethics in Society. Methods of research. Students present issues of public and personal morality; topics chosen with advice of instructor.

3 units, Win (Reich, R)

ETHICSOC 198. Community Engagement Internship
Restricted to Ethics in Society minors with the citizenship option. Opportunities for students to engage in community work via the Haas Center for Public Service. Students work with Haas Center staff to design an internship involving community-based research or supported by a Haas Center fellowship or community service work/study, or to serve for an academic year as a tutor in one of the Haas Center's several K-12 programs in East Palo Alto. May be repeated for credit.

3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ETHICSOC 199. Independent Studies in Ethics in Society
May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ETHICSOC 200A. Ethics in Society Honors Thesis
Limited to Ethics in Society honors students, who must enroll once in A and once in B.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ETHICSOC 200B. Ethics in Society Honors Thesis
Limited to Ethics in Society honors students, who must enroll once in A and once in B.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ETHICSOC 277M. Human Rights and Moral Questions
(Same as ETHICSOC 177M, PHIL 177M, PHIL 277M) The proliferation of human rights in the discourse of international justice has raised questions in both moral and legal theory such as: What are human rights? How should they be conceptualized? Who ought to bear the duties associated with them? Can their protection justify military interventions into sovereign states? Course focus is on topics in moral and legal theory surrounding human rights including: the question of what these rights are; the various substantive moral justifications for the protection of human rights; the moral issues raised by the dominance of human rights in international law and relations; can any rights be universal? How are these rights to be framed in the light of crosscultural values and claims about cultural dominance? The connections between these questions.

5 units, Aut (Thomas, J)

ETHICSOC 278M. ENVIRONMENTAL JUSTICE
(Same as ETHICSOC 178M, PHIL 178M, PHIL 278M, POLISCI 134L) Explores the normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

4 units, Win (Staff)

FEMINIST STUDIES (FEMST) COURSES

UNDERGRADUATE COURSES IN FEMINIST STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FEMST 101. Introduction to Feminist Studies
(Same as CSRE 108, HISTORY 107) Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analysis of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.

5 units, Aut (Freedman, E)

FEMST 103. Feminist Theories and Methods Across the Disciplines
(Same as FEMST 203, PHIL 153, PHIL 253) The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research. GER:EC-Gender

4-5 units, Win (Longino, H)

FEMST 104A. Junior Seminar and Practicum
Preference to and required of Feminist Studies majors; others require consent of instuctor. Feminist experiential learning projects related to critical studies in gender and sexuality. Identifying goals, grant proposal writing, and negotiating ethical issues in feminist praxis. Developing the relationship between potential projects and their academic focus in the major.

1 unit, Win (Coll, K)

FEMST 104B. Senior Seminar and Practicum
Required for Feminist Studies majors. Non-majors enrolled with consent of instructor. Students develop oral reports on their practicum and its relationship to their academic work, submit a report draft and revised written analysis of the practicum, and discuss applications of feminist scholarship. May be repeated once for credit.

2 units, Aut (Coll, K)

FEMST 105. Honors Work
(Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FEMST 108. Internship in Feminist Studies
For non-majors. Supervised field, community, or lab experience in law offices, medical research and labs, social service agencies, legislative and other public offices, or local and national organizations that address issues related to gender and/or sexuality. One unit represents approximately three hours work per week. Required paper. May be repeated for credit. Service Learning Course (certified by Haas Center). Prerequisites: course in Feminist Studies, consent of program office, written consent of faculty sponsor, application.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FEMST 120. Introduction to Queer Studies
A historical overview of key theoretical developments in queer studies. Multidisciplinary perspective from a social constructionist approach to gender and sexual identity, which not only affects understandings of queer people, but straight as well. How queer theory has been influential across disciplines and in popular culture, refining not only an understanding of gender and sexuality but also providing new critical perspectives for social theory more broadly. Engagement with contemporary debates and controversies in the public domain. GER:EC-Gender

4-5 units, Spr (Staff)

FEMST 138. Violence Against Women: Theory, Issues, and Prevention
Interdisciplinary feminist perspective. Causes of abuse, approaches to ending violence against women, and its relationship to other forms of oppression such as racism, economic exploitation, heterosexism, and social class. Institutional barriers maintaining this violence; individual, community, political, legal, national, and global dimensions of possible solutions. Limited enrollment. Prerequisite: consent of instructor.

2-4 units, Aut (Baran, N)

FEMST 139. Rereading Judaism in Light of Feminism
During the past three decades, Jewish feminists have asked new questions of traditional rabbinic texts, Jewish law, history, and religious life and thought. Analysis of the legal and narrative texts, rituals, theology, and community to better understand contemporary Jewish life as influenced by feminism. GER:EC-Gender

4-5 units, given next year

FEMST 140C. Gender Transgression
Exploration of gender as a category and (compulsory) identification. What happens when people challenge or refuse gender categories and stereotypes? Participating in conversations initiated in queer and feminist theory, anthropology, history, science, and popular culture, we will examine how gender works and consider the experiences, writing, and art of people who challenge it. Course culminates in an ethnographic research project.
4-5 units, Aut (Staff)

FEMST 140D. LGBT History in the United States
LGBT social, cultural, and political history in the U.S. How categories of sexuality have changed over time, with emphasis on the relationship among homosexuality, heterosexuality, and transgenderism. How the intersections of race, class, and sexuality influenced the constitution of these categories and the politics of social relations. Historical and literary sources used to examine changes in LGBT experiences and identities, primarily in the 20th century.
4-5 units, Spr (Staff)

FEMST 153. Women and the Creative Imagination
(Same as FEMST 253) Interdisciplinary. The lives of women artists in different cultures and generations. Students write about art forms, the role of artists in the academy, and their social responsibilities. Similarities and differences among artists. GER:DB-Hum, EC-Gender
4-5 units, Aut (Miner, V)

FEMST 166. Feminist Theories of Knowledge
(Same as PHIL 184F, PHIL 284F) Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power. GER:DB-Hum, EC-Gender
4 units, not given this year

FEMST 188N. Imagining Women: Writers in Print and in Person
(Stanford Introductory Seminar) Gender roles, gender relations, and sexual identity explored in contemporary literature and conversation with guest authors. Poetry and narrative examining relationships between race and gender set in 19th-21st centuries in the Phillippines, Jamaica, Japan, China, and various parts of the U.S. Expository writing and oral skills are emphasized. Writing experience not necessary. GER:DB-Hum, EC-Gender
4-5 units, Win (Miner, V)

FEMST 191Q. Writing Women's Lives
(Stanford Introductory Seminar) Creative writing through dialogue focusing on prose about the lives of women in different cultures and generations. Novels, short stories, and micro-narrative including fiction and memoir. Students produce work using research, memory, imagination, and metaphor.
2 units, Aut (Miner, V)

FEMST 195. Directed Reading
May be repeated for credit. (Staff)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FEMST 260. Seminar in Women's Health: Women and Disabilities
(Same as FEMST 360) Explores visible and invisible disabilities, women's psychological as well as physical health, issues of access, caretaking, self-definition and the diversity of disabled women's identities. Prerequisite: consent of instructor. GER:DB-SocSci, EC-Gender
5 units, Spr (Krieger, S)

GRADUATE COURSES IN FEMINIST STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FEMST 203. Feminist Theories and Methods Across the Disciplines
(Same as FEMST 103, PHIL 153, PHIL 253) The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research.
4-5 units, Win (Longino, H)

FEMST 253. Women and the Creative Imagination
(Same as FEMST 153) Interdisciplinary. The lives of women artists in different cultures and generations. Students write about art forms, the role of artists in the academy, and their social responsibilities. Similarities and differences among artists.
4-5 units, Aut (Miner, V)

FEMST 360. Seminar in Women's Health: Women and Disabilities
(Same as FEMST 260) Explores visible and invisible disabilities, women's psychological as well as physical health, issues of access, caretaking, self-definition and the diversity of disabled women's identities. Prerequisite: consent of instructor.
5 units, Spr (Krieger, S)

FILM STUDIES (FILMSTUD) COURSES

UNDERGRADUATE COURSES IN FILM STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FILMSTUD 4. Introduction to Film Study
Formal, historical, and cultural issues in the study of film. Classical narrative cinema compared with alternative narrative structures, documentary films, and experimental cinematic forms. Issues of cinematic language and visual perception, and representations of gender, ethnicity, and sexuality. Aesthetic and conceptual analytic skills with relevance to cinema. GER:DB-Hum
5 units, Aut (Bukatman, S)

FILMSTUD 6. Introduction to Digital Media
Media beyond the horizon of cinema and television present unique problems of definition and analysis. Taking the digital (information represented as discrete values) as a reasonable approximation of the mechanics and fantasies of computation, course surveys theoretical approaches to code, networks, and cyberculture. Taking familiar formations like web sites and video games as objects by which to learn how thinkers have understood and envisioned emerging media from the mid-20th century to the present. Students to develop own methodological tools for becoming more critical users of digital media.
5 units, not given this year

FILMSTUD 7. Introduction to Television Studies
Television is arguably the most influential and ubiquitous mass medium of the last half century. Because of its familiarity and popularity, it is also often the medium most overlooked, dismissed, and maligned. Drawing from the history of television and of television scholarship, this course builds a theoretical framework for understanding this pivotal cultural form. Course covers interdisciplinary approaches to studying TV texts, TV audiences, and TV industries, including questions of the boundaries of television (from independent and avant-garde video to convergence). In the process students develop methodological tools as critical television viewers.
5 units, Aut (Russo, J)

FILMSTUD 100A. History of World Cinema I, 1895-1929
(Same as FILMSTUD 300A) From cinema's precursors to the advent of synchronized sound. GER:DB-Hum
4 units, Aut (Staff)

FILMSTUD 100B. History of World Cinema II, 1930-1959
(Same as FILMSTUD 300B) The impact of sound to the dissolution of Hollywood's studio system. GER:DB-Hum
4 units, Win (Staff)

FILMSTUD 100C. History of World Cinema III, 1960-Present
(Same as FILMSTUD 300C) From the rise of the French New Wave to the present. GER:DB-Hum
4 units, not given this year

FILMSTUD 101. Fundamentals of Cinematic Analysis
(Same as FILMSTUD 301) The close analysis of film. Emphasis is on formal and narrative techniques in structure and style, and detailed readings of brief sequences. Elements such as cinematography, mise-en-scène, composition, sound, and performance. Films

from various historical periods, national cinemas, directors, and genres. Prerequisite: FILMSTUD 4 or equivalent. Recommended: ARTHIST 1 or FILMSTUD 102. GER:DB-Hum, WIM

4 units, Win (Staff)

FILMSTUD 102. Theories of the Moving Image

(Same as FILMSTUD 302) Major theoretical arguments and debates about cinema: realism,formalism, poststructuralism, feminism, postmodernism, and phenomenology. Prerequisites: ARTHIST 1, FILMSTUD 4. GER:DB-Hum

4 units, Spr (Levi, P)

FILMSTUD 111. The Body in American Genre Film: From Chaplin to The Matrix

(Same as FILMSTUD 311) The American genre film as a mass form that shares elements with a carnivalesque, folk culture such as a rejection of politeness and piety, and an emphasis on the physical. Genres include comedy, western, war, science fiction, musical, horror, melodrama, gangster, and cult, exploitation, and blaxploitation films. The place of the body onscreen. How does the body exist in relation to the world, other bodies, and the act of perception? What meaning does bodily movement have in relation to narrative? GER:DB-Hum

4 units, not given this year

FILMSTUD 113. Queer Film and Media

(Same as FILMSTUD 313) According to identity politics, visibility is a key tactic in the fight for societal acceptance and civil rights. But how is sexuality visible? Course addresses this question by analyzing queer film and media since the 1970s, focusing primarily on explicit representations of GLBTQ characters and communities in US cinema, television, and cyberculture. Themes include positive images, AIDS, coming out, celebrity, and the gay market. Through queer theory and criticism, analysis of the contested relationships between spectators and texts, identity and commodities, realism and fantasy, activism and entertainment, desire and politics.

4 units, Win (Russo, J)

FILMSTUD 114. Comics

(Same as FILMSTUD 314) The modern medium of comics, a history that spans 150 years. The flexibility of the medium encountered through the genres of humorous and dramatic comic strips, superheroes, undergrounds, independents, journalism, and autobiography. Innovative creators including McCay, Kirby, Barry, Ware, and critical writings including McCloud, Eisner, Groenstee. Topics include text/image relations, panel-to-panel relations, the page, caricature, sequence, seriality, comics in the context of the fine arts, and relations to other media. GER:DB-Hum

4 units, not given this year

FILMSTUD 115. Documentary Issues and Traditions

(Same as FILMSTUD 315) Issues include objectivity/subjectivity, ethics, censorship, representation, reflexivity, responsibility to the audience, and authorial voice. Parallel focus on form and content. GER:DB-SocSci

4 units, not given this year

FILMSTUD 116. International Documentary

(Same as FILMSTUD 316) Historical, aesthetic, and formal developments of documentary through nonfiction films in Europe, Asia, Latin America, and Africa. GER:DB-Hum

4 units, Aut (Meltzer, J)

FILMSTUD 122. Kubrick

(Same as FILMSTUD 322) Thematic and stylistic richness of the cinema of Stanley Kubrick. Methodological approaches to the subject. Emphasis is on questions of close textual analysis, authorship and genre, and critique of ideology. Focus is on A Clockwork Orange. Other films include: 2001: A Space Odyssey, Barry Lyndon, Killer's Kiss, and The Shining.

4 units, not given this year

FILMSTUD 132. East Asian Cinema

(Same as FILMSTUD 332) Social, historical, and aesthetic dimensions of the cinemas of Japan, Hong Kong, Taiwan, mainland China, and Korea. Topics such as nation and gender, form and genre, and local and transnational conditions of practice and reception. Screenings include popular and art films from the silent to contemporary eras, including, Zhang Yimou, Wong Kar-wai, Hou Hsiao-hsien, Ozu Yasujiro, Kurosawa Akira, and Im Kwon-taek.

4 units, not given this year

FILMSTUD 133A. Latin American Cinema

(Same as FILMSTUD 333A) Emphasis is on Mexico, Brazil, Argentina, and Cuba. How filmmakers represent and sometimes rewrite key moments in national history. When have filmmakers constructed a dialogue with older cinematic traditions versus breaking from past practices? How have political concerns shaped cinematic practices. Directors include Fernando de Fuentes, Luis Buñuel, Leopoldo Torre Nilsson, Patricio Guzmán, Humberto Solas, Nelson Pereira dos Santos, Lucrecia Martel, and Héctor Babenco.

4 units, not given this year

FILMSTUD 134A. Poetic Cinema: The Soviet School

(Same as FILMSTUD 334A) The poetic or archaic school of Soviet cinema which emerged primarily in the non-Russian Soviet Republics in the 60s and 70s and traced its aesthetic to the films of Aleksandr Dovzhenko. Films by Dovzhenko, Andrei Tarkovsky, Sergei Parajanov, Tengiz Abuladze, and Otar Ioseliani. GER:DB-Hum

4 units, not given this year

FILMSTUD 135. History of Video Art

(Same as FILMSTUD 335) Focus is on artists who have contributed to the history of video art. Topics include: theoretical analyses of the medium; challenges to the performer-spectator dynamic (Dan Graham and Vito Acconci); feminist culture critique (Martha Rosler and Dara Birnbaum); closed-circuit installations and performances (Peter Campus and Joan Jonas); combinations of linguistic and bodily investigations (Bruce Nauman and Gary Hill); representations of girl culture (Sadie Benning); guerrilla television (TVTV and Ant Farm); image processing (Woody and Steina Vasulka); the turn toward cinematic installations (Stan Douglas and Douglas Gordon); and more recent trends (Cory Arcangel and Ryan Trecartin).

4 units, not given this year

FILMSTUD 136. Gender and Sexuality in Chinese Cinema

(Same as FILMSTUD 336) Representations of gender and sexuality in the cinemas of China, Taiwan, and Hong Kong, covering key periods and genres such as the golden age of Shanghai film, Hong Kong action pictures, opera films, post-socialist art films, and new queer cinema. Historical and contemporary perspectives on cinematic constructions of femininity, masculinity, and sexuality as they relate to issues of nationalism, modernity, globalization, and feminist and queer politics. Weekly screening required. GER:EC-Gender

4 units, not given this year

FILMSTUD 137. European New Wave Cinemas

(Same as FILMSTUD 337) an exploration of the major currents, movements, and schools in the European cinema of the post-war era from the late 1940s to the 1970s. A mixture of historical, aesthetic, and theoretical concerns will inform the study of French New Wave, British Free Cinema, Italian cinema in the 1960s, the New German Cinema of the 1970s, and more.

4 units, Win (Levi, P)

FILMSTUD 145. Politics and Aesthetics in East European Cinema

(Same as FILMSTUD 345) From 1945 to the mid-80s, emphasizing Polish, Hungarian, Czech, Slovak, and Yugoslav contexts. The relationship between art and politics; postwar establishment of film industries; and emergence of national film movements such as the Polish school, Czech new wave, and new Yugoslav film. Thematic and aesthetic preoccupations of filmmakers such as Wajda, Jancso, Forman, and Kusturica. GER:DB-Hum

4 units, not given this year

FILMSTUD 150. Cinema and the City

(Same as FILMSTUD 350) Utopian built environments of vast perceptual and experiential richness in the cinema and city. Changing understandings of urban space in film. The cinematic city as an arena of social control, social liberation, collective memory, and complex experience. Films from international narrative traditions, industrial films, experimental cinema, documentaries, and musical sequences. Recommended: 4 or equivalent. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

FILMSTUD 153A. Transmedia TV

(Same as FILMSTUD 353A) Beginning from theoretical questions about the structure of media texts and their production, distribu-

tion, reception, and regulation, this course analyzes how the collision of broadcast and broadband is reshaping the media landscape. Course investigates the definition of television and its articulation across multiple platforms, including streaming video, online tie-ins, fan remixes, and web shows. Such convergence involves both intensified corporate consolidation and intensified viewer participation. As the boundary between producers and consumers of entertainment breaks down, course explores renegotiating the possibilities of the TV experience.

4 units, not given this year

FILMSTUD 156. Copy This Class (The Art of the Remix)
(Same as FILMSTUD 356) Mashups, sampling, parodies, fan video, DIY media, memes: we are in the midst of an explosion in vernacular creativity that appropriates, celebrates, critiques, and transforms commercial entertainment. New digital technologies and Internet platforms support a developing ecology of remix forms with unprecedented reach, richness, and cultural influence. At the same time, the value and legitimacy of this popular production is hotly contested on the basis of artistic merit, traditional literacies, and intellectual property. Course analyzes and engages in contemporary remix culture via precursors like appropriation art and hip hop, exploring theoretical questions about originality, capitalism, law, and digital media.

4 units, Spr (Russo, J)

FILMSTUD 167. The Hollywood Musical
(Same as AMSTUD 167, FILMSTUD 367) The sense of physical, emotional, aesthetic, and social liberation in this most colorful of film genres. Musicals as a place for the staging of issues of identity, including the impact of African American and Jewish culture, and issues of gay reception and interpretation. Attention to technologies of sound and color, the relation to vaudeville and Broadway, and ethnic and aesthetic diversity. Musicals as the epitome of filmic illusionism and the Hollywood studio system; the implications of their seduction of audiences; the meaning of spectacle, the centrality of performance. Busby Berkeley, Fred Astaire, Judy Garland, Bob Fosse, Stanley Donen, Gene Kelly, Vincente Minnelli.

4 units, Spr (Bukatman, S)

FILMSTUD 220. Being John Wayne
John Wayne's imposing corporeality and easy comportment combined to create an icon of masculinity, the American West, and America itself. Focus is on the films that contributed most to the establishment, maturation, and deconstruction of the iconography and mythology of the John Wayne character. The western and war film as genres; the crisis of and performance of masculinity in postwar culture; gender and sexuality in American national identity; relations among individualism, community, and the state; the Western and national memory; and patriotism and the Vietnam War.

5 units, not given this year

FILMSTUD 231. Contemporary Chinese Auteurs
New film cultures and movements in Taiwan, Hong Kong, and mainland China in the 80s. Key directors including Jia Zhangke, Wu Wenguang, Tsai Ming-liang, Hou Hsiao-hsien, Wong Kar-wai, Ann Hui. Topics include national cinema in the age of globalization, the evolving parameters of art cinema, and authorship.

5 units, not given this year

FILMSTUD 240A. History and Poetics of Cinematography
The history of cinematographic devices and styles through the work of such cinematographers as Billy Bitzer, Eduard Tisse, Greg Toland, Kazuo Miyagawa, John Alton, James Wong Howe, Sergei Urusevskii, Raoul Coutard, and Jack Cardiff.

5 units, not given this year

FILMSTUD 250A. Politics of Representation
Counterpoising viewpoints on media visibility drawn from identity politics and post-structuralist theory, course explores the questions entangled in negotiating a politics of representation: Can images show how things really are? Who is seen and who isn't? Can interpretation go beyond stereotypes? How are we situated as media content and consumers? Focusing primarily on gender, race, sexuality, and their intersections, course analyzes specific invocations of these categories in film, television, and cyberculture. Texts presenting opposing perspectives by theorists, critics, and activists to scaffold each example. Ultimate objective to explore how different media forms open or close possibilities for progressive representation, reception, and political change.

5 units, not given this year

FILMSTUD 251. Media in Transition
In a culture obsessed with new media, we are bombarded with hype about the present as a revolutionary phase of convergence. But everything old was once new, and pioneering media of the past also had to negotiate existing technologies, ideologies, and fantasies. This seminar is organized around case studies of transitional media moments from the long 20th century, including protocinema, ham radio, early television, hypertext, and digital film. In exploring the material and discursive aspects of remediation through theoretical, historical, and media archaeological readings, we will ask: what is a medium and how do they emerge and evolve.

5 units, Aut (Russo, J)

FILMSTUD 279. Asian American Experiences and Documentary Practice
(Same as ASNAMST 179, CSRE 179) Focus is on documentary cinema as a technology for understanding Asian Americans in the U.S. The social and historical context of the formation of the Asian American filmmaker, an authorial position that emerges in the 60s and 70s as part of the civil rights movement. Works include films by Loni Ding, Bob Nakamura and Curtis Choy; readings about the establishment of Asian American media industries and Asian American film criticism as a multi-genre. Social issue documentaries that represent new ethnographies of social experience including transnational adoption (Daughter From Danang), refugee experience (AKA Don Bonus), and sex tourism (The Women Outside). Readings include analyses of the implications of these works for cinema studies, ethnic studies, and the politics of film in everyday life. Experimental documentaries and their interrogation of the limits of the documentary form in representing identities and social problems. How does representation matter within and for Asian America in framing the complexities of race and racial identity? Screenings include works by Marlon Fuentes, Rea Tajiri and Trinh T. Minh-ha.

5 units, Spr (Shimizu, C)

FILMSTUD 290. Senior Seminar: Movies and Methods
Capstone course for majors. Topics vary year to year. Focus is on historiography and theory.

5 units, Spr (Levi, P)

FILMSTUD 297. Honors Thesis Writing
May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

FILMSTUD 299. Independent Study: Film and Media Studies
May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN FILM STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FILMSTUD 300A. History of World Cinema I, 1895-1929
(Same as FILMSTUD 100A) From cinema's precursors to the advent of synchronized sound.

4 units, Aut (Staff)

FILMSTUD 300B. History of World Cinema II, 1930-1959
(Same as FILMSTUD 100B) The impact of sound to the dissolution of Hollywood's studio system.

4 units, Win (Staff)

FILMSTUD 300C. History of World Cinema III, 1960-Present
(Same as FILMSTUD 100C) From the rise of the French New Wave to the present.

4 units, not given this year

FILMSTUD 301. Fundamentals of Cinematic Analysis
(Same as FILMSTUD 101) The close analysis of film. Emphasis is on formal and narrative techniques in structure and style, and detailed readings of brief sequences. Elements such as cinematography, mise-en-scène, composition, sound, and performance. Films from various historical periods, national cinemas, directors, and genres. Prerequisite: FILMSTUD 4 or equivalent. Recommended: ARTHIST 1 or FILMSTUD 102.

4 units, Win (Staff)

FILMSTUD 302. Theories of the Moving Image
(Same as FILMSTUD 102) Major theoretical arguments and debates about cinema: realism,formalism, poststructuralism, feminism, postmodernism, and phenomenology. Prerequisites: ARTHIST 1, FILMSTUD 4.
4 units, Spr (Levi, P)

FILMSTUD 311. The Body in American Genre Film: From Chaplin to The Matrix
(Same as FILMSTUD 111) The American genre film as a mass form that shares elements with a carnivalesque, folk culture such as a rejection of politeness and piety, and an emphasis on the physical. Genres include comedy, western, war, science fiction, musical, horror, melodrama, gangster, and cult, exploitation, and blaxploitation films. The place of the body onscreen. How does the body exist in relation to the world, other bodies, and the act of perception? What meaning does bodily movement have in relation to narrative?
4 units, not given this year

FILMSTUD 313. Queer Film and Media
(Same as FILMSTUD 113) According to identity politics, visibility is a key tactic in the fight for societal acceptance and civil rights. But how is sexuality visible? Course addresses this question by analyzing queer film and media since the 1970s, focusing primarily on explicit representations of GLBTQ characters and communities in US cinema, television, and cyberculture. Themes include positive images, AIDS, coming out, celebrity, and the gay market. Through queer theory and criticism, analysis of the contested relationships between spectators and texts, identity and commodities, realism and fantasy, activism and entertainment, desire and politics.
4 units, Win (Russo, J)

FILMSTUD 314. Comics
(Same as FILMSTUD 114) The modern medium of comics, a history that spans 150 years. The flexibility of the medium encountered through the genres of humorous and dramatic comic strips, superheroes, undergrounds, independents, journalism, and autobiography. Innovative creators including McCay, Kirby, Barry, Ware, and critical writings including McCloud, Eisner, Groenstee. Topics include text/image relations, panel-to-panel relations, the page, caricature, sequence, seriality, comics in the context of the fine arts, and relations to other media.
4 units, not given this year

FILMSTUD 315. Documentary Issues and Traditions
(Same as FILMSTUD 115) Issues include objectivity/subjectivity, ethics, censorship, representation, reflexivity, responsibility to the audience, and authorial voice. Parallel focus on form and content.
4 units, not given this year

FILMSTUD 316. International Documentary
(Same as FILMSTUD 116) Historical, aesthetic, and formal developments of documentary through nonfiction films in Europe, Asia, Latin America, and Africa.
4 units, Aut (Meltzer, J)

FILMSTUD 322. Kubrick
(Same as FILMSTUD 122) Thematic and stylistic richness of the cinema of Stanley Kubrick. Methodological approaches to the subject. Emphasis is on questions of close textual analysis, authorship and genre, and critique of ideology. Focus is on A Clockwork Orange. Other films include: 2001: A Space Odyssey, Barry Lyndon, Killer's Kiss, and The Shining.
4 units, not given this year

FILMSTUD 332. East Asian Cinema
(Same as FILMSTUD 132) Social, historical, and aesthetic dimensions of the cinemas of Japan, Hong Kong, Taiwan, mainland China, and Korea. Topics such as nation and gender, form and genre, and local and transnational conditions of practice and reception. Screenings include popular and art films from the silent to contemporary eras, including, Zhang Yimou, Wong Kar-wai, Hou Hsiao-hsien, Ozu Yasujiro, Kurosawa Akira, and Im Kwon-taek.
4 units, not given this year

FILMSTUD 333A. Latin American Cinema
(Same as FILMSTUD 133A) Emphasis is on Mexico, Brazil, Argentina, and Cuba. How filmmakers represent and sometimes rewrite key moments in national history. When have filmmakers constructed a dialogue with older cinematic traditions versus breaking from past practices? How have political concerns shaped cinematic practices. Directors include Fernando de Fuentes, Luis Buñuel, Leopoldo Torre Nilsson, Patricio Guzmán, Humberto Solas, Nelson Pereira dos Santos, Lucrecia Martel, and Héctor Babenco.
4 units, not given this year

FILMSTUD 334A. Poetic Cinema: The Soviet School
(Same as FILMSTUD 134A) The poetic or archaic school of Soviet cinema which emerged primarily in the non-Russian Soviet Republics in the 60s and 70s and traced its aesthetic to the films of Aleksandr Dovzhenko. Films by Dovzhenko, Andrei Tarkovsky, Sergei Parajanov, Tengiz Abuladze, and Otar Ioseliani.
4 units, not given this year

FILMSTUD 335. History of Video Art
(Same as FILMSTUD 135) Focus is on artists who have contributed to the history of video art. Topics include: theoretical analyses of the medium; challenges to the performer-spectator dynamic (Dan Graham and Vito Acconci); feminist culture critique (Martha Rosler and Dara Birnbaum); closed-circuit installations and performances (Peter Campus and Joan Jonas); combinations of linguistic and bodily investigations (Bruce Nauman and Gary Hill); representations of girl culture (Sadie Benning); guerrilla television (TVTV and Ant Farm); image processing (Woody and Steina Vasulka); the turn toward cinematic installations (Stan Douglas and Douglas Gordon); and more recent trends (Cory Arcangel and Ryan Trecartin).
4 units, not given this year

FILMSTUD 336. Gender and Sexuality in Chinese Cinema
(Same as FILMSTUD 136) Representations of gender and sexuality in the cinemas of China, Taiwan, and Hong Kong, covering key periods and genres such as the golden age of Shanghai film, Hong Kong action pictures, opera films, post-socialist art films, and new queer cinema. Historical and contemporary perspectives on cinematic constructions of femininity, masculinity, and sexuality as they relate to issues of nationalism, modernity, globalization, and feminist and queer politics. Weekly screening required.
4 units, not given this year

FILMSTUD 337. European New Wave Cinemas
(Same as FILMSTUD 137) an exploration of the major currents, movements, and schools in the European cinema of the post-war era from the late 1940s to the 1970s. A mixture of historical, aesthetic, and theoretical concerns will inform the study of French New Wave, British Free Cinema, Italian cinema in the 1960s, the New German Cinema of the 1970s, and more.
4 units, Win (Levi, P)

FILMSTUD 345. Politics and Aesthetics in East European Cinema
(Same as FILMSTUD 145) From 1945 to the mid-80s, emphasizing Polish, Hungarian, Czech, Slovak, and Yugoslav contexts. The relationship between art and politics; postwar establishment of film industries; and emergence of national film movements such as the Polish school, Czech new wave, and new Yugoslav film. Thematic and aesthetic preoccupations of filmmakers such as Wajda, Jancso, Forman, and Kusturica.
4 units, not given this year

FILMSTUD 350. Cinema and the City
(Same as FILMSTUD 150) Utopian built environments of vast perceptual and experiential richness in the cinema and city. Changing understandings of urban space in film. The cinematic city as an arena of social control, social liberation, collective memory, and complex experience. Films from international narrative traditions, industrial films, experimental cinema, documentaries, and musical sequences. Recommended: 4 or equivalent.
4 units, not given this year

FILMSTUD 353A. Transmedia TV
(Same as FILMSTUD 153A) Beginning from theoretical questions about the structure of media texts and their production, distribution, reception, and regulation, this course analyzes how the collision of broadcast and broadband is reshaping the media landscape. Course investigates the definition of television and its articulation across multiple platforms, including streaming video, online tie-ins, fan remixes, and web shows. Such convergence involves both intensified corporate consolidation and intensified viewer participation. As the boundary between producers and consumers of entertainment breaks down, course explores renegotiating the possibilities of the TV experience.

4 units, not given this year

FILMSTUD 356. Copy This Class (The Art of the Remix)
(Same as FILMSTUD 156) Mashups, sampling, parodies, fan video, DIY media, memes: we are in the midst of an explosion in vernacular creativity that appropriates, celebrates, critiques, and transforms commercial entertainment. New digital technologies and Internet platforms support a developing ecology of remix forms with unprecedented reach, richness, and cultural influence. At the same time, the value and legitimacy of this popular production is hotly contested on the basis of artistic merit, traditional literacies, and intellectual property. Course analyzes and engages in contemporary remix culture via precursors like appropriation art and hip hop, exploring theoretical questions about originality, capitalism, law, and digital media.

4 units, Spr (Russo, J)

FILMSTUD 367. The Hollywood Musical
(Same as AMSTUD 167, FILMSTUD 167) The sense of physical, emotional, aesthetic, and social liberation in this most colorful of film genres. Musicals as a place for the staging of issues of identity, including the impact of African American and Jewish culture, and issues of gay reception and interpretation. Attention to technologies of sound and color, the relation to vaudeville and Broadway, and ethnic and aesthetic diversity. Musicals as the epitome of filmic illusionism and the Hollywood studio system; the implications of their seduction of audiences; the meaning of spectacle, the centrality of performance. Busby Berkeley, Fred Astaire, Judy Garland, Bob Fosse, Stanley Donen, Gene Kelly, Vincente Minnelli.

4 units, Spr (Bukatman, S)

FILMSTUD 404. Postwar American Avant Garde Cinema
History and theory of post-WW II American independent and experimental film. Emphasis is on issues of audiovisual form, structure, and medium specificity. Films and writings include Maya Deren, Stan Brakhage, Michael Snow, and Hollis Frampton.

5 units, Aut (Levi, P)

FILMSTUD 406. Montage
Graduate seminar in film aesthetics. Theoretical and practical approaches to editing/montage. Stylistic, semiotic, epistemological, and ideological functions of montage considered in film-historical contexts including: development of the continuity system of editing; flourishing of the Soviet montage school; and achievements of the post-war new waves. Filmmakers include D. W. Griffith, Sergei Eisenstein, Jean-Luc Godard, and Dusan Makavejev.

5 units, not given this year

FILMSTUD 407. The Still Moving Image
Tension and overlap between cinema and photography as technological media, beginning with Frankfurt school critiques of media theory, classical film, and photography theory through recent considerations of the post-cinematic age of digital and virtual images. How ideas of indexicality, medium specificity, memory, duration, narrativity, chance, stasis, repetition have informed accounts of the relationship of these media.

5 units, not given this year

FILMSTUD 410A. Documentary Perspectives I
Restricted to M.F.A. documentary film students. Topics in nonfiction media. Presentations and screenings by guest filmmakers. Prerequisite: consent of instructor.

4 units, Win (Samuelson, K)

FILMSTUD 410B. Documentary Perspectives II
Restricted to M.F.A. documentary film students. Continuation of 410A. Topics in nonfiction media. Presentations and screenings by guest filmmakers. Prerequisite: consent of instructor.

4 units, not given this year

FILMSTUD 411. Animation
The fantasy of an image coming to life dates back centuries, and artists have long sought to imbue their images with liveliness, but it wasn't until the cinema that the fantasy was actualized. It is sometimes argued that animation is the ground against which cinema situates itself: the history of moving pictures begins with optical toys that greatly predate the invention of the cinema, and mainstream cinema is increasingly dominated by films that are computer animated, in whole or in part. The implications of animation, considering its underlying fantasies (in art and literature), its phenomenologies, its relation to the uncanny, its status as a pure cinema, and its place in film theory. Different modes of production and style explored, including realist animation, abstract animation; animistic animation; animated drawings, objects, and puppets; CGI, and live/animation hybrids.

5 units, not given this year

FILMSTUD 440. Sound Technology
Development of sound technology and reproduction in context of modernity, with some emphasis on the crossings of sound and image in the history and theory of technological reproduction. Topics include phonography, recording, and mass culture (Adorno, Sterne, Thompson, Lastra); cinematic sound and music (Chion, Altman, Gorbman); filmic and compositional practices in the American avant-garde (Joseph, Kahn); acoustic ecology (Schafer). Weekly screenings or listenings.

5 units, not given this year

FILMSTUD 441. Theories of Cinematic Spectacle
How cinematic spectacle has been theorized; the adoption of new technologies such as sound, color, or special effects; theories of the sublime and the grotesque. Spectacle as a vehicle for propaganda or pedagogy, and its relation to narrative and gender. The role of spectacle in experimental cinema and its deconstruction by Godard and others. Recommended: 4 or equivalent.

5 units, Spr (Bukatman, S)

FILMSTUD 620. Area Core Examination Preparation
For Art History Ph.D. candidates. Prerequisite: consent of instructor.

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FILMSTUD 660. Independent Study
For graduate students only. Approved independent research projects with individual faculty members.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FILMSTUD 660E. Extended Seminar
May be repeated for credit. (Staff)

4 units, Aut (Staff), Win (Staff), Spr (Staff)

FILM, PRACTICE OF (FILMPROD) COURSES

UNDERGRADUATE COURSES IN FILM, PRACTICE OF

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FILMPROD 10AX. Dcoumentary Film
The fundamentals of digital video production. The process of expressing ideas in an audiovisual medium from the concept stage through post-production. Examples of narrative, documentary, and experimental work screened and discussed. Hands-on experience in directing, shooting, editing on Final Cut Pro, sound design, and a fuller understanding of film production. The components of a film and the concepts of visual storytelling. Emphasis is on the conceptual and technical aspects of filmmaking.

2 units, Aut (Krawitz, J)

FILMPROD 101. Screenwriting
(Same as FILMPROD 301) Priority to Film and Media Studies majors. Craft, form, and approaches to writing for the screen. Prerequisites: ENGLISH 90, 190F, and consent of instructor.

5 units, Spr (Tobin, A)

FILMPROD 103. Adaptation
A close analysis of film adaptation, using various source materials to examine the demands form makes on content and the creative

choices made in adaptation to film. Source materials include plays, fiction, biography, history, graphic novels, and reference to video games and amusement park rides. Weekly film screening.
4 units, Spr (Tobin, A)

FILMPROD 104. Visual Writing
A writing workshop that is an exploration of visual storytelling. Beginning with visual literacy, the class progresses from basic cinematic techniques through scene exercises to revisions and ultimately to connecting scenes in order to build sequences of script pages. Open to all majors; NOT a prerequisite for FP101.
4 units, Win (Tobin, A)

FILMPROD 105. Script Analysis
(Same as FILMPROD 305) Analysis of screenplay and film from the writer's perspective, with focus on ideation, structure, and dramatic tension in narrative features. Sources include screenplays and screenings.
4 units, Aut (Tobin, A)

FILMPROD 114. Introduction to Film and Video Production
Hands-on. Techniques of film and video making including conceptualization, visualization, story structure, cinematography, sound recording, and editing.
5 units, Aut (Samuelson, K)

GRADUATE COURSES IN FILM, PRACTICE OF

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FILMPROD 301. Screenwriting
(Same as FILMPROD 101) Priority to Film and Media Studies majors. Craft, form, and approaches to writing for the screen. Prerequisites: ENGLISH 90, 190F, and consent of instructor.
5 units, Spr (Tobin, A)

FILMPROD 305. Script Analysis
(Same as FILMPROD 105) Analysis of screenplay and film from the writer's perspective, with focus on ideation, structure, and dramatic tension in narrative features. Sources include screenplays and screenings.
4 units, Aut (Tobin, A)

FILMPROD 400. Film/Video Writing and Directing
Restricted to M.F.A. documentary students. Emphasis is on the development of the research, conceptualization, visualization, and preproduction skills required for nonfiction filmmaking. Prerequisite: consent of instructor.
4 units, Aut (Meltzer, J)

FILMPROD 401. Nonfiction Film Production
Restricted to M.F.A documentary students. 16mm production techniques and concepts. Final project is a short black-and-white film with multitrack sound design. Prerequisite: consent of instructor.
4 units, Aut (Krawitz, J)

FILMPROD 402. Digital Video
Restricted to M.F.A. documentary students. Fundamentals of digital storytelling. Working with small format cameras, interviewing techniques, and nonlinear editing skills. Prerequisite: consent of instructor.
4 units, Win (Krawitz, J)

FILMPROD 403. Advanced Documentary Directing
Restricted to M.F.A. documentary students. Further examination of structure, empasizing writing and directing nonfiction film. Prerequisite: consent of instructor.
4 units, Spr (Samuelson, K)

FILMPROD 404. Advanced Film and Video Production
Restricted to M.F.A. documentary students. Techniques of visual storytelling and observational shooting. Final quarter of professional training in 16mm motion picture production. Prerequisite: consent of instructor.
4 units, Spr (Meltzer, J)

FILMPROD 405. Producing Practicum
Restricted to M.F.A. documentary students. Advanced producing principles through the preproduction of the M.F.A. thesis project, including development of a professional film proposal. Practical training in fundraising. Prerequisite: consent of instructor.
4 units, Aut (Samuelson, K)

FILMPROD 406A. Documentary M.F.A. Thesis Seminar I
Restricted to M.F.A. documentary students. Production of film or video project. Focus is on shooting strategies, ethical challenges, and practical production issues. Prerequisite: consent of instructor.
4 units, Win (Krawitz, J)

FILMPROD 406B. Documentary M.F.A.Thesis Seminar II
Restricted to M.F.A. documentary students. Editing and post-production of film or video project. Emphasis is on aesthetic choices (structure, narration, music), distribution, contracts, and audience. Prerequisite: consent of instructor.
4 units, Spr (Meltzer, J)

FRENCH GENERAL (FRENGEN) COURSES

UNDERGRADUATE COURSES IN FRENCH GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FRENGEN 55N. After Epic: Romance, Lyric, and Novelistic Responses in Western European Literature
(Stanford Introductory Seminar) Stanford Introductory Seminar. Preference to freshmen. Exploration of the quest in diverse genres: medieval romance (Chrétien de Troyes), Ovidian fables (Marie de France), allegorical dream quests (Roman de la Rose), and the novel (Cervantes¿ Don Quixote). How do stories of bodily transformation or animal fables challenge epic narratives of patriarchy or moral transcendence, and grand narratives of civilization? How does the art of courtly love and medieval allegory replace the mythology of classical epics? Focus on close analysis of primary texts with secondary research.
3-4 units, Spr (Galvez, M)

FRENGEN 168. American Writers in 20th-Century Paris
Paris as inspiration and refuge for American writers when it was the cultural capital of the world. Role of artistic movements (Cubism, Surrealism, Existentialism) and cultural institutions such as the cafés, librairies and salons in the life and creativity of the expatriate. Birth of their writing selves and existential questioning around issues of national and individual identities. A cross-cultural inquiry into Paris as a part of American culture, a myth, a longing, and source of inspiration. Readings: Gertrude Stein, Hemingway, Fitzgerald, Anaïs Nin, Baldwin. In English.
3-5 units, Win (Alduy, C)

FRENGEN 172. Dream Visions: The Roman de la Rose
(Same as FRENGEN 272, ITALGEN 172, ITALGEN 272) What truths are in dreams? How does the quest for a symbolic object embody a moral struggle? What motivates a personal search for divine love? Study of arguably the most influential work of the European Middle Ages, the Roman de la Rose of Guillaume de Lorris and Jean de Meun. Focus on the work as erotic, allegorical quest for the mystical Rose, and scholastic encyclopedia through close analysis, secondary readings, and study of manuscript illumination. Use of medieval and modern French edition.
3-5 units, Spr (Galvez, M)

FRENGEN 181. Philosophy and Literature
(Same as CLASSGEN 81, COMPLIT 181, ENGLISH 81, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum
4-5 units, Win (Anderson, L; Landy, J)

FRENGEN 190Q. Parisian Cultures of the 19th and Early 20th Centuries
(Stanford Introductory Seminar) Preference to sophomores. Political, social, and cultural events in Paris from the Napoleonic era and the Romantic revolution to the 30s. The arts and letters of bourgeois, popular, and avant garde cultures. Illustrated with slides. GER:DB-Hum

4 units, Win (Bertrand, M)

FRENGEN 192E. Images of Women in French Cinema: 1930-1990
The myth of the feminine idol in French films in historical and cultural context. The mythology of stars as the imaginary vehicle that helped France to change from traditional society to modern nation after 1945. Filmmakers include Renoir, Truffaut, and Nelly Kaplan. The evolution of the role of women in France over 60 years. Lectures in English; films in French with English subtitles. This course must be taken for either 3 units or 5 units; cannot be taken for 4 units. GER:DB-Hum, EC-Gender

3-5 units, alternate years, not given this year

GRADUATE COURSES IN FRENCH GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FRENGEN 219. The Renaissance Body
The body as locus for desire, pleasure, disease, mortality, sexuality, and gender; and as canon of beauty and reflection of cosmic harmony. How literature responded to the development of an anatomical gaze in arts and medicine; how it staged the aesthetic, religious, philosophical, and moral issues related to such a promotion or deconstruction of the body. Does literature aim at representing the body, or use it as signifier for intellectual, emotional, and political ideas? Readings from Rabelais, Ronsard, Labé, Montaigne; medical texts and archival documents from http://renaissancebodyproject.stanford.edu.

3-5 units, Win (Alduy, C)

FRENGEN 242. Women Mystics from the Middle Ages to the Present
(Same as ITALGEN 242) The predominantly female mystical experience or direct-embodied encounter with a spiritual reality that is difficult, perhaps impossible, to reduce to words, or to explain rationally. Sources include European texts from the Middle Ages to the present by women and men who attempt to convey the experience metaphorically, to interpret it theologically and philosophically, and to transmit it actively to others.

3-5 units, not given this year

FRENGEN 260. Voltaire's Work and Life, or: Managing Enlightenment
A textual look at one of the figures that invented, embodied, and operated -- in their roles as intense agents of communication -- the European Enlightenment. Voltaire will be seen, above all, from the angle of his correspondence which, despite its seemingly personal nature, was mostly written for large groups or (often) paying readers looking for both instruction and entertainment.

3-5 units, Win (Gumbrecht, H)

FRENGEN 269. Transfigurative Lyric: Baudelaire and Mallarmé
Key lyrical works, prose poems, and theoretical essays by Charles Baudelaire and Stéphane Mallarmé. The rise of modernity and the birth of Modernism. Referential, non-referential, and anti-referential dimensions of the new lyric. Artifice and impersonality. Literary reflexivity and lucid illusion. The musical turn and the paradox of silence. The hundred-word sublime. The disenchantment and re-enchantment of the world.

3-5 units, Aut (Landy, J)

FRENGEN 272. Dream Visions: The Roman de la Rose
(Same as FRENGEN 172, ITALGEN 172, ITALGEN 272) What truths are in dreams? How does the quest for a symbolic object embody a moral struggle? What motivates a personal search for divine love? Study of arguably the most influential work of the European Middle Ages, the Roman de la Rose of Guillaume de Lorris and Jean de Meun. Focus on the work as erotic, allegorical quest for the mystical Rose, and scholastic encyclopedia through close analysis, secondary readings, and study of manuscript illumination. Use of medieval and modern French edition.

3-5 units, Spr (Galvez, M)

FRENGEN 277. Introduction to René Girard¿s Theory: Mimesis, Desire, Violence, and the Sacred
René Girard's ¿uvre has been hailed as one of the most powerful and influential theories in the human sciences. This reading seminar will provide a critical introduction to Girard's theory, emphasizing its epistemological and philosophical underpinnings and its potential for interdisciplinarity. Its relevance for anthropology, economics, political and social philosophy, religious studies and literary theory will be fully explored.

3-5 units, Spr (Dupuy, J)

FRENGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
(Same as ITALGEN 284) To what extent is poetry the other of modern philosophy? How does modern aesthetic theory understand the distinction and blur the boundaries between philosophical and poetic thinking? Authors include Croce, Gentile, Sartre, Bataille, Agamben, Ricoeur, Cacciari, Derrida, and Vattimo.

3-5 units, Aut (Wittman, L)

FRENGEN 286. Michel Foucault and Literary Theory
Michel Foucault can be seen as a philosopher, an historian or a theoretician of literature. In this course, we will study Michel Foucault's work in the perspective of literary theory. Using some of his major works as well as his numerous articles (published in 4 volumes after his death), we will see him as a major 20th Century literary theoretician.

3-5 units, Spr (Apostolides, J)

FRENGEN 289. French and Italian Women Writers
(Same as ITALGEN 289) How does women's writing evolve from the very early 20th century, when women's liberation movements first began and WW I brought major social changes, to the flowering of feminine writing in the 70s and beyond? What is the relationship between women writers and filmmakers, and feminism? Is it legitimate to consider women writers in a separate category? To what extent does a reevaluation of women writers mean reconsidering modern literary history? Authors and filmmakers include Aleramo, Yourcenar, de Beauvoir, Banti, Duras, Cavani.

3-5 units, not given this year

FRENGEN 301E. New Methods and Sources in French and Italian Studies
(Same as ITALGEN 301E) Based on student interest. Changes in research methods: the use of digitized texts, resources, and databases available through Stanford Libraries¿ gateways. Emphasis is on strategies for exploration of broad and specialized topics through new and traditional methods. Using a flexible schedule based on enrollment and the level of students¿ knowledge, may be offered in forms including a shortened version on the basics, independent study, or a syllabus split over two quarters. Unit levels adjusted accordingly.

1-4 units, alternate years, not given this year

FRENGEN 338. Biohumanities: Continental Philosophy and the Human and Social Sciences
(Same as ANTHRO 338A) This course will consider theoretical topics that arose in post-war continental philosophy (for example, Deleuze's ontology, Foucault's biopolitics, and Latour's collective of humans and non-humans) and which have served as a basis for recent attempts to reconcile the human and social sciences with the natural sciences around big picture questions (ecological crisis, biotechnological progress) and around such bridging concepts as human and non-human agency, assemblage, emergence, force, habitus, and mimicry. Focusing on case studies drawn from archaeology, anthropology, history, literature, film and bio-art, the course tries to indicate what sort of topics, research questions, approaches, theories, and concepts might lead to an integration of these various kinds of knowledges.

5 units, Spr (Domanska, E)

FRENGEN 356. Theories of the Novel
(Same as COMPLIT 322A) The novel as the literary genre most closely identified with the development of cultural modernity by literary historians and theorists. Critical models for defining the novel's poetics and cultural work. Critical readings such as texts by Lukacs, Bakhtin, Auerbach, Barthes, Armstrong, Gallagher, Bourdieu, Macherey, Jameson, Said and Spivak. Tutor texts such as

Defoe's Robinson Crusoe,Flaubert's Madame Bovary, and Woolf's To the Lighthouse.

3-5 units, not given this year

FRENGEN 369. Introduction to Graduate Studies: Criticism as Profession

(Same as COMPLIT 369, ITALGEN 369, GERLIT 369) Major texts of modern literary criticism in the context of professional scholarship today. Readings of critics such as Lukács, Auerbach, Frye, Ong, Benjamin, Adorno, Szondi, de Man, Abrams, Bourdieu, Vendler, and Said. Contemporary professional issues including scholarly associations, journals, national and comparative literatures, university structures, and career paths.

5 units, Aut (Berman, R)

FRENGEN 395. Philosophical Reading Group

(Same as COMPLIT 359A, ITALGEN 395) Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit.

1 unit, Aut (Gumbrecht, H), Win (Gumbrecht, H)

FRENCH LANGUAGE (FRENLANG) COURSES

UNDERGRADUATE COURSES IN FRENCH LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FRENLANG 1. First-Year French, First Quarter

Proficiency-based. Development of discourse appropriate in French and Francophone contexts.

5 units, Aut (Staff), Win (Dozer-Rabedeau, J), Spr (Lasnier, M)

FRENLANG 1A. Accelerated First-Year French, Part 1

Completes first-year language sequence in two rather than three quarters. Recommended for students with previous knowledge of French who place into 1A on the placement test or who are familiar with another Romance language. 2A fulfills the University foreign language requirement. Prerequisite: French placement test and consent of instructor. Win, Spr

5 units, Aut (Lasnier, M), Win (Staff)

FRENLANG 2. First-Year French, Second Quarter

Continuation of 1. Prerequisite 1 or equivalent

5 units, Aut (Kershaw, M), Win (Staff), Spr (Staff)

FRENLANG 2A. Accelerated First-Year French, Part 2

Continuation of 1A. Fulfills the University foreign language requirement. Prerequisite: 1A, or French placement test and consent of instructor.

5 units, Win (Lasnier, M), Spr (Lasnier, M)

FRENLANG 3. First-Year French, Third Quarter

Continuation of 2. Prerequisite: 2 or equivalent. Fulfills the language requirement.

5 units, Aut (Saint-Jude, A), Win (Kershaw, M), Spr (Staff)

FRENLANG 5A. Intensive First-Year French, Part A

Accelerated. Written exercises, compositions, conversational practice, and daily work.

5 units, Sum (Gardner, D)

FRENLANG 5B. Intensive First-Year French, Part B

Continuation of 5B.

5 units, Sum (Dozer-Rabedeau, J)

FRENLANG 5C. Intensive First-Year French, Part C

Continuation of 5B. Fulfills the University language requirement.

5 units, Sum (Giachetti, L)

FRENLANG 10. Beginning French Oral Communication

For students who have completed 2 or equivalent. Emphasis is on speaking skills, vocabulary, and pronunciation. May be repeated once for credit.

2 units, Aut (Dozer-Rabedeau, J), Win (Lasnier, M), Spr (Dozer-Rabedeau, J)

FRENLANG 15. Intermediate French Oral Communication

For students who have completed the first-year language requirement. May be repeated once for credit.

2 units, Aut (Dozer-Rabedeau, J), Win (Lasnier, M), Spr (Dozer-Rabedeau, J)

FRENLANG 15S. Intermediate Conversation: French in Everyday Life

Same content as 15. May be repeated once for credit. Prerequisite: one year of college French or equivalent.

3 units, not given this year

FRENLANG 20A. France and Francophonie

Second-year French conversation based on themes from the regions of France and the Francophone world. Intermediate-level speaking skills and advanced-level functions. Topics include travel, food, and crosscultural comparisons. Students returning from study abroad programs are encouraged to enroll. May be repeated once for credit. Prerequisite: 22 or equivalent.

2 units, Aut (Staff)

FRENLANG 20B. French Cinema

Second-year French conversation based on films. Intermediate-level speaking skills and advanced-level functions. Themes include: French filmmakers, stars, and trends. Required film viewing in and outside class in French. May be repeated once for credit. Prerequisite: 22 or equivalent.

2 units, Win (Staff)

FRENLANG 20C. Contemporary French Language

Second-year French conversation. Intermediate-level speaking skills and advanced-level functions for formal and informal situations. Useful for students planning to travel or study abroad. May be repeated once for credit. Prerequisite: 22 or equivalent.

2 units, Spr (Staff)

FRENLANG 21C. Second-Year French: Cultural Emphasis, First Quarter

Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: one year of college French or consent of coordinator.

4-5 units, Aut (Lewallen, J), Win (Dozer-Rabedeau, J), Spr (Lasnier, M)

FRENLANG 22C. Second-Year French: Cultural Emphasis, Second Quarter

Continuation of 21C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: 21C or consent of coordinator.

4-5 units, Aut (Lasnier, M), Win (Kershaw, M), Spr (Dozer-Rabedeau, J)

FRENLANG 23C. Second-Year French: Cultural Emphasis, Third Quarter

Continuation of 22C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: 22Cor consent of coordinator.

4-5 units, Aut (Comsa, M), Win (Lasnier, M), Spr (Kershaw, M)

FRENLANG 24C. Second-Year French: Literary Texts

Proficiency oriented. Discussion, writing, reading, and listening comprehension based on literary texts. Prerequisite: 23.

3-4 units, not given this year

FRENLANG 24R. Second-Year French: International Relations, Political Science, and Economics Emphasis

Proficiency-based. Discussion, writing, reading, and listening comprehension based on political, economic, and social topics. Prerequisite: 23.

3-4 units, not given next year

FRENLANG 50. Reading French
For seniors or graduate students seeking to meet the University reading requirement for advanced degrees. Reading strategies for comprehension of secondary literature for academic research. Fulfills the University foreign language requirement for advanced degrees if student earns a grade of 'B.' Prerequisite: one year or reading proficiency in another Romance language.
4 units, Aut (Staff)

FRENLANG 50S. Reading French
Same content as 50.
2-4 units, Sum (Saint-Jude, A)

FRENLANG 60A. Beginning French Conversation
(AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60B. Intermediate French Conversation
(AU) (Staff)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60C. Advanced French Conversation
(AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60D. French Viticulture
See http://www.stanford.edu/class/frenlang60d/. Prerequisite: 21 or older. (AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60E. French Cooking
(AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60F. French Cinema
May be repeated for credit. (AU)
1 unit, Win (de Castries, P)

FRENLANG 60K. Introduction to BOSP Paris
(AU)
1 unit, Aut (de Castries, P)

FRENLANG 60N. French cheese
1 unit, not given this year

FRENLANG 60P. Advanced Viticulture
Prerequisite: Completion of 60D. (AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 60T. Teaching French Conversation
(AU)
1 unit, Aut (de Castries, P), Win (de Castries, P), Spr (de Castries, P)

FRENLANG 120. Advanced French Oral Communication
Speaking skills and functions including narration, description, supporting opinions, and hypothesizing about current events and issues in France. May be repeated once for credit. Prerequisites: 23 or equivalent, and consent of instructor.
3 units, Aut (Staff), Win (Staff), Spr (Staff)

FRENLANG 121. Introduction to French Texts
Readings of major literary figures and themes from medieval times to the present. Prerequisite: 23 or consent of coordinator. Recommended: 124.
3-4 units, not given this year

FRENLANG 122. Introduction to French Culture and Civilization
Discussion of French art, geography, history, political change, and social institutions. Prerequisite: 23 or equivalent.
3-4 units, not given this year

FRENLANG 123. French Creative Writing
Advanced. Model texts introduce students to genres and styles; review of grammar and vocabulary. Discussion of original writing by students. Prerequisite: 23 or equivalent.
3-4 units, not given this year

FRENLANG 124. Advanced French Grammar
Required for students majoring or minoring in French; recommended for students planning to take literature courses. Review of difficulties in French. Grammatical and logical analysis. Prerequisite: 23 or equivalent.
3-4 units, Aut (Howard, H), Win (Howard, H), Spr (Staff)

FRENLANG 125. French Phonetics
For majors and other students who plan to enroll in advanced courses. Study and practice of the French language sound system. Language lab. Prerequisite: 23 or equivalent.
3-4 units, not given this year

FRENLANG 199. Language Specials
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN FRENCH LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FRENLANG 33G. Business French III
For GSB students only. Enrollment limited to 18. (Staff)
4 units, not given this year

FRENLANG 205A. Intensive First-Year French, Part A
Accelerated. Written exercises, compositions, conversational practice, and daily work. Stanford graduate students restricted to 9 units may take 205A,B,C courses for a total of 9 units.
3-5 units, Sum (Staff)

FRENLANG 205B. Intensive First-Year French, Part B
Continuation of 205A. Prerequisite 205B or equivalent.
3-5 units, Sum (Staff)

FRENLANG 205C. Intensive First-Year French - Part C
Accelerated. Written exercises, compositions, conversational practice, and daily work. Stanford graduate students restricted to 9 units may take both courses for a total of 9 units.
3-5 units, Sum (Staff)

FRENLANG 250S. Reading French
For graduate students only. Same content as 50.
2-4 units, Sum (Staff)

FRENLANG 394. Graduate Studies in French Conversation
Prerequisite: consent of the instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

FRENLANG 395. Graduate Studies in French
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

FRENCH LITERATURE (FRENLIT) COURSES

UNDERGRADUATE COURSES IN FRENCH LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

FRENLIT 120. Coffee and Cigarettes: The Making of French Intellectual Culture
Explore this unique characteristic of French culture by reading some of its greatest works. Readings and discussion in French. Texts by Sartre, Camus, Voltaire, Molière, and many others. GER:DB-Hum
3-5 units, Aut (Edelstein, D)

FRENLIT 122. Great Moments in French Culture and History
How did France stay in the global limelight for over three centuries? Discover and discuss some of its cultural high points such as Versailles and the French Revolution in this gateway course to French studies. Prerequisite: FRENLANG 23 or equivalent. GER:DB-Hum
3-5 units, Spr (Calefas-Strebelle, A)

FRENLIT 130. Introduction to Medieval and Renaissance French Literature
Introduction to the Middle Ages and the Renaissance. The birth of a national literature and its evolution. Literature as addressing cultural, philosophical, and artistic issues which question assumptions on love, ethics, art, and the nature of the self. Readings: epics

(La Chanson de Roland), medieval romances (Tristan, Chrétien de Troyes' Yvain), post-Petrarchan poetics (Du Bellay, Ronsard, Labé), and prose humanists (Rabelais, Montaigne). Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, WIM

4 units, Aut (Alduy, C)

FRENLIT 131. Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France

The literature, culture, and politics of France from Louis XIV to Olympe de Gouges. How this period produced the political and philosophical foundations of modernity. Readings include Corneille, Molière, Racine, Lafayette, Voltaire, Diderot, Rousseau, Beaumarchais, and Gouges. Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, WIM

4 units, Win (Robert, Y)

FRENLIT 132. Literature, Revolutions, and Changes in 19th- and 20th-Century France

Major literary genres, and social and cultural contexts. Focus is on the emergence of new literary forms such as surréalisme, nouveau roman, and nouveau théâtre. Topics of colonization, decolonization, and feminism. Readings include Balzac, Baudelaire, Césaire, Colette, and Ionesco. Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, WIM

4 units, Spr (Apostolides, J)

FRENLIT 133. Literature and Society in Africa and the Caribbean

(Same as COMPLIT 141) Major African and Caribbean writers. Issues raised in literary works which reflect changing aspects of the societies and cultures of Francophone Africa and the French Caribbean. Topics include colonization and change, quest for identity, tradition and modernity, and new roles and status for women. Readings in fiction and poetry. Authors include Laye Camara, Mariama Ba, and Joseph Zobel. In French. Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, EC-GlobalCom, WIM

4 units, Win (Boyi, E)

FRENLIT 152. Fashion and Image in Post-Romantic Paris

The roles of fashion and image in the literature and visual culture of late-19th-century Paris. Topics ranging from the formation of aesthetic values to the impact of the media on popular taste. Visual genres such as caricature, cosmopolitan portraiture, and advertising. Readings include essays and short fiction by Balzac, Gautier, Baudelaire, Mallarmé, Flaubert, de Maupassant, and Zola. GER:DB-Hum

3-5 units, Win (Gardner, D)

FRENLIT 159. Confessions in 19th-Century French Literature

Evolution of confessional mode in 19th-century first-person narrative. In what way the confessional mode of the Christian practice was preserved in literature and what changes it underwent in the narratives about the self. How did the religious crisis in 19th century France invest the literary confessions? The topics are confessors, conversion, sincerity, repentance, guilt. Authors include Saint Augustine, Rousseau, Musset, Constant, Sainte-Beuve, Fouché, Guizot, Lamartine, Verlaine, Nerval. Taught in French. GER:DB-Hum

3-5 units, Spr (Samokhina, D)

FRENLIT 189A. Honors Research

Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.

5 units, Win (Staff)

FRENLIT 189B. Honors Research

Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.

2 units, Spr (Staff)

FRENLIT 199. Individual Work

Restricted to French majors with consent of department. Normally limited to 4-unit credit toward the major. May be repeated for credit.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff)

FRENLIT 204. Revolutions in Prose: The 19th-Century French Novel

How the French Revolution and its aftershocks were represented in novels; how this political imperative revolutionized literary form. Readings from Stendhal, Hugo, Balzac, Flaubert, Sand, and Zola. GER:DB-Hum

3-5 units, Win (Edelstein, D)

GRADUATE COURSES IN FRENCH LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FRENLIT 219. The Renaissance Body

The body as locus for desire, pleasure, disease, mortality, sexuality, and gender; and as canon of beauty and reflection of cosmic harmony. How literature responded to the development of an anatomical gaze in arts and medicine; how it staged the aesthetic, religious, philosophical, and moral issues related to such a promotion or deconstruction of the body. Does literature aim at representing the body, or use it as signifier for intellectual, emotional, and political ideas? Readings from Rabelais, Scève, Ronsard, Labé, d¿Aubigné, Montaigne, and medical texts.

3-5 units, not given this year

FRENLIT 222. The Political Unconscious of the Ancien Regime

The lasting influence in Europe of absolutism. Topics include political theories, the importance of court life, art as a political tool, modifications in human sensibility, literature, and social transformations.

3-5 units, not given this year

FRENLIT 225. Multicultural Moliere

Molière's life and work as a point of departure for the notion of multiculturalism. Born in a bourgeois family, Molière was in contact with social milieux including the French peasantry for whom he wrote farces, and the court of Louis XIV for whom he provided spectacles at Versailles. Major plays, including Tartuffe, Le bourgeois gentilhomme, and Le malde imaginaire as the expression of the new court culture. Sociohistorical and contemporary literary approaches: Molière as the unifying artistic figure in a multicultural France.

3-5 units, not given this year

FRENLIT 244. The Politics of Spectacle in a Time of Revolution

Emphasis on the rise, in the decades preceding and following the French Revolution, of a modern conception of the state, the theater, and their interaction. Topics include the /drame/, the festival, the ethics of acting, the politically engaged playwright, the democracy of the parterre, and innovations in theater design. Authors include Plato, Diderot, Rousseau, Mercier, Rétif, and Madame de Staël.

3-5 units, Spr (Robert, Y)

FRENLIT 248. Literature, History, and Representation

(Same as COMPLIT 250) Literary works as historical narratives; texts which envision ways of reconstructing or representing an ancient or immediate past through collective or individual narratives. Narration and narrator; relation between individual and collective history; historical events and how they have shaped the narratives; master narratives; and alternative histories. Reading include Glissant, Césaire, Dadié, Cixous, Pérec, Le Clézio, Mokkedem, Benjamin, de Certeau, and White.

3-5 units, not given this year

FRENLIT 256. Mind and Body in 20th-Century French Fiction

How fiction articulates the tensions among the sensuous, the sensual, the embodied, and the aspiration to purity, abstraction, and transcendence. Focus is on questioning dichotomies such as nature/culture, masculine/feminine, sacred/profane, and written word/voice. Authors include Gide, Camus, Butor, Duras, and Tournier.

3-5 units, not given this year

FRENLIT 267. National Literatures, Littérature-monde: A New Comparatism

(Same as COMPLIT 267) This course will focus on the implications of a ¿global francophonie,¿ through discussion of texts produced in different francophone times and spaces. Among the topics to be explored: confrontation of inward/outward territories and the questions of otherness, identity and minority status, the relation between history and literature, transnationality, métissage of lan-

guages and transnationality. Readings include Montaigne and Calvin, Tzetan Todorov, Lise Gauvin, Aimé Césaire, Bernard Dadié, Edouard Glissant, Leila Sebbar and others.

3-5 units, Win (Boyi, E)

FRENLIT 272. Francophone Literature: Bilingualism and Cultural Polyphonies in North African Literature

Francophone Maghrebian literature (Abdelkébir Khatibi, Colette Fellous essentially). Emphasis on bilingualism and multilingualism within the North African context in which literary language follows the contact between languages (spoken or merely heard). Not always to be considered in terms of conflict, it generates a new cultural identity, including the feeling, as Derrida says, to be at the edge of French. Topics also include dialogism and heteroglossy.

2 units, Aut (Staff)

FRENLIT 278. Special Topics (Francophone Literature): From Exoticism to a Discourse of Auto-Representation

(Same as AFRICAST 278, COMPLIT 278) Critical analysis of major issues relating to literatures in French language in and outside France. Focus is on exoticism and and self-representation, with an emphasis on the evolution of mentalities, new sensitivities and the role of literature in developing individual or collective identity. Readings include Le Clézio, Memmi, Malouf, Lopes, Schwarz-Bart, Delaygue, Glissant, Todorov, Kane and others. Primary sources, secondary sources and film. Taught in French.

3-5 units, not given this year

FRENLIT 280. Women in Print: Gender, Authorship, and Book Culture in Early Modern France

The relationships between gender, concepts of authorship, and early modern book culture in Renaissance France. What rhetorical, commercial, or textual strategies were used by printers, publishers, and writers, male and female alike, to create a new commodity, the female-authored book, and a new notion, that of ""female author,"" at a time when the phrase was still an oxymoron. Readings from Marguerite de Navarre, Helisenne de Crenne, Pernette du Guillet, Louise Labé, the Dame des Roches, and Marie de Gournay.

3-5 units, given next year

FRENLIT 293A. Topics in French Literature and Philosophy

Five-week course. May be repeated for credit.

2 units, Aut (Serres, M)

FRENLIT 293B. Topics in French Literature and Philosophy

Five-week course. May be repeated for credit.

2 units, Spr (Serres, M)

FRENLIT 299. Individual Work

May be repeated for credit.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FRENLIT 399. Individual Work

For students in French working on special projects or engaged in predissertation research.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

FRENLIT 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GENETICS (GENE) COURSES

UNDERGRADUATE COURSES IN GENETICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GENE 25SI. The Art and Science of Beer

Colloquium-style lecture series. Topics include: basics of beer brewing, the science behind the brew, history of beer brewing, government regulation, regional traditions and techniques, American micro-brewing. Includes hands-on brewing experience.

1 unit, Spr (Sherlock, G)

GENE 109Q. Genomics: A Technical and Cultural Revolution

(Stanford Introductory Seminar) (Same as BIOMEDIN 109Q) Preference to sophomores. Concepts of genomics, high-throughput methods of data collection, and computational approaches to analysis of data. The social, ethical, and economic implications of genomic science. Students may focus on computational or social aspects of genomics.

3 units, Win (Altman, R)

GENE 199. Undergraduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN GENETICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GENE 202. Human Genetics

Theoretical and experimental basis for the genetics of human health and disease. Molecular, chromosomal, biochemical, developmental, cancer, and medical genetics, emphasizing the last. Clinical case discussions. Prerequisites: biochemistry; basic genetics.

4 units, Aut (Ormond, K; Hudgins, L)

GENE 203. Advanced Genetics

(Same as BIO 203, DBIO 203) For graduate students in Bioscience programs; may be appropriate for graduate students in other programs. The genetic toolbox. Examples of analytic methods, genetic manipulation, genome analysis, and human genetics. Emphasis is on use of genetic tools in dissecting complex biological pathways, developmental processes, and regulatory systems. Faculty-led discussion sections with evaluation of papers. Students with minimal experience in genetics should prepare by working out problems in college level textbooks.

4 units, Aut (Stearns, T; Sidow, A; Kim, S)

GENE 206. Epigenetics

(Same as BIO 156, BIO 256, PATH 206) For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in Drosophila in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42 , or GENE 203, or consent of instructor.

2 units, Spr (Lipsick, J; Gozani, O), alternate years, not given next year

GENE 210. Genomics and Personalized Medicine

Principles of genetics underlying associations between genetic variants and disease susceptibility and drug response. Topics include: genetic and environmental risk factors for complex genetic disorders; design and interpretation of genome-wide association studies; pharmacogenetics; full genome sequencing for disease gene discovery; population structure and genetic ancestry; use of personal genetic information in clinical medicine; ethical, legal, and social issues with personal genetic testing. Hands-on workshop making use of personal or publicly available genetic data. Prerequisite: GENE 202 or 203.

2 units, Sum (Kim, S; Salari, K)

GENE 211. Genomics

Genome evolution, organization, and function; technical, computational, and experimental approaches; hands-on experience with representative computational tools used in genome science; and a beginning working knowledge of PERL.

3 units, Win (Cherry, J; Sherlock, G)

GENE 212. Introduction to Biomedical Informatics Research Methodology

(Same as BIOE 212, BIOMEDIN 212, CS 272) Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor.

3 units, Spr (Altman, R)

GENE 214. Representations and Algorithms for Computational Molecular Biology

(Same as BIOE 214, BIOMEDIN 214, CS 274) Topics: introduction to bioinformatics and computational biology, algorithms for

alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Aut (Altman, R)

GENE 215. Frontiers in Biological Research

(Same as BIOC 215, DBIO 215) Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker¿s primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research.

1 unit, Aut (Harbury, P; Calos, M; Villeneuve, A), Win (Harbury, P; Villeneuve, A; Calos, M)

GENE 218. Computational Analysis of Biological Images

(Same as PATH 218) Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy.

2 units, Spr (Staff)

GENE 221. Current Issues in Aging

(Same as DBIO 221) Current research literature on genetic mechanisms of aging in animals and human beings. Topics include: mitochondria mutations, insulin-like signaling, sirtuins, aging in flies and worms, stem cells, human progeria, and centenarian studies. Prerequisite: GENE 203.

2 units, Spr (Kim, S; Brunet, A), alternate years, not given next year

GENE 222. Method and Logic in Experimental Genetics

For graduate students only. How experimental strategies are applied to biological questions irrespective of discipline boundaries. Examples include purifying activities from complex mixtures, localizing molecules in space and time, discovering macromolecular interactions, inferences from sequence similarity, using structure to elucidate function, and applying genomics to biological problems. Weekly discussion of two representative papers selected by faculty and a student presentation of a third paper which illustrate principles of biochemistry and cell and molecular biology, and the historical context of important scientific advances.

3 units, Win (Baker, J; Pringle, J)

GENE 233. The Biology of Small Modulatory RNAs

(Same as MI 233, PATH 233) Open to graduate and medical students. How recent discoveries of miRNA, RNA interference, and short interfering RNAs reveal potentially widespread gene regulatory mechanisms mediated by small modulatory RNAs during animal and plant development. Required paper proposing novel research.

2 units, Aut (Chen, C; Fire, A)

GENE 234. Fundamentals of RNA Biology

(Same as MI 234, PATH 234) For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students.

2 units, alternate years, not given this year

GENE 235. C. Elegans Genetics

Genetic approaches to C. elegans, practice in designing experiments and demonstrations of its growth and anatomy. Probable topics include: growth and genetics, genome map and sequence, mutant screens that start with a desired phenotype, reverse genetics and RNAi screens, genetic duplications, uses of null phenotype non-null alleles, genetic interactions and pathway analysis, and embryogenesis and cell lineage. Focus of action, mosaic analysis, and interface with embryological and evolutionary approaches.

2 units, alternate years, not given this year

GENE 243. Scientific Evidence and Expert Testimony: Patent Litigation

Open to clinical MD and graduate students. How to explain science to judge and jury; how litigators determine which legal issues to argue. Patent and expert testimony law. Student teams choose patents for final simulation projects, prepare claim charts, devise a design-around, and present simulations of expert testimony. Prerequisite: Graduate students must have completed all coursework in their departments for the PhD degree.

3 units, Aut (Morris, R)

GENE 244. Introduction to Statistical Genetics

Statistical methods for analyzing human genetics studies of Mendelian disorders and common complex traits. Probable topics include: principles of population genetics; epidemiologic designs; familial aggregation; segregation analysis; linkage analysis; linkage-disequilibrium-based association mapping approaches; and genome-wide analysis based on high-throughput genotyping platforms. Prerequisite: STATS 116 or equivalent or consent of instructor.

3 units, Aut (Tang, H), alternate years, not given next year

GENE 245. Computational Algorithms for Statistical Genetics

(Same as STATS 345) Computational algorithms for human genetics research. Topics include: permutation, bootstrap, expectation maximization, hidden Markov model, and Markov chain Monte Carlo. Rationales and techniques illustrated with existing implementations commonly used in population genetics research, disease association studies, and genomics analysis. Prerequisite: GENE 244 or consent of instructor.

2-3 units, alternate years, not given this year

GENE 260. Supervised Study

Genetics graduate student lab research from first quarter to filing of candidacy. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GENE 271. Human Molecular Genetics

For genetic counseling students, graduate students in genetics, medical students, residents, and postdoctoral fellows interested in the practice of medical genetics. Gene structure and function; the impact of mutation and polymorphism as they relate to developmental pathways and health and human disease; population based genetics; approaches to the study of complex genetic conditions; GWAS and genome sequencing technologies; gene therapy, proteomics, stem cell biology, and pharmacogenetics. Undergraduates require consent of instructor and a basic genetics course.

4 units, Aut (Kwan, A; Francke, U)

GENE 272. Introduction to Medical Genetics

For genetic counseling students, graduate students in human genetics, medical students, residents, and fellows; undergraduates with consent of instructor. Principles of medical genetics including taking a family history, modes of inheritance, and mathematical principles of medical genetics (Bayes theorem, population genetics). An additional problem set is required for 3 units.

2-3 units, Aut (Hudgins, L; Ormond, K)

GENE 273. Introduction to Clinical Genetics Testing

For genetic counseling students, graduate students in genetics, medical students, residents, and fellows; undergraduates with consent of instructor. Principles of cytogenetic, molecular, and biochemical laboratory analysis. How to select the appropriate laboratory for testing and laboratory quality assurance, including the CLIA process. An additional problem set is required for 3 units.

2-3 units, Aut (Kwan, A)

GENE 274A. A Case Based Approach to Clinical Genetics

For genetic counseling students, graduate students in genetics, medical students, residents and fellows. Case-based scenarios and guest expert lectures. Students learn skills in case preparation, management, and presentation, as well as content around common genetic disorders.

2 units, Win (Hudgins, L; Kwan, A)

GENE 274B. A Case Based Approach to Clinical Genetics

For genetic counseling students, graduate students in genetics, medical students, residents, and fellows. Case-based scenarios and guest expert lectures. Students learn skills in case preparation, management, and presentation, as well as content around common genetic disorders.

2 units, Spr (Hudgins, L; Ormond, K)

GENE 275. Role Play and Genetic Counseling Observations
Students role play aspects of genetic counseling sessions and learn through clinical observations. Observation includes genetic counseling sessions in prenatal, pediatric, and cancer settings.

2 units, Aut (Kwan, A; Ormond, K)

GENE 276. Genetic Counseling Clinical Rotations
For genetic counseling students only. Supervised clinical experiences. May be repeated for credit. Prerequisite: GENE 275.

4-7 units, Aut (Ormond, K; Kwan, A), Win (Ormond, K; Kwan, A), Spr (Ormond, K; Kwan, A), Sum (Ormond, K; Kwan, A)

GENE 278. Prenatal Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial prenatal genetics rotation. Topics include prenatal genetic screening and diagnosis in the first and second trimesters, ultrasound, teratology, and genetic carrier screening.

1 unit, Aut (Ormond, K), Win (Ormond, K), Spr (Ormond, K), Sum (Ormond, K)

GENE 279. Pediatric and Adult Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial general genetics rotation. Topics include: common genetic conditions; assessment of child development and medical history in the context of a genetic workup; dysmorphology; development of a differential diagnosis; and resources for case management and family support.

1 unit, Aut (Kwan, A), Win (Kwan, A), Spr (Kwan, A), Sum (Ormond, K)

GENE 280. Metabolic Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their metabolic genetics rotation. Topics include: overview of metabolic diseases; common pathways; diagnosis, management, and treatment of metabolic disorders; and newborn screening.

1 unit, Aut (Kwan, A), Win (Kwan, A), Spr (Kwan, A), Sum (Ormond, K)

GENE 281. Cancer Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial cancer genetics rotation. Topics include: cancer biology and cytogenetics; diagnosis and management of common cancer genetic syndromes; predictive testing; psychology of cancer genetic counseling; and topics recommended by ASCO guidelines.

1 unit, Aut (Ormond, K), Win (Ormond, K), Spr (Ormond, K), Sum (Ormond, K)

GENE 282A. Genetic Counseling Research Seminar
For genetic counseling students only. Facilitated discussions on identifying a topic and mentor for genetic counseling departmental research projects.

1 unit, Win (Ormond, K)

GENE 282B. Genetic Counseling Research Seminar
For genetic counseling students only. Lectures and facilitated discussions on research methodology for genetic counseling departmental research projects. Prerequisite: GENE 282A,

1 unit, Spr (Ormond, K)

GENE 283. Genetic Counseling Research
Genetic counseling students conduct clinical research projects as required by the department for graduation. May be repeated for credit. Pre- or corequisite:GENE 282.

1-8 units, Aut (Ormond, K; Kwan, A), Win (Ormond, K; Kwan, A), Spr (Ormond, K; Kwan, A), Sum (Ormond, K; Kwan, A)

GENE 284. Medical Genetics Seminar
Presentation of research and cases. Students enrolling for 2 units also attend and report on external seminars. May be repeated for credit.

1-2 units, Aut (Kwan, A), Win (Kwan, A), Spr (Kwan, A)

GENE 285A. Genetic Counseling Seminar
Year-long seminar primarily for genetic counseling students. Autumn: basics of medical communication; crosscultural and disability sensitive communication about genetics, and principles of providing genetic counseling. Winter: the impact of chronic illness and genetic disease in a developmental manner. Spring: applying therapeutic counseling approaches to the practice of genetic counseling. Undergraduates may enroll in Autumn Quarter with consent of instructor.

2-3 units, Aut (Ormond, K)

GENE 285B. Genetics Counseling Seminar
Year-long seminar primarily for genetic counseling students. Autumn: basics of medical communication; crosscultural and disability sensitive communication about genetics, and principles of providing genetic counseling. Winter: the impact of chronic illness and genetic disease in a developmental manner. Spring: applying therapeutic counseling approaches to the practice of genetic counseling. Prerequisite: GENE 285A.

2-3 units, Win (Ormond, K)

GENE 285C. Genetic Counseling Seminar
Year-long seminar primarily for genetic counseling students. Autumn: basics of medical communication; crosscultural and disability sensitive communication about genetics, and principles of providing genetic counseling. Winter: the impact of chronic illness and genetic disease in a developmental manner. Spring: applying therapeutic counseling approaches to the practice of genetic counseling. Prerequisite: 285 A/B.

2-3 units, Spr (Ormond, K)

GENE 286A. Advanced Genetic Counseling Seminar
For genetic counseling students only. Psychosocial issues associated with genetic counseling cases are discussed through presentation of cases that students have seen throughout their training. Professional development topics including: the expanding roles of genetic counselors; billing, reimbursement, and licensing; the role of genetic counseling in the changing healthcare system; the incorporation of genetics into all areas of medicine and public health; and implications of direct-to-consumer genetic testing. Prerequisites: GENE 285 A,B,C and 276.

2 units, Aut (Ormond, K; Kwan, A)

GENE 286B. Advanced Genetic Counseling Seminar
Continuation of GENE 286A. For genetic counseling students only. Psychosocial issues associated with genetic counseling cases are discussed through presentations of cases that students have seen throughout their training. Professional development topics including: the expanding roles of genetic counselors; billing, reimbursement, and licensing; the role of genetic counseling in the changing healthcare system; the incorporation of genetics into all areas of medicine and public health; and implications of direct-to-consumer genetic testing. Prerequisites: GENE 285 A,B,C and 276.

2 units, Win (Ormond, K; Kwan, A)

GENE 286C. Advanced Genetic Counseling Seminar
Continuation of 286A/B. For genetic counseling students only. Psychosocial issues associated with genetic counseling cases are discussed through presentation of cases that students have seen throughout their training. Professional development topics including: the expanding roles of genetic counselors; billing, reimbursement, and licensing; the role of genetic counseling in the changing healthcare system; the incorporation of genetics into all areas of medicine and public health; and implications of direct-to-consumer genetic testing. Prerequisites: GENE 285 A,B,C and 276.

2 units, Spr (Ormond, K; Kwan, A)

GENE 299. Directed Reading in Genetics
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GENE 399. Graduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GENE 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GENE 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES (GES) COURSES

UNDERGRADUATE COURSES IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GES 1A. Introduction to Geology: The Physical Science of the Earth
For non-majors or prospective majors in the Earth Sciences. Lectures, hands-on laboratories, and three one-day weekend field trips. Focus is on the physical and chemical processes of heat and mass transfer within the earth and its fluid envelopes, including deep-earth, crustal, surface, and atmospheric processes. Topics include the dynamics of and interactions between the inner earth, plate tectonics, surface processes, and atmospheric processes such as climate change and global warming. Only one of GES 1A, 1B, or 1C may be taken for credit. Prerequisites: MATH 19 or equivalent. GER:DB-NatSci
5 units, Aut (Hilley, G)

GES 1BN. Introductory to Geology: California Desert Field Geology
(Stanford Introductory Seminar) California's Death Valley and Owens Valley are used as natural laboratories for studying active geologic processes and a billion years of earth history: ancient ocean sediments, mountain building, earthquake faulting, glacial landscapes, volcanic eruptions, hot springs and ore deposits, prehistoric climate changes, and historic human impacts. The course culminates in a 6-day field trip to these areas during Spring Break. Class lectures provide the basics of plate tectonics and physical geology. Laboratory exercises involve rock identification and interpreting topographic and geologic maps and remote sensing imagery. Camping and moderate hiking required. Limited enrollment. Only one of GES 1A, 1B, or 1C may be taken for credit. Recommended: high school chemistry. GER:DB-NatSci
4 units, Win (Mahood, G)

GES 1C. Introduction to Geology: Dynamic Earth
For non-majors or prospective majors in the Earth Sciences. Integrated lecture-lab includes hands-on activities and local field trips. Focus is on reading the dynamic geological landscape, with an emphasis on California¿primarily Bay Area¿geology. Topics include plate tectonics, earthquakes and volcanoes, Earth materials, geologic time, stream processes, and climate change over geologic time. Only one of GES 1A, 1B, or 1C may be taken for credit. GER:DB-NatSci
4 units, Spr (Egger, A)

GES 4. Evolution and Extinction: Introduction to Historical Geology
(Same as EARTHSYS 4) Focus is on the end-Cretaceous mass extinction. Principles of stratigraphy, correlation, the geological timescale, the history of biodiversity, and the interpretation of fossils. The use of data from sedimentary geology, geochemistry, and paleontology to test theories to explain the mass extinction event. Two half-day field trips. GER:DB-NatSci
4 units, alternate years, not given this year

GES 7A. An Introduction to Wilderness Skills
Living, traveling, and working in the wilderness for those planning fieldwork in the back country. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on back country travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and back country skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See http://www.stanford.edu/class/ges7, or email oep-teachers@lists.stanford.edu.
1 unit, Aut (Bird, D)

GES 7B. An Introduction to Wilderness Skills
Living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on backcountry travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and backcountry skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See http://www.stanford.edu/class/ges7, or email oep-teachers@lists.stanford.edu.
1 unit, Win (Bird, D)

GES 7C. Advanced Wilderness Skills
For students with prior backcountry experience. Backcountry skiing, mountaineering, climbing, first aid, and trip planning. Focus is on outdoor leadership experience and trip management techniques. Food, group, and major personal gear provided. Four mandatory weekend trips. Fee. See http://www.stanford.edu/class/ges7/ for information or contact oep-teachers@lists.stanford.edu. Prerequisite: application.
1 unit, Spr (Bird, D)

GES 8. Oceanography: An Introduction to the Marine Environment
For non-majors and earth science and environmental majors. Topics: topography and geology of the sea floor; evolution of ocean basins; circulation of ocean and atmosphere; nature of sea water, waves, and tides; and the history of the major ocean basins. The interface between continents and ocean basins, emphasizing estuaries, beaches, and continental shelves with California margin examples. Relationships among the distribution of inorganic constituents, ocean circulation, biologic productivity, and marine environments from deep sea to the coast. One-day field trip to measure and analyze waves and currents. GER:DB-NatSci
3 units, Sum (Ingle, J)

GES 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration
(Stanford Introductory Seminar) (Same as EESS 38N, EARTHSYS 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci
3 units, Win (Dunbar, R)

GES 39N. Forensic Geoscience: Stanford CSI
(Stanford Introductory Seminar) Preference to freshmen. Geological principles, materials, and techniques indispensable to modern criminal investigations. Basic earth materials, their origin and variability, and how they can be used as evidence in criminal cases and investigations such as artifact provenance and environmental pollution. Sources include case-based, simulated forensic exercises and the local environments of the Stanford campus and greater Bay Area. Local field trips; research presentation and paper. GER:DB-NatSci
3 units, Aut (Maher, K)

GES 40N. Diamonds
(Stanford Introductory Seminar) Preference to freshmen. Topics include the historyof diamonds as gemstones, prospecting and mining, and their often tragic politics. How diamond samples provide clues for geologists to understand the Earth's deep interior and the origins of the solar system. Diamond's unique materials properties and efforts in synthesizing diamonds. GER:DB-NatSci
3 units, Spr (Mao, W)

GES 43Q. Environmental Problems
(Stanford Introductory Seminar) (Same as EARTHSYS 43Q) Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to tim-

ber and mining practices, acid rain, and subsurface disposal of nuclear waste. GER:DB-NatSci

3 units, Win (Loague, K)

GES 55Q. The California Gold Rush: Geologic Background and Environmental Impact

(Stanford Introductory Seminar) Preference to sophomores. Topics include: geologic processes that led to the concentration of gold in the river gravels and rocks of the Mother Lode region of California; and environmental impact of the Gold Rush due to population increase, mining operations, and high concentrations of arsenic and mercury in sediments from hard rock mining and milling operations. Recommended: introductory geology. GER:DB-NatSci

3 units, Win (Bird, D)

GES 90. Introduction to Geochemistry

The chemistry of the solid earth and its atmosphere and oceans, emphasizing the processes that control the distribution of the elements in the earth over geological time and at present, and on the conceptual and analytical tools needed to explore these questions. The basics of geochemical thermodynamics and isotope geochemistry. The formation of the elements, crust, atmosphere and oceans, global geochemical cycles, and the interaction of geochemistry, biological evolution, and climate. Recommended: introductory chemistry. GER:DB-NatSci

3-4 units, Win (Stebbins, J)

GES 101. Environmental and Geological Field Studies in the Rocky Mountains

(Same as EESS 101, EARTHSYS 100) Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.

3 units, Aut (Chamberlain, P)

GES 102. Earth Materials: Introduction to Mineralogy

The minerals and materials that comprise the earth and their uses in modern society. How to identify, classify, and interpret rock-forming minerals. Emphasis is on information provided by common minerals about the nature of the Earth's interior and processes such as magmatism and metamorphism that operate there, as well as the major processes of weathering and erosion that link plate tectonics to earth cycles. Prerequisite: introductory geology course. Recommended: introductory chemistry. GER:DB-NatSci

3 units, Aut (Brown, G; Mao, W)

GES 102L. Introductory Mineralogy Laboratory

One weekly 3-hour laboratory to identify and interpret rock-forming minerals, industrially important minerals, and gems. Introduction to the use of hand lens, petrographic microscope and x-ray diffraction. Prerequisite: GES102 taken concurrently.

1 unit, Aut (Brown, G; Mao, W)

GES 103. Earth Materials: Rocks in Thin Section

Use of petrographic microscope to identify minerals and common mineral associations in igneous, metamorphic, and sedimentary rocks. Crystallization histories, mineral growth and reaction relations, deformation textures in metamorphic rocks, and provenance of siliciclastic rocks. Prerequisite 102.

3 units, Win (Miller, E)

GES 104. Earth Materials: Introduction to Petrology

The origin of different rock types as a function of geologic and plate tectonic setting. How mineral and energy resources occur in rocks. Prerequisite: introductory geology course. Recommended: GES102.

3 units, Spr (Mahood, G)

GES 104L. Introductory Petrology Laboratory

One weekly 3-hour laboratory on how to identify igneous, metamorphic, and sedimentary rocks, and interpret their mode and conditions of formation using hand lens and petrographic microscope. Prerequisite: GES 102L; GES103; GES104 taken concurrently.

1 unit, Spr (Mahood, G)

GES 105. Introduction to Field Methods

Two-week, field-based course in the White Mountains of eastern California. Introduction to the techniques for geologic mapping and geologic investigation in the field: systematic observations and data collection for lithologic columns and structural cross-sections. Interpretation of field relationships and data to determine the stratigraphic and deformational history of the region. Prerequisite: GES 1. Recommended: GES 102.

3 units, Aut (Grove, M; Maher, K)

GES 107. Journey to the Center of the Earth

(Same as GEOPHYS 184) The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution.

3 units, alternate years, not given this year

GES 110. Structural Geology and Tectonics

Theory, principles, and practical techniques to measure, describe, analyze, and interpret deformation-related structures on Earth. Collection of fault and fold data in the field followed by lab and computer analysis; interpretation of geologic maps and methods of cross-section construction; structural analysis of fault zone and metamorphic rocks; measuring deformation; regional structural styles and associated landforms related to plate tectonic convergence, rifting, and strike-slip faulting; the evolution of mountain belts and formation of sedimentary basins. Prerequisite: GES 1, calculus. Recommended: 102. GER:DB-NatSci

3-5 units, Spr (Miller, E)

GES 111A. Fundamentals of Structural Geology

(Same as CEE 195A) Techniques for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; measurement and analysis of stress. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisites: GES 1, MATH 51, 52. GER:DB-NatSci

3 units, Aut (Pollard, D)

GES 111B. Fundamentals of Structural Geology

(Same as CEE 195B) Continuation of GES 111A/CEE 195A. Conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding and magma dynamics; model development and methodology. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisite: GES 111A/CEE 195B.

3 units, Win (Pollard, D)

GES 115. Engineering Geology Practice

(Same as CEE 196) The application of geology and global change to the planning, design, and operation of engineering projects. Case histories taught in a seminar setting and field trips emphasize the impact of geology and global change on both individual engineering works and the built environment by considering Quaternary history and tectonics, anthropogenic sea level rise, active geologic processes, engineering properties of geologic deposits, site exploration, and professional ethics. Prerequisite: GES 1 or consent of instructor. GER:DB-NatSci

3 units, alternate years, not given this year

GES 120. Planetary and Early Biological Evolution Seminar

(Same as GES 220) Interdisciplinary. For upper division science undergraduates and graduate students. Synthesis of biology, geology, physics, and chemistry. Recent approaches for identifying traces of past life on Earth. How to look for life on other planets such as Mars, Europa, and Titan. May be repeated for credit.

2-3 units, not given this year

GES 121. What Makes a Habitable Planet?

(Same as GES 221) Physical processes affecting habitability such as large impacts and the atmospheric greenhouse effect, comets, geochemistry, the rise of oxygen, climate controls, and impact cratering. Detecting and interpreting the spectra of extrasolar terrestrial planets. Student-led discussions of readings from the scientific literature. Team taught by planetary scientists from NASA Ames Research Center.

3 units, Aut (Lissauer, J; Marley, M; Zahnle, K)

GES 122. Planetary Systems: Dynamics and Origins

(Students with a strong background in mathematics and the physical sciences should register for 222.) Motions of planets and smaller bodies, energy transport in planetary systems, composition,

structure and dynamics of planetary atmospheres, cratering on planetary surfaces, properties of meteorites, asteroids and comets, extrasolar planets, and planetary formation. Prerequisite: some background in the physical sciences, especially astronomy, geophysics, or physics.

3-4 units, alternate years, not given this year

GES 123. Paleobiology

(Same as EARTHSYS 122) Introduction to the fossil record with emphasis on marine invertebrates. Major debates in paleontological research. The history of animal life in the oceans. Topics include the nature of the fossil record, evolutionary radiations, mass extinctions, and the relationship between biological evolution and environmental change. Fossil taxa through time. Exercises in phylogenetics, paleoecology, biostratigraphy, and statistical methods. GER:DB-NatSci

4 units, Spr (Harnik, P)

GES 130. Soil Physics and Hydrology

(Same as EARTHSYS 130) The occurrence, distribution, circulation, and reaction of water at the surface and within the near surface. Topics: precipitation, evapotranspiration, infiltration and vadose zone, groundwater, surface water and streamflow generation, and water balance estimates. Current and classic theory in soil physics and hydrology. Urban, rangeland, and forested environments. GER:DB-NatSci

3 units, Aut (Loague, K)

GES 131. Hydrologically-Driven Landscape Evolution

(Same as EARTHSYS 131H) Materials of the Earth and hydrologically driven landscape processes. Topics: hillslope hydrology, weathering of rocks and soils, erosion, flow failures, mass wasting, and conceptual models of landscape evolution. Current and classic theory in geomorphology. GER:DB-NatSci

3 units, Win (Loague, K)

GES 150. Senior Seminar: Issues in Earth Sciences

Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review.

3 units, Aut (Bird, D; Egger, A)

GES 151. Sedimentary Geology and Petrography: Depositional Systems

Topics: weathering, erosion and transportation, deposition, origins of sedimentary structures and textures, sediment composition, diagenesis, sedimentary facies, tectonics and sedimentation, and the characteristics of the major siliciclastic and carbonate depositional environments. Lab: methods of analysis of sediments in hand specimen and thin section. Field trips. Prerequisites: 1, 102, 103. GER:DB-NatSci

4 units, Win (Graham, S; Lowe, D)

GES 163. Introduction to Isotope Geochemistry

(Same as GES 263) Stable, cosmogenic, and radiogenic isotopes; processes that govern isotopic variations. Application of isotopes to geologic, biologic, and hydrologic questions. Major isotopic systems and their applications. Simple modeling techniques used in isotope geochemistry.

3 units, alternate years, not given this year

GES 170. Environmental Geochemistry

(Same as EARTHSYS 170) Solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and chemical interactions. Contrast between natural sources of hazardous elements and compounds and types and sources of anthropogenic contaminants and pollutants. Chemical and physical processes of weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. The release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The impact of contaminants and design of remediation strategies. Case studies. Prerequisite: 90 or consent of instructor. GER:DB-NatSci

4 units, Win (Brown, G)

GES 171. Geochemical Thermodynamics

Introduction to the application of chemical principles and concepts to geologic systems. The chemical behavior of fluids, minerals, and gases using simple equilibrium approaches to modeling the geochemical consequences of diagenetic, hydrothermal, metamorphic, and igneous processes. Topics: reversible thermodynamics, solution chemistry, mineral-solution equilibria, reaction kinetics, and the distribution and transport of elements by geologic processes. Prerequisite: GES 102. GER:DB-NatSci

3 units, Aut (Bird, D)

GES 180. Igneous Processes

For juniors, seniors and beginning graduate students in Earth Sciences. Structure and physical properties of magmas; use of phase equilibria and mineral barometers and thermometers to determine conditions of magmatic processes; melting and magmatic lineages as a function of tectonic setting; processes that control magma composition including fractional crystallization, partial melting, and assimilation; petrogenetic use of trace elements and isotopes. Labs emphasize identification of volcanic and plutonic rocks in thin section and interpretation of rock textures. Prerequisite 102, 103, or consent of instructor.

4 units, alternate years, not given this year

GES 181. Metamorphic Processes

For juniors, seniors, and beginning graduate students in Earth Sciences. Thermodynamics and phase equilibria of multiple component systems; use of phase equilibria to determine pressure and temperature of metamorphic assemblages; geochronology of metamorphic rocks; heat flow in the lithosphere; links between tectonics and metamorphism; and the role of heat and mass transfer in the Earth's crust and mantle. Labs emphasize identification of metamorphic rocks and minerals for common pelitic and basic rocks and interpretation of rock textures. May be taken for 3 units without lab. Prerequisites: 102, 103, or consent of instructor. GER:DB-NatSci

3-5 units, not given this year

GES 182. Field Seminar on Continental-Margin Volcanism

For juniors, seniors, and graduate students in the earth sciences and archeology. One weekend-long, and two one-day field trips to study Cenozoic volcanism associated with subduction and with passage of the Mendocino Triple Junction off the west coast of California: Mt. Lassen/Mt. Shasta/Modoc plateau; Clear Lake/Sonoma volcanics; Pinnacles National Monument. Andesite and basalt lavas, cinder cones, mixed magmas, blast deposit, debris avalanches, volcanic mudflows, hydrologic controls of springs in volcanic terrains, hydrothermal alteration and modern geothermal systems, Hg mineralization, obsidian source. Prerequisite: 1, 104 or equivalent.

2 units, given occasionally

GES 183. California Desert Geology

Field seminar. Six-day field trip over Spring Break to Mojave Desert, Death Valley, and Owens Valley. Basin-and-range faulting, alluvial fans, playas, sand dunes, metamorphic rocks, granites of the Sierra Nevada, obsidian lava flows and the deposits of major explosive eruptions, hot springs and ore deposits, and desert landscapes. Camping and moderate hiking. Recommended: introductory geology.

1 unit, Win (Mahood, G)

GES 185. Volcanology

For juniors, seniors, and beginning graduate students. Volcanic landforms and deposits and eruptive processes. How they relate to physical properties of magmas and the modes of emplacement. Volcanic hazards and the effects of eruptions on climate; volcanic-hosted geothermal systems and mineral resources. Required 4-day field trip over Memorial Day weekend to study silicic and mafic volcanism associated with the western margin of the Basin and Range Province. Those taking the class for 4 units will complete a 3-hour weekly lab involving hand specimen and thin section identification and interpretation, which emphasizes recognizing types of lavas and products of explosive eruptions. Prerequisite: 1, for those taking the course for 3 units; 103 and 104 or equivalent for those taking the course for 4 units. GER:DB-NatSci

3-4 units, alternate years, not given this year

GES 186. Geoarchaeology

For juniors, seniors, and beginning graduate students with interests in archaeology or geosciences. Geological concepts, techniques, and data in the study of artifacts and the interpretation of the archaeological record. Topics include: sediments and soils; sedimentary settings of site formation; postdepositional processes that disturb sites; paleoenvironmental reconstruction of past climates and landscapes using plant and animal remains and isotopic studies; raw materials (minerals, metals, stone, shells, clay, building mate-

rials) and methods used in sourcing; estimating age based on stratigraphic and radiometric techniques. Weekly lab; weekend field trip to local archaeological/geological site. GER:DB-NatSci

5 units, not given this year

GES 190. Field Research

Two-three week field research projects. Written report required. May be repeated three times.

2-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 191. GES Field Trips

Four- to seven-day field trips to locations of geologic and environmental interest. Includes trips offered during Thanksgiving and Spring breaks. May be repeated for credit. See http://pangea.stanford.edu/GES/undergraduates/courses/.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 192. Undergraduate Research in Geological and Environmental Sciences

Field-, lab-, or literature-based. Faculty supervision. Written reports. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 197. Senior Thesis

For seniors who wish to write a thesis based on research in 192 or as a summer research fellow. May not be repeated for credit; may not be taken if enrolled in 199.

3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 198. Special Problems in Geological and Environmental Sciences

Reading and instruction under faculty supervision. Written reports. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 199. Honors Program

Research on a topic of special interest. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GES 209. Microstructures

Microstructures in metamorphic rocks reveal temperature, pressure, and rates of deformation in the crust and variations in its thermo-mechanical behavior. Topics include the rheology of rocks and minerals, strain partitioning, shear zones and brittle-ductile transition in the crust, mechanisms of foliation and lineation development, preferred crystallographic fabrics, and geochronologic methods useful for dating deformation. Labs involve microstructure analysis of suites of rocks from classic localities. 5 units for extra project.

3-5 units, not given this year

GES 210. Geologic Evolution of the Western U.S. Cordillera

The geologic and tectonic evolution of the U.S. Cordillera based on its rock record through time. This region provides good examples of large-scale structures and magmatic activity generated during crustal shortening, extension, and strike-slip faulting and affords opportunity to study crustal-scale processes involved in mountain building in context of plate tectonic motions.

2-3 units, given next year

GES 211. Topics in Regional Geology and Tectonics

May be repeated for credit.

2-3 units, Aut (Miller, E), Win (Miller, E), Spr (Staff)

GES 212. Topics in Tectonic Geomorphology

For upper-division undergraduates and graduate students. Topics vary and may include coupling among erosional, tectonic, and chemical weathering processes at the scale of orogens; historical review of tectonic geomorphology; hillslope and fluvial process response to active uplift; measures of landscape form and their relationship to tectonic uplift and bedrock lithology. May be repeated for credit.

2 units, Aut (Hilley, G)

GES 213. Topics in Sedimentary Geology

For upper division undergraduates and graduate students. Topics vary each year but the focus is on current developments and problems in sedimentary geology, sedimentology, and basin analysis. These include issues in deep-water sediments, their origin, facies, and architecture; sedimentary systems on the early Earth; and relationships among tectonics, basin development, and basin fill. May be repeated for credit.

2 units, by arrangement

GES 214. Topics in Paleobiology

For upper division undergraduates and graduate students. Topics vary each year; focus is on paleontological, sedimentological, and geochemical approaches to the history of life. Topics may include: mass extinction events; evolutionary radiations; the history of global biodiversity; links between evolutionary histories of primary producers and consumers; and the quality of the fossil record. Term paper. May be repeated for credit.

2 units, given occasionally

GES 215A. Structural Geology and Rock Mechanics

(Same as CEE 297G, GEOPHYS 251A) Quantitative field and laboratory data integrated with solutions to initial and boundary-value problems of continuum mechanics introduce tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent.

3-5 units, Aut (Pollard, D)

GES 215B. Structural Geology and Rock Mechanics

(Same as CEE 297H, GEOPHYS 251B) Field equations for elastic solids and viscous fluids derived from conservation laws to develop mechanical models for tectonic processes and their structural products. Topics include: conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding, model development, and methodology. Models constructed and solutions visualized using MATLAB. Prerequisite: GES 215A.

3-5 units, Win (Staff)

GES 216. Rock Fracture Mechanics

Principles and tools of elasticity theory and fracture mechanics are applied to the origins and physical behaviors of faults, dikes, joints, veins, solution surfaces, and other natural structures in rock. Field observations, engineering rock fracture mechanics, and the elastic theory of cracks. The role of natural fractures in brittle rock deformation, and fluid flow in the earth's crust with applications to crustal deformation, structural geology, petroleum geology, engineering, and hydrogeology. Prerequisite: 215 or equivalent.

3-5 units, Spr (Pollard, D)

GES 217. Faults, Fractures, and Fluid Flow

Process-based approach to rock failure; the microstructures and overall architectures of the failure products including faults, joints, solution seams, and types of deformation bands. Fluid flow properties of these structures are characterized with emphasis on sealing and transmitting of faults and their role in hydrocarbon flow, migration, and entrapment. Case studies of fracture characterization experiments in aquifers, oil and gas reservoirs, and waste repository sites. Guest speakers; weekend field trip. Prerequisite: first-year graduate student in Earth Sciences.

3 units, Win (Aydin, A)

GES 220. Planetary and Early Biological Evolution Seminar

(Same as GES 120) Interdisciplinary. For upper division science undergraduates and graduate students. Synthesis of biology, geology, physics, and chemistry. Recent approaches for identifying traces of past life on Earth. How to look for life on other planets such as Mars, Europa, and Titan. May be repeated for credit.

2-3 units, not given this year

GES 221. What Makes a Habitable Planet?

(Same as GES 121) Physical processes affecting habitability such as large impacts and the atmospheric greenhouse effect, comets, geochemistry, the rise of oxygen, climate controls, and impact cratering. Detecting and interpreting the spectra of extrasolar terrestrial planets. Student-led discussions of readings from the scientific literature. Team taught by planetary scientists from NASA Ames Research Center.

3 units, Aut (Lissauer, J; Marley, M; Zahnle, K)

GES 222. Planetary Systems: Dynamics and Origins
(For students with a strong background in mathematics and the physical sciences; other should register for 122.) Motions of planets, moons, and small bodies; energy transport in planetary systems; meteorites and the constraints they provide on the formation of the solar system; asteroids and Kuiper belt objects; comets; planetary rings; planet formation; and extrasolar planets. In-class presentation of student papers.

3-4 units, alternate years, not given this year

GES 223. Planetary Systems: Atmospheres, Surfaces, and Interiors
Focus is on physical processes, such as radiation transport, atmospheric dynamics, thermal convection, and volcanism, shaping the interiors, surfaces, and atmospheres of the major planets in the solar system. How these processes manifest themselves under various conditions in the solar system. Case study of the surface and atmosphere of Mars. Application of comparative planetary science to extrasolar planets and brown dwarfs. In-class presentation of student papers.

3 units, by arrangement

GES 224. Modeling Transport and Transformations in the Environment
An introduction to geochemical and reactive transport modeling using Geochemist¿s Workbench and other appropriate models. Students required to participate in a weekend-long short course at the beginning of the quarter. Throughout the quarter the students will use the principles and tools presented in the class to develop and analyze an environmental problem as part of a simulated consulting exercise. Topics covered include contaminant transport, mineral dissolution/precipitation and aquifer microbiology. Prerequisites: Either EESS 221 (CEE 260C) or EESS 220 (CEE 260A) and either GES 90, 170, or 171, or permission from instructors.

2-3 units, Aut (Maher, K; Bethke, C)

GES 237. Surface and Near-Surface Hydrologic Response
(Same as CEE 260B) Quantitative review of process-based hydrology and geomorphology. Introduction to finite-difference and finite-element methods of numerical analysis. Topics: biometeorology, unsaturated and saturated subsurface fluid flow, overland and open channel flow, and physically-based simulation of coupled surface and near-surface hydrologic response. Links hydrogeology, soil physics, and surface water hydrology.

3 units, alternate years, not given this year

GES 238. Soil Physics
Physical properties of the soil solid phase emphasizing the transport, retention, and transformation of water, heat, gases, and solutes in the unsaturated subsurface. Field experiments.

3 units, Aut (Loague, K)

GES 240. Geostatistics for Spatial Phenomena
(Same as ENERGY 240) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Multiple-point geostatistics and training image-based stochastic imaging of reservoir/field heterogeneities. Introduction to GSLIB and SGEMS software. Case studies from the oil and mining industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, STATS 116, GES 161, or equivalent.

3-4 units, Spr (Staff)

GES 246. Reservoir Characterization and Flow Modeling with Outcrop Data
(Same as ENERGY 146, ENERGY 246) Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip.

3 units, Aut (Graham, S; Tchelepi, H; Boucher, A; Stright, L; Kuralkhanov, D)

GES 249. Petroleum Geochemistry in Environmental and Earth Science
How molecular fossils in crude oils, oil spills, refinery products, and human artifacts identify their age, origin, and environment of formation. The origin and habitat of petroleum, technology for its analysis, and parameters for interpretation, including: origins of molecular fossils; function, biosynthesis, and precursors; tectonic history related to the evolution of life, mass extinctions, and molecular fossils; petroleum refinery processes and the kinds of molecular fossils that survive; environmental pollution from natural and anthropogenic sources including how to identify genetic relationships among crude oil or oil spill samples; applications of molecular fossils to archaeology; worldwide petroleum systems through geologic time.

3 units, alternate years, not given this year

GES 250. Sedimentation Mechanics
The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures as applied to interpreting ancient rock sequences. Dimensional analysis, fluid flow, drag, boundary layers, open channel flow, particle settling, erosion, sediment transport, sediment gravity flows, soft sediment deformation, and fluid escape. Field trip required.

4 units, alternate years, not given this year

GES 251. Sedimentary Basins
Analysis of the depositional framework and tectonic evolution of sedimentary basins. Topics: tectonic and environmental controls on facies relations, synthesis of basin development through time in terms of depositional systems and tectonic settings. Weekend field trip required. Prerequisites: 110, 151.

3 units, alternate years, not given this year

GES 252. Sedimentary Petrography
Siliciclastic sediments and sedimentary rocks. Research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, tectonic settings, and diagenetic histories. Topics vary yearly. Prerequisite: 151 or equivalent.

4 units, Aut (Lowe, D)

GES 253. Petroleum Geology and Exploration
The origin and occurrence of hydrocarbons. Topics: thermal maturation history in hydrocarbon generation, significance of sedimentary and tectonic structural setting, principles of accumulation, and exploration techniques. Prerequisites: 110, 151. Recommended: GEOPHYS 223.

3 units, Spr (Graham, S)

GES 254. Carbonate Sedimentology
Processes of precipitation and sedimentation of carbonate minerals with emphasis on marine systems. Topics include: geographic and bathymetric distribution of carbonates in modern and ancient oceans; genesis and environmental significance of carbonate grains and sedimentary textures; carbonate rocks and sediments as sources of geochemical proxy data; carbonate diagenesis; changes in styles of carbonate deposition through Earth history; carbonate depositional patterns and the global carbon cycle. Lab exercises emphasize petrographic and geochemical analysis of carbonate rocks including map and outcrop scale, hand samples, polished slabs, and thin sections.

3-4 units, alternate years, not given this year

GES 255. Basin and Petroleum System Modeling
For advanced undergraduates or graduate students. Students use stratigraphy, subsurface maps, and basic well log, lithologic, paleontologic, and geochemical data to construct 1-D, 2-D, and 3-D models of petroleum systems that predict the extent of source-rock thermal maturity, petroleum migration paths, and the volumes and compositions of accumulations through time (4-D). Recent software such as PetroMod designed to reconstruct basin geohistory. Recommended: 251 or 253.

3 units, Aut (Peters, K)

GES 256. Quantitative Methods in Paleobiology
Introduction to statistical methods relevant to the analysis of paleobiological data. Methods include principles of inference, linear and logistic regression, principal components analysis, time-series, and re-sampling methods. Paleobiological problems include assessment of spatial and temporal patterns in biodiversity, selectivity of extinction and origination, and evolutionary trends. Readings, examples, and problems from the primary literature. Term paper. Prerequisite: Previous course in paleobiology or permission of the instructor.

3 units, given occasionally

GES 257. Clastic Sequence Stratigraphy
Sequence stratigraphy facilitates integration of all sources of geologic data, including seismic, log, core, and paleontological, into a

time-stratigraphic model of sediment architecture. Tools applicable to regional and field scales. Emphasis is on practical applications and integration of seismic and well data to exploration and field reservoir problems. Examples from industry data; hands-on exercises.

3 units, Spr (McHargue, T)

GES 258. Introduction to Depositional Systems
The characteristics of the major sedimentary environments and their deposits in the geologic record, including alluvial fans, braided and meandering rivers, aeolian systems, deltas, open coasts, barred coasts, marine shelves, and deep-water systems. Emphasis is on subdivisions; morphology; the dynamics of modern systems; and the architectural organization and sedimentary structures, textures, and biological components of ancient deposits.

3 units, not given this year

GES 259. Stratigraphic Architecture
The stratigraphic architecture of deposits associated with a spectrum of depositional environments, using outcrop and subsurface data. Participants read and discuss selected literature.

1 unit, Aut (McHargue, T)

GES 260. Laboratory Methods in Organic Geochemistry
Knowledge of components in geochemical mixtures to understand geological and environmental samples. The presence and relative abundance of these compounds provides information on the biological source, depositional environment, burial history, biodegradation, and toxicity of organic materials. Laboratory methods to detect and quantify components of these mixtures. Methods for separation and analysis of organic compounds in geologic samples: extraction, liquid chromatography, absorption by zeolites, gas chromatography and gas chromatography-mass spectrometry. Student samples considered as material for analysis. Prerequisite: GES 249 or consent of instructor.

2-3 units, not given this year

GES 261. Physics and Chemistry of Minerals and Mineral Surfaces
The concepts of symmetry and periodicity in crystals; the physical properties of crystals and their relationship to atomic-level structure; basic structure types; crystal chemistry and bonding in solids and their relative stability; the interaction of x-rays with solids and liquids (scattering and spectroscopy); structural variations in silicate glasses and liquids; UV-visible spectroscopy and the color of minerals; review of the mineralogy, crystal chemistry, and structures of selected rock-forming silicates and oxides; mineral surface and interface geochemistry.

4 units, alternate years, not given this year

GES 262. Thermodynamics and Disorder in Minerals and Melts
The thermodynamic properties of crystalline, glassy, and molten silicates and oxides in light of microscopic information about short range structure and ordering. Measurements of bulk properties such as enthalpy, density, and their pressure and temperature derivatives, and structural determination by spectroscopies such as nuclear magnetic resonance and Mössbauer. Basic formulations for configurational entropy, heats of mixing in solid solutions, activities; and the energetics of exsolution, phase transitions, and nucleation. Quantitative models of silicate melt thermodynamics are related to atomic-scale views of structure. A general view of geothermometry and geobarometry. Prerequisites: introductory mineralogy and thermodynamics.

3 units, Spr (Stebbins, J)

GES 263. Introduction to Isotope Geochemistry
(Same as GES 163) Stable, cosmogenic, and radiogenic isotopes; processes that govern isotopic variations. Application of isotopes to geologic, biologic, and hydrologic questions. Major isotopic systems and their applications. Simple modeling techniques used in isotope geochemistry.

3 units, alternate years, not given this year

GES 264. Mathematical Modeling in Biogeochemistry
The basics of translating a conceptual model into a numerical model is presented. Emphasis on building models, box modeling, methods of solving models. Lab exercises draw from examples in biogeochemistry, including modeling global biogeochemical cycles, sediment biogeochemistry, and microbial processes.

3 units, Win (Meyer, K)

GES 267. Solution-Mineral Equilibria: Theory
Procedures for calculating and evaluating the thermodynamic properties of reversible and irreversible reactions among rock-forming minerals and aqueous solutions in geologic systems. Emphasis is on the generation and utility of phase diagrams depicting solution-mineral interaction relevant to phase relations associated with weathering diagenetic, hydrothermal, and metamorphic processes, and the prediction of temperature, pressure, and the chemical potential of thermodynamic components compatible with observed mineralogic phase relations in geologic outcrops. Individual research topics. Prerequisite: 171.

3 units, given occasionally

GES 273. Isotope Geochemistry Seminar
Current topics including new analytical techniques, advances in isotopic measurements, and new isotopic approaches and systems.

1-3 units, Win (Maher, K)

GES 275. Electron Probe Microanalytical Techniques
The practical and theoretical aspects of x-ray generation and detection, and the behavior of electron beams and x-rays in solids. The basic principles needed to quantitatively analyze chemically complex geological materials. Operation of the JEOL 733 electron microprobe and associated computer software for quantitatively analyzing materials. X-ray chemical mapping. Enrollment limited to 8.

2-3 units, Win (Jones, R)

GES 277. Flood Basalts and Mass Extinctions
Recent work in geochronology and paleobiology supports the temporal coincidence of the eruption of continental flood basalts with mass extinction in the marine and terrestrial realms. The mechanisms and timescale of flood basalt eruptions, their likely environmental and biological consequences, and the evidence for flood basalt eruptions as the triggers of many mass extinction events. Sources include recent primary literature.

3 units, given occasionally

GES 282. Interpretative Methods in Detrital Geochronology
Over the past decade, the number of studies that make use of isotopic provenance data has sky-rocketed. This type of data is now routinely used throughout the geosciences to solve a broad range of geologic problems. This seminar examines the state-of-the-art of existing interpretative methods for detrital geo/thermochronology data in provenance studies and critically examines their strengths and weaknesses. While this course will touch upon sampling approaches analytical aspects of data collection, focus is primarily upon data interpretation.

1-5 units, Spr (Grove, M)

GES 283. Thermochronology and Crustal Evolution
Thermochronology analyzes the competition between radioactive in-growth and temperature-dependant loss of radiogenic isotopes within radioactive mineral hosts in terms of temperature-time history. Coupled with quantitative understanding of kinetic phenomena and crustal- or landscape-scale interpretational models, thermochronology provides an important source of data for the Earth Sciences, notably tectonics, geomorphology, and petrogenesis. The underpinning concepts and key developments in thermochronology, focusing upon analytical and interpretative innovations developed over the past decade.

4 units, Spr (Grove, M)

GES 284. Field Seminar on Eastern Sierran Volcanism
For graduate students in the earth sciences and archaeology. Four-day trip over Memorial Day weekend to study silicic and mafic volcanism associated with the western margin of the Basin and Range province: basaltic lavas and cinder cones erupted along normal faults bounding Owens Valley, Long Valley caldera, post-caldera rhyolite lavas, hydrothermal alteration and hot springs, Holocene rhyolite lavas of the Inyo and Mono craters, volcanism of the Mono Basin with subaqueous basaltic eruptions, floating pumice blocks, and cryptodomes punching up lake sediments. If snow-level permits, silicic volcanism associated with the Bodie gold district. Prerequisite: 1.

1 unit, Spr (Mahood, G)

GES 285. Igneous Petrogenesis
Radiogenic isotopes, stable isotopes, and trace elements applied to igneous processes; interaction of magmas with mantle and crust; convergent-margin magmatism; magmatism in extensional terrains; origins of rhyolites; residence times of magmas and magma

chamber processes; granites as imperfect mirrors of their source regions; trace element modeling of igneous processes; trace element discriminant diagrams in tectonic analysis; phase equilibria of partial melting of mantle and crust; geothermometry and geobarometry. Topics emphasize student interest. Prerequisite: 180 or equivalent.

4 units, alternate years, not given this year

GES 290. Departmental Seminar in Geological and Environmental Sciences

Current research topics. Presentations by guest speakers from Stanford and elsewhere. May be repeated for credit.

1 unit, Win (Maher, K; Mao, W), Spr (Maher, K; Mao, W)

GES 291. GES Field Trips

Field trips for teaching and research purposes. Trips average 5-10 days. Prerequisite: consent of instructor.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 292. Directed Reading with Geological and Environmental Sciences Faculty

May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 299. Field Research

Two-three week field research projects. Written report required. May be repeated three times.

2-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 310. Climate Change, Climate Variability, and Landscape Development

The impact of long-term climate change on erosional processes and the evolution of Cenozoic landscapes. Climate data that highlight recurring climate variability on inter-annual to decadal timescales. The behavior of climate on multi-decadal to tectonic timescales over which significant changes in topography take place. The effects of climate change and variability on landscape development, sedimentary environments, and the deposits of these events. May be repeated for credit.

1 unit, not given this year

GES 315. Literature of Structural Geology

Classic studies and current journal articles. May be repeated for credit.

1 unit, Aut (Pollard, D), Win (Staff)

GES 328. Seminar in Paleobiology

For graduate students. Current research topics including paleobotany, vertebrate and invertebrate evolution, paleoecology, and major events in the history of life on Earth.

1 unit, Spr (Payne, J)

GES 336. Stanford Alpine Project Seminar

Seminar on the geology of the Himalaya, Tibetan plateau, and India. Weekly student presentations on continental collision tectonics, structure, petrology, geomorphology, culture, and other topics of interest. Students create a guidebook of geologic stops in advance of field trip to northwestern India in summer 2011. May be repeated for credit.

1 unit, Aut (Hilley, G), Win (Staff), Spr (Staff)

GES 355. Advanced Stratigraphy Seminar and Field Course

Student-led presentations; poster-sized display on assigned topic; field trip.

1-3 units, given occasionally

GES 381. Igneous Petrology and Petrogenesis Seminar

Topics vary by quarter. May be repeated for credit.

1-2 units, given occasionally

GES 384. Volcanology Seminar

Specialized and advanced topics vary by offering. May be repeated for credit.

1-2 units, given occasionally

GES 385. Practical Experience in the Geosciences

On-the-job training in the geosciences. May include summer internship; emphasizes training in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets USCIS requirements for F-1 curricular practical training. (Staff)

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 399. Advanced Projects

Graduate research projects that lead to reports, papers, or other products during the quarter taken. On registration, students designate faculty member and agreed-upon units.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 400. Graduate Research

Faculty supervision. On registration, students designate faculty member and agreed-upon units.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GES 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYSICS (GEOPHYS) COURSES

UNDERGRADUATE COURSES IN GEOPHYSICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GEOPHYS 25. Hands-on Introduction to Astrobiology

Are human beings alone; are microbes common in the universe? Historical development and modern status of topics such as: the vastness of space and time; star evolution; planetary climate; effects of geological processes and asteroid impacts on life; other habitable places in the solar system with updates on Mars; the Earth as a biological organism; maintenance of society for a geologically long time; and the search for intelligent extraterrestrials. Outdoor lab exercises designed to work in K-12 science classes. Non-science majors welcome.

3 units, Aut (Sleep, N)

GEOPHYS 60N. Man versus Nature: Coping with Disasters Using Space Technology

(Stanford Introductory Seminar) (Same as EE 60N) Stanford Introductory Seminar. Preference to freshman. Natural hazards, such as earthquakes, volcanoes, floods, hurricanes, and fires, affect the lives of thousands of people worldwide everyday. Over the past twenty years developments in spaceborne imaging technology have made it possible to monitor and respond to such disasters much more rapidly than in the past, saving lives and money. Additionally, greater understanding of the physical processes involved allows us to anticipate and plan for mitigation of the consequences of the disasters. In this course we will explore these new tools, how they are applied to natural disasters, and learn how the remotely-sensed data are manipulated and analyzed. The technical material consists of a summary of basic geophysical properties of the Earth, their physical characteristics that can be sensed remotely, and the design of satellite systems to measure these phenomena and predict/mitigate natural hazards. GER:DB-EngrAppSci

4 units, Aut (Zebker, H)

GEOPHYS 100. Directed Reading

(Staff)

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 104. The Water Course

(Same as EARTHSYS 104) The pathway that water takes from rainfall to the tap using student home towns as an example. How the geological environment controls the quantity and quality of water; taste tests of water from around the world. Current U.S. and world water supply issues. GER:DB-NatSci

3 units, not given this year

GEOPHYS 110. Earth on the Edge

Introduction to the foundations of contemporary geophysics. Topics drawn from four broad themes in: whole Earth geodynamics, geohazards, natural resources, and environment/sustainability. In each case the focus is on how the interpretation of a variety of geophysical measurements (e.g., gravity, seismology, heat flow, magnetism, electromagnetics, and geodesy) can be used to provide fundamental insight into the behavior of the Earth's complex geo-

systems. Prerequisite: CME 100 or MATH 51, or co-registration in either.

3 units, Win (Beroza, G)

GEOPHYS 112. Exploring Geosciences with MATLAB

How to use MATLAB as a tool for research and technical computing, including 2-D and 3-D visualization features, numerical capabilities, and toolboxes. Practical skills in areas such as data analysis, regressions, optimization, spectral analysis, differential equations, image analysis, computational statistics, and Monte Carlo simulations. Emphasis is on scientific and engineering applications.

1-3 units, Aut (Mukerji, T)

GEOPHYS 112. Exploring Geosciences with MATLAB

How to use MATLAB as a tool for research and technical computing, including 2-D and 3-D visualization features, numerical capabilities, and toolboxes. Practical skills in areas such as data analysis, regressions, optimization, spectral analysis, differential equations, image analysis, computational statistics, and Monte Carlo simulations. Emphasis is on scientific and engineering applications.

1-3 units, Aut (Mukerji, T)

GEOPHYS 113. Earthquakes and Volcanoes

(Same as EARTHSYS 113) Earthquake location, magnitude and intensity scales, seismic waves, styles of eruptions and volcanic hazards, tsunami waves, types and global distribution of volcanoes, volcano forecasting. Plate tectonics as a framework for understanding earthquake and volcanic processes. Forecasting; earthquake resistant design; building codes; and probabilistic hazard assessment. For non-majors and potential earth scientists. GER:DB-EngrAppSci

3 units, Win (Segall, P)

GEOPHYS 120. Ice, Water, Fire

Introductory application of continuum mechanics to natural phenomena, including deformation of ice sheets and glaciers, volcanoes, water waves, and fluid flow in porous media. Emphasis on underlying physical processes and mathematical description using balance of mass, momentum, and energy, combined with constitutive equations for fluids and solids. Prerequisites: CME 102 or MATH 53 and PHYSICS 45.

3 units, Win (Dunham, E)

GEOPHYS 130. Introductory Seismology

Introduction to seismology including: elasticity and the wave equation, P, S, and surface waves, dispersion, ray theory, reflection and transmission of seismic waves, seismic imaging, large-scale Earth structure, earthquake location, earthquake statistics and forecasting, magnitude scales, seismic source theory. (Beroza, G)

3 units, not given this year

GEOPHYS 140. The Earth From Space: Introduction to Remote Sensing

(Same as EE 140) Global change science as viewed using space remote sensing technology. Global warming, ozone depletion, the hydrologic and carbon cycles, topographic mapping, and surface deformation. Physical concepts in remote sensing. EM waves and geophysical information. Sensors studied: optical, near and thermal IR, active and passive microwave. GER:DB-EngrAppSci

3 units, not given this year

GEOPHYS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

(Same as EARTHSYS 146A, EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 246A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

3 units, Win (Thomas, L; Diffenbaugh, N)

GEOPHYS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation

(Same as EARTHSYS 146B, EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 246B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.

3 units, Spr (Thomas, L; Diffenbaugh, N)

GEOPHYS 150. Our Dynamic Earth

In this course we cover the dynamic forces acting upon the Earth. We will investigate how geophysical forces effect the bending of tectonic plates, the flow of heat, sea level topography, the breaking point of rocks, porous flow, and how faults store and release energy. Math 52 or CME 102, GP 107 or permission from instructor. More detailed course description to come. GER:DB-NatSci

3 units, Spr (Lawrence, J)

GEOPHYS 160. Introduction to SES Computing (ISESC)

For beginning undergraduates and graduate students in the School of Earth Sciences. Computer concepts. What are computers and networks, and how do they work? Web page authoring. Introduction to scientific programming. Free computing tools for plotting data. Computer resources available to students in the school. An online repository of source codes useful for and developed by SES students, faculty, and staff. Specialists from around the school provide practical instruction and concrete examples of how to achieve basic computing needs. 2 units requires a class project: code development to be uploaded to the course's code repository.

2-3 units, Aut (Lawrence, J)

GEOPHYS 162. Laboratory Methods in Geophysics

Lab. Types of equipment used in experimental rock physics. Principles and measurements of geophysical properties such as porosity, permeability, acoustic wave velocity, and resistivity through lectures and laboratory experiments. Training in analytical project writing skills and understanding errors for assessing accuracy and variability of measured data. Students may investigate a scientific problem to support their own research.

2-3 units, Win (Vanorio, T)

GEOPHYS 170. Global Tectonics

The architecture of the Earth's crust; regional assembling of structural or deformational features and their relationship, origin and evolution. The plate-tectonic cycle: rifting, passive margins, seafloor spreading, subduction zones, and collisions. Case studies.

3 units, Aut (Cruz, L)

GEOPHYS 171. Tectonics Field Trip

Long weekend field trip to examine large-scale features in the crust. Destinations may include the San Andreas fault, Mendocino Triple Junction, Sierra Nevada, and western Basin and Range province.

3 units, Spr (Staff)

GEOPHYS 181. Fluids and Flow in the Earth: Computational Methods

(Same as GEOPHYS 200) Interdisciplinary problems involving the state and movement of fluids in crustal systems, and computational methods to model these processes. Examples of processes include: nonlinear, time-dependent flow in porous rocks; coupling in porous rocks between fluid flow, stress, deformation, and heat and chemical transport; percolation of partial melt; diagenetic processes; pressure solution and the formation of stylolites; and transient pore pressure in fault zones. MATLAB, Lattice-Boltzmann, and COMSOL Multiphysics. Term project. No experience with COMSOL Multiphysics required.

3 units, Win (Mukerji, T)

GEOPHYS 182. Reflection Seismology

(Same as GEOPHYS 222) The principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration. (Klemperer, S) GER:DB-NatSci

3 units, alternate years, not given this year

GEOPHYS 183. Reflection Seismology Interpretation
(Same as GEOPHYS 223) The structural and stratigraphic interpretation of seismic reflection data, emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Lectures only, 1 unit. Prerequisite: 222, or consent of instructor.

1-4 units, alternate years, not given this year

GEOPHYS 184. Journey to the Center of the Earth
(Same as GES 107) The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution.

3 units, alternate years, not given this year

GEOPHYS 185. Rock Physics for Reservoir Characterization
(Same as GEOPHYS 260) How to integrate well log and laboratory data to determine and theoretically generalize rock physics transforms between sediment wave properties (acoustic and elastic impendence), bulk properties (porosity, lithology, texture, permeability), and pore fluid conditions (pore fluid and pore pressure). These transforms are used in seismic interpretation for reservoir properties, and seismic forward modeling in what-if scenarios. (Dvorkin, J)

3 units, alternate years, not given this year

GEOPHYS 186. Tectonophysics
(Same as GEOPHYS 290) The physics of faulting and plate tectonics. Topics: plate driving forces, lithospheric rheology, crustal faulting, and the state of stress in the lithosphere. Exercises: lithospheric temperature and strength profiles, calculation of seismic strain from summation of earthquake moment tensors, slip on faults in 3D, and stress triggering and inversion of stress from earthquake focal mechanisms.

3 units, Win (Zoback, M)

GEOPHYS 187. Environmental Soundings Image Estimation
(Same as GEOPHYS 211) Imaging principles exemplified by means of imaging geophysical data of various uncomplicated types (bathymetry, altimetry, velocity, reflectivity). Adjoints, back projection, conjugate-gradient inversion, preconditioning, multidimensional autoregression and spectral factorization, the helical coordinate, and object-based programming. Common recurring issues such as limited aperture, missing data, signal/noise segregation, and nonstationary spectra. See http://sep.stanford.edu/sep/prof/.

3 units, Aut (Claerbout, J)

GEOPHYS 190. Near Surface Geophysics
Applications of geophysical methods for imaging and characterizing the top 100 meters of Earth. The link between the measured properties of rocks, soils, and sediments, and their material properties. Forward modeling and inversion of geophysical data sets. Each week includes two hours of lectures; plus one three-hour lab that involves acquisition of data at campus and near-by sites, or computer modeling of data. Pre-requisite: CME 100 or Math 51, or co-registration in either. GER:DB-EngrAppSci

3 units, Spr (Knight, R), alternate years, not given next year

GEOPHYS 196. Undergraduate Research in Geophysics
Field-, lab-, or computer-based. Faculty supervision. Written reports.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 197. Senior Thesis in Geophysics
For seniors writing a thesis based on research in 196 or as a summer research fellow.

3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 197. Undergraduate Research in Geophysics
Field-, lab-, or computer-based. Faculty supervision. Written reports.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 199. Senior Seminar: Issues in Earth Sciences
Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review. For 2010-11, enroll in GES 150.

3 units, Aut (Staff)

GRADUATE COURSES IN GEOPHYSICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GEOPHYS 198. Honors Program
Experimental, observational, or theoretical honors project and thesis in geophysics under supervision of a faculty member. Students who elect to do an honors thesis should begin planning it no later than Winter Quarter of the junior year. Prerequisites: department approval.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 200. Fluids and Flow in the Earth: Computational Methods
(Same as GEOPHYS 181) Interdisciplinary problems involving the state and movement of fluids in crustal systems, and computational methods to model these processes. Examples of processes include: nonlinear, time-dependent flow in porous rocks; coupling in porous rocks between fluid flow, stress, deformation, and heat and chemical transport; percolation of partial melt; diagenetic processes; pressure solution and the formation of stylolites; and transient pore pressure in fault zones. MATLAB, Lattice-Boltzmann, and COMSOL Multiphysics. Term project. No experience with COMSOL Multiphysics required.

3 units, Win (Mukerji, T)

GEOPHYS 201. Frontiers of Geophysical Research at Stanford: Faculty Lectures
Required for new students entering the department. Second-year and other graduate students may attend either for credit or as auditors. Department faculty and senior research staff introduce the frontiers of research problems and methods being employed or developed in the department and unique to department faculty and students: what the current research is, why the research is important, what methodologies and technologies are being used, and what the potential impact of the results might be.

1 unit, Aut (Beroza, G)

GEOPHYS 202. Reservoir Geomechanics
Basic principles of rock mechanics and the state of stress and pore pressure in sedimentary basins related to exploitation of hydrocarbon and geothermal reservoirs. Mechanisms of hydrocarbon migration, exploitation of fractured reservoirs, reservoir compaction and subsidence, hydraulic fracturing, utilization of directional and horizontal drilling to optimize well stability.

3 units, alternate years, not given this year

GEOPHYS 210. Basic Earth Imaging
Echo seismogram recording geometry, head waves, moveout, velocity estimation, making images of complex shaped reflectors, migration by Fourier and integral methods. Anti-aliasing. Dip moveout. Computer labs. See http://sep.stanford.edu/sep/prof/.

3-4 units, Aut (Claerbout, J; Clapp, R)

GEOPHYS 211. Environmental Soundings Image Estimation
(Same as GEOPHYS 187) Imaging principles exemplified by means of imaging geophysical data of various uncomplicated types (bathymetry, altimetry, velocity, reflectivity). Adjoints, back projection, conjugate-gradient inversion, preconditioning, multidimensional autoregression and spectral factorization, the helical coordinate, and object-based programming. Common recurring issues such as limited aperture, missing data, signal/noise segregation, and nonstationary spectra. See http://sep.stanford.edu/sep/prof/.

3 units, Aut (Claerbout, J)

GEOPHYS 222. Reflection Seismology
(Same as GEOPHYS 182) The principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration. (Klemperer, S)

3 units, alternate years, not given this year

GEOPHYS 223. Reflection Seismology Interpretation
(Same as GEOPHYS 183) The structural and stratigraphic interpretation of seismic reflection data, emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Lectures only, 1 unit. Prerequisite: 222, or consent of instructor.

1-4 units, alternate years, not given this year

GEOPHYS 224. Seismic Reflection Processing
(Formerly 184.) Workshop in computer processing of seismic reflection data. Students individually process a commercial seismic reflection profile from field tapes to migrated stack, using interactive software on a workstation. Prerequisite: consent of instructor.
2 units, Win (Klemperer, S)

GEOPHYS 240. Crosswell Seismic Profiling
Seismic imaging between boreholes for applications to subsurface characterization, reservoir imaging, and reservoir monitoring. Topics include data acquisition, data analysis, data processing and imaging. Inversion models for transmitted, reflected, and diffracted waves for imaging velocity, attenuation, and anisotropy in heterogeneous media. Use of field datasets and field applications. Prerequisites: 160 or equivalent; familiarity with Matlab or other programming language.
3 units, alternate years, not given this year

GEOPHYS 241A. Seismic Reservoir Characterization
(Same as ENERGY 141, ENERGY 241) (Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112
3-4 units, Spr (Mukerji, T; Jia, B)

GEOPHYS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation
(Same as EARTHSYS 146A, EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 146A) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.
3 units, Win (Thomas, L; Diffenbaugh, N)

GEOPHYS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation
(Same as EARTHSYS 146B, EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 146B) Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. Structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic circumpolar current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A/246A or CEE 164/262D or consent of instructor.
3 units, Spr (Thomas, L; Diffenbaugh, N)

GEOPHYS 251A. Structural Geology and Rock Mechanics
(Same as CEE 297G, GES 215A) Quantitative field and laboratory data integrated with solutions to initial and boundary-value problems of continuum mechanics introduce tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent.
3-5 units, Aut (Pollard, D)

GEOPHYS 251B. Structural Geology and Rock Mechanics
(Same as CEE 297H, GES 215B) Field equations for elastic solids and viscous fluids derived from conservation laws to develop mechanical models for tectonic processes and their structural products. Topics include: conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding, model development, and methodology. Models constructed and solutions visualized using MATLAB. Prerequisite: GES 215A.
3-5 units, Win (Staff)

GEOPHYS 255. Report on Energy Industry Training
On-the-job-training for master's and doctoral degree students under the guidance of on-site supervisors. Students submit a report detailing work activities, problems, assignment, and key results. May be repeated for credit. Prerequisite: written consent of adviser.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 257. Introduction to Computational Earth Sciences
Techniques for mapping numerically intensive algorithms to modern high performance computers such as the Center for Computational Earth and Environmental Science¿s (CEES) high productivity technical computing (HPTC). Topics include: debugging, performance analysis, and concepts of parallel programming; efficient serial and parallel programs; OpenMP; and MPI. Exercises using SMP and cluster computers. See http://pangea.stanford.edu/research/cees/. Recommended: familiarity with MATLAB, C, or Fortran. May be repeated for credit.
2-4 units, Win (Staff), alternate years, not given next year

GEOPHYS 258. Scientific Data Processing
(Same as EE 257) Assimilation, processing, and modeling of large observational data sets. Solution of scientific and engineering problems, especially those requiring large amounts of data. Inverse methods and transform domain analysis for indirect measurements, implemented on digital computers using scientific languages. Large-scale computing, including hardware architectures, input/output and data bus bandwidth, programming efficiency, parallel programming techniques. Student projects involve analyzing real data by implementing an observational system such as tomography for medical and Earth observation uses, radar and matched filtering, multispectral/multitemporal studies, or migration processing. Prequisites: Programming with high level language
3-4 units, Win (Zebker, H)

GEOPHYS 260. Rock Physics for Reservoir Characterization
(Same as GEOPHYS 185) How to integrate well log and laboratory data to determine and theoretically generalize rock physics transforms between sediment wave properties (acoustic and elastic impendence), bulk properties (porosity, lithology, texture, permeability), and pore fluid conditions (pore fluid and pore pressure). These transforms are used in seismic interpretation for reservoir properties, and seismic forward modeling in what-if scenarios. (Dvorkin, J)
3 units, alternate years, not given this year

GEOPHYS 262. Rock Physics
Properties of and processes in rocks as related to geophysical exploration, crustal studies, and tectonic processes. Emphasis is on wave velocities and attenuation, hydraulic permeability, and electrical resistivity in rocks. Application to in situ problems, using lab data and theoretical results.
3 units, Aut (Mavko, G)

GEOPHYS 265. Imaging Radar and Applications
(Same as EE 355) Radar remote sensing, radar image characteristics, viewing geometry, range coding, synthetic aperture processing, correlation, range migration, range/Doppler algorithms, wave domain algorithms, polar algorithm, polarimetric processing, interferometric measurements. Applications: surfafe deformation, polarimetry and target discrimination, topographic mapping surface displacements, velocities of ice fields. Prerequisites: EE261
3 units, Win (Zebker, H)

GEOPHYS 270. Electromagnetic Properties of Geological Materials
Laboratory observations and theoretical modeling of the electromagnetic properties and nuclear magnetic resonance response of geological material. Relationships between these properties and water-saturated materials properties such as composition, water content, surface area, and permeability.
2-3 units, Win (Knight, R)

GEOPHYS 280. 3-D Seismic Imaging
The principles of imaging complex structures in the Earth subsurface using 3-D reflection seismology. Emphasis is on processing methodologies and algorithms, with examples of applications to field data. Topics: acquisition geometrics of land and marine 3-D seismic surveys, time vs. depth imaging, migration by Kirchhoff

methods and by wave-equation methods, migration velocity analysis, velocity model building, imaging irregularly sampled and aliased data. Computational labs involve some programming. Lab for 3 units.

2-3 units, Win (Biondi, B)

GEOPHYS 281. Geophysical Inverse Problems

Concepts of inverse theory, with application to geophysics. Inverses with discrete and continuous models, generalized matrix inverses, resolving kernels, regularization, use of prior information, singular value decomposition, nonlinear inverse problems, back-projection techniques, and linear programming. Application to seismic tomography, earthquake location, migration, and fault-slip estimation. Prerequisite: MATH 103.

3 units, Aut (Segall, P; Beroza, G)

GEOPHYS 284. Hydrogeophysics

The use of geophysical methods for imaging and characterizing the top 100 meters of Earth for hydrogeologic applications. Includes material properties, forward modeling, data acquisition, inversion, and integration with other forms of measurement. Each week includes three hours of lectures; plus one three-hour lab that involves acquisition of data at campus or near-by sites, or computer modeling of data.

3 units, Spr (Knight, R)

GEOPHYS 286. Global Seismology

How waves propagate through the whole Earth. How do body waves and surface waves behave within the Earth? What does that reveal about the Earth? How theory is applied to understand seismic observations. Prerequisites: MATH 52 or CME 102, GEOPHYS 130, or consent of instructor.

3 units, Win (Lawrence, J)

GEOPHYS 287. Earthquake Seismology

Theorems in elastodynamics, Green's functions, attenuation, wave propagation in layered media, ray theory, seismic moment tensors, finite-source effects, kinematics and dynamics of earthquakes, and engineering aspects of seismology.

3 units, Spr (Dunham, E)

GEOPHYS 288A. Crustal Deformation

Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Deformation, stress, and conservation laws. Dislocation models of strike slip and dip slip faults, in 2 and 3 dimensions. Crack models, including boundary element methods. Dislocations in layered and elastically heterogeneous earth models. Models of volcano deformation, including sills, dikes, and magma chambers.

3-5 units, alternate years, not given this year

GEOPHYS 288B. Crustal Deformation

Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Viscoelasticity, post-seismic rebound, and viscoelastic magma chambers. Effects of surface topography and earth curvature on surface deformation. Gravity changes induced by deformation and elastogravitational coupling. Poro-elasticity, coupled fluid flow and deformation. Earthquake nucleation and rate-state friction. Models of earthquake cycle at plate boundaries.

3-5 units, alternate years, not given this year

GEOPHYS 289. Global Positioning System in Earth Sciences

The basics of GPS, emphasizing monitoring crustal deformation with a precision of millimeters over baselines tens to thousands of kilometers long. Applications: mapping with GIS systems, airborne gravity and magnetic surveys, marine seismic and geophysical studies, mapping atmospheric temperature and water content, measuring contemporary plate motions, and deformation associated with active faulting and volcanism.

3-5 units, alternate years, not given this year

GEOPHYS 290. Tectonophysics

(Same as GEOPHYS 186) The physics of faulting and plate tectonics. Topics: plate driving forces, lithospheric rheology, crustal faulting, and the state of stress in the lithosphere. Exercises: lithospheric temperature and strength profiles, calculation of seismic strain from summation of earthquake moment tensors, slip on faults in 3D, and stress triggering and inversion of stress from earthquake focal mechanisms.

3 units, Win (Zoback, M)

GEOPHYS 385A. Reflection Seismology

Research in reflection seismology and petroleum prospecting. May be repeated for credit.

1-5 units, Aut (Biondi, B; Clapp, R), Win (Biondi, B; Clapp, R), Spr (Biondi, B; Clapp, R), Sum (Biondi, B; Clapp, R)

GEOPHYS 385B. Environmental Geophysics

Research on the use of geophysical methods for near-surface environmental problems. May be repeated for credit.

1-5 units, Aut (Knight, R), Win (Knight, R), Spr (Knight, R), Sum (Knight, R)

GEOPHYS 385D. Theoretical Geophysics

Research on physics and mechanics of earthquakes, volcanoes, ice sheets, and glaciers. Emphasis is on developing theoretical understanding of processes governing natural phenomena.

1-5 units, Aut (Dunham, E), Win (Dunham, E), Spr (Dunham, E), Sum (Dunham, E)

GEOPHYS 385E. Tectonics

Research on the origin, major structures, and tectonic processes of the Earth's crust. Emphasis is on use of deep seismic reflection and refraction data. May be repeated for credit.

1-5 units, Aut (Klemperer, S; Sleep, N), Win (Klemperer, S; Sleep, N), Spr (Klemperer, S; Sleep, N), Sum (Klemperer, S; Sleep, N)

GEOPHYS 385J. Global Seismic Techniques, Theory, and Application

Topics chosen from surface wave dispersion measurement, 1D inversion techniques, regional tomographic inversion, receiver functions, ray theory in spherical geometry, seismic attenuation, seismic anisotropy, seismic focusing, reflected phases, stacking, and interpretations of seismic results in light of other geophysical constraints. May be repeated for credit.

1-5 units, Aut (Lawrence, J), Win (Lawrence, J), Spr (Lawrence, J), Sum (Lawrence, J)

GEOPHYS 385K. Crustal Mechanics

Research in areas of petrophysics, seismology, in situ stress, and subjects related to characterization of the physical properties of rock in situ. May be repeated for credit.

1-5 units, Aut (Zoback, M), Win (Zoback, M), Spr (Zoback, M), Sum (Zoback, M)

GEOPHYS 385L. Earthquake Seismology, Deformation, and Stress

Research on seismic source processes, crustal stress, and deformation associated with faulting and volcanism. May be repeated for credit.

1-5 units, Aut (Beroza, G; Segall, P; Zoback, M), Win (Beroza, G; Segall, P; Zoback, M), Spr (Beroza, G; Segall, P; Zoback, M), Sum (Segall, P; Beroza, G; Zoback, M)

GEOPHYS 385S. Wave Physics

Theory, numerical simulation, and experiments on seismic and electromagnetic waves in complex porous media. Applications from Earth imaging and in situ characterization of Earth properties, including subsurface monitoring. Presentations by faculty, research staff, students, and visitors. May be repeated for credit.

1-5 units, Aut (Harris, J), Win (Harris, J), Spr (Harris, J), Sum (Harris, J)

GEOPHYS 385V. Poroelasticity

Research on the mechanical properties of porous rocks: dynamic problems of seismic velocity, dispersion, and attentuation; and quasi-static problems of faulting, fluid transport, crustal deformation, and loss of porosity. Participants define, investigate, and present an original problem of their own. May be repeated for credit.

1-5 units, Aut (Mavko, G), Win (Mavko, G), Spr (Mavko, G), Sum (Mavko, G)

GEOPHYS 385Z. Radio Remote Sensing

Research applications, especially crustal deformation measurements. Recent instrumentation and system advancements. May be repeated for credit.

1-5 units, Aut (Zebker, H), Win (Zebker, H), Spr (Zebker, H), Sum (Zoback, M)

GEOPHYS 400. Research in Geophysics

1-15 units, Aut (Staff), Win (Lawrence, J), Spr (Staff), Sum (Staff)

GEOPHYS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERMAN GENERAL (GERGEN) COURSES

UNDERGRADUATE COURSES IN GERMAN GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GERGEN 38A. Introduction to Germanic Languages
(Same as GERLIT 138) The oldest attested stages of the Germanic language family, including Gothic, Old Norse, Old Saxon, Old English, Old Frisian, Old Low Franconian (Old Dutch), and Old High German. The linguistic interrelationships, prehistory, Germanic tribal groupings, and literature. GER:DB-Hum
4 units, not given this year

GERGEN 104N. Resistance Writings in Nazi Germany
(Stanford Introductory Seminar) Preference to sophomores. The letters and diaries of individuals who resisted Nazi oppression and paid with their lives. Readings include the Scholl diaries, Bonhoeffer¿s letters and his Ethics, and letter exchanges from other crucial figures. No knowledge of German required; students may read texts in original if able. GER:DB-Hum
3 units, Win (Bernhardt, E)

GERGEN 109. Music, Poetry, and Prose
The relationship between music and literature. Looking at a range of literary and musical periods, how and to what effect did writers incorporate music into their texts? Conversely, how did composers transform literary texts by setting them to music? Cultural and historical standpoints. The tension and interplay between music and text. Writers such as Luther, Schiller, Goethe, Heine, ETA Hoffmann, T. Mann, and Brecht. Composers such as Bach, Beethoven, Schubert, Schumann, Wagner, and Weill. In German.
3-4 units, Win (Staff)

GERGEN 122Q. The Culture of Pessimism in 19th- and 20th-Century Europe
(Stanford Introductory Seminar) European culture long relied on a narrative of inexorable human progress. Starting in the 19th century, this triumphalist narrative was shadowed by another tradition that rejected such trust in progress. The pessimistic tradition in Europe in literature, philosophy, the study of history, anthropology, and psychology; the distinction between pessimism in the fields of morality, culture, and intellectual life. Authors include Giacomo Leopardi, Arthur Schopenhauer, Lautréamont, T. S. Eliot, and Sigmund Freud. GER:DB-Hum
3-5 units, Spr (Daub, A)

GERGEN 129. German Cinema
(Same as GERGEN 229) History of German cinema in the Weimar Republic, Nazi era, and the immediate aftermath of WWII. German thought, political valences, and social potential as portrayed in film.
5 units, not given next year

GERGEN 141. Fables of Retreat
Modern anti-heroes who assert themselves through feats of reduction and retreat. Writers include Rousseau, Tieck, Emerson, Thoreau, Melville, Dostoevsky, and Kafka.
3-5 units, not given this year

GERGEN 148. A Brief History of Misogyny
(Same as GERGEN 248) Genealogy of philosophical misogyny in 19th- and 20th-century German thought from German idealism. Authors include Schopenhauer, Nietzsche, Weininger, and the George circle. In English. GER:DB-Hum, EC-Gender
3-5 units, not given this year

GERGEN 160. Interiors and Interiority in the 19th Century
Interiority and the interior as focal points of 19th-century Europe. Domestic space, and its political dimensions and structures of feeling in 19th-century German literature, from the romance to the detective novel. Ideology of domesticity in German music, design, architecture, visual art, and science of the period. In German. GER:DB-Hum
4 units, not given this year

GERGEN 161. Wagnerian Echos: A Cultural History from Modernism to Popular Culture
(Same as MUSIC 150G) The afterlives of mythological themes from the operas and music dramas of Richard Wagner (The Flying Dutchman, Tannhäuser, Lohengrin, Ring Cycle, Parsifal) in literature, modernist aesthetics, fascist politics, film, philosophy, and contemporary media. GER:DB-Hum
3-5 units, Spr (Daub, A; Grey, T)

GERGEN 170A. Postwar: German Culture after World War II
(Same as GERGEN 270A) How did German culture react to WW II, the Holocaust, and the exile of Germans from E. Europe? Questions of representations, political debate, and the future of Germany in Europe. German cinema, architecture, and art related to the subject. Readings include: Adorno, Grass, Habermas, Kluge, Bachmann, Jelinek, and Beyer. Recommended: German, but not required.
3-5 units, not given this year

GERGEN 170Q. Prussia: Culture and Literature
The history and culture of a country that disappeared not too long ago, but about which most tend to know very little. In 1947, the Allied Control Council dissolved Prussia in the interest of maintaining world peace and security and the restoration of political life in Germany on a democratic basis. Many of the stereotypical images of Germany and Germanness, and certainly most negative images of Germany, from the spiked helmet to the iron cross, the Red Baron and the Blitzkrieg, are bound up with Prussia, its military, and its ruling class. Prussia's militaristic culture not only brought on a series of wars, while also often being a beacon of Enlightenment and religious tolerance; it brought together Germany's most traditional backwater with its most progressive metropolis.
3-5 units, Spr (Daub, A)

GERGEN 181. Philosophy and Literature
(Same as CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENGEN 181, ITALGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum
4-5 units, Win (Anderson, L; Landy, J)

GERGEN 183. Scenarios of Dissolution in the Modern Novel
(Same as GERGEN 283) How do novels capture chaos? 20th-century novels responding to catastrophes such as: the disintegration of the Austro-Hungarian monarchy (Musil, Roth); demise of the Third Reich (Mann); chaotic forces in an oppressive order (Bulgakov); corrosion of imperial confidence through fear of barbarian invaders (Coetzee); and transformation of masses into a mob destroying the body politic from within (Krasznahorkai). GER:DB-Hum
4 units, not given this year

GERGEN 201. Conservative Revolution
(Same as COMPLIT 234) An examination of conservative critiques of modernity in the early 20th century, including topics such as German nationalism, the war experience, responses to democracy, anti-liberalism, cultural pessimism in the decline of the West, crises of authority, technology, geopolitics, existentialism, and tradition. Readings from authors such as Oswald Spengler, Thomas Mann, Carl Schmitt, Ernst Jünger, Hugo von Hofmannsthal,

Rudolf Borchardt, Karl Haushofer, Konrad Weiss. Readings in either English or German. GER:DB-Hum

3-5 units, not given this year

GERGEN 205. Technologies of the Self

Important moments in the history of the discursive and rhetorical construction of the subject. Emphasis is on tensions between uniqueness and exemplariness, chronology and repetition, narrative and archive, and aesthetics and ethics of retrospection. Works by Augustine, Teresa of Avila, Montaigne, Rousseau, Goethe, Nietzsche, Joyce, Gide, Sartre, Leiris, and Barthes. Theoretical and critical essays including by Lejeune, Starobinski, De Man, Derrida, Marin, Koerner, Foucault, and Beaujour. GER:DB-Hum

3-5 units, not given this year

GERGEN 212. The Invention of Experience

Experience viewed as a source of orientation irreducible to discursive knowledge in the 19th century. The encounter with art as the paradigm of experience; lived vs. cumulative experience; the modern crisis of experience; experiential openness and the authority conferred by experience. If it is neither pleasure nor knowledge sought in art, could it be experience? Role of Goethe in the cult of experience (Faust I, Elective Affinities). Montaigne, Hegel, Emerson, Rilke, Benjamin, Koselleck, and Gadamer. GER:DB-Hum

3-5 units, Spr (Dornbach, M)

GERGEN 221. Memory in the Modernist Novel

Preference to freshmen. The art of memory as one of the main characteristics of modernity. The relationship between memory and modernism through major narrative texts: Rainer Maria Rilke's The Notebooks of Malte Laurids Brigger; James Joyce's A Portrait of the Artist as a Young Man; and Marcel Proust's Combray.. How memory is represented in the novels, and its role in the perception of external reality. How memory helps to constitute personal identity. The metaphors used to define memory. Readings include theoretical and critical essays, and primary texts. GER:DB-Hum, DB-Hum

4 units, Spr (Douvaldzi, C)

GERGEN 221A. Modernism and the Jewish Voice in Europe

(Same as COMPLIT 247, SLAVGEN 221) Some of the most haunting literary voices of the 20th century emerged from the Jewish communities of Eastern and Central Europe. The Jewishness of the modernists is thematized, asking whether it contributed to shared attitudes toward text, history, or identity. Their works are situated in specific linguistic traditions: Yiddish, Hebrew, Russian, Polish, or German. Primary readings from Ansky, Bialik, Mandelstam, Babel, Schulz, Kafka, Celan; secondary readings in history, E. European literature, and theory, including Marx, Freud, Benjamin, and Arendt. GER:DB-Hum

3-4 units, not given this year

GERGEN 267. Freud and the Apostle Paul

(Same as GERGEN 367) Intersections between Freud's psychoanalysis of society and Paul's political theology. Emphasis is on the issues of law, love, justice, community, and language. Readings include Freud and Paul, and theoretical essays by Taubes, Badiou, Santner, Agamben, Assmann, Zizek, and Boyarin. GER:DB-Hum

3-5 units, not given this year

GRADUATE COURSES IN GERMAN GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GERGEN 200. The Arcades Project

When Walter Benjamin committed suicide while fleeing from the Nazis in 1940, he left behind a large corpus of unpublished writing, perhaps none more famous than the collection of notes, fragments, and drafts that are collectively known as the Arcades Project, which Benjamin entrusted to his friend Georges Bataille when forced to flee Paris. The Arcades Project undertakes an archaeology of the 19th century, combining literary scholarship, sociology, Marxism, mysticism, a theory of signification, and a philosophy of history. This course considers this projects in its totality, drawing on some of Benjamin's writings of the same period, and tracing some common readings and misreadings of the project's material. All readings and class discussions in English.

3-5 units, Win (Daub, A)

GERGEN 206. Narrative, Visuality, Memory

(Same as GERGEN 306) Moments in the history of the relationship between the verbal and the visual: the classical ars memoriae; the ekphrasis debates of the 18th century; the emergence of a new visuality and mnemonic art as structuring principles for modernist narrative. Authors include Plato, Aristotle, Cicero, Augustine, Winckelmann, Lessing, Diderot, Goethe, Moritz, Flaubert, Rilke, Joyce, and Proust.

3-5 units, not given this year

GERGEN 210. Nietzsche's Beginnings

The emergence of Nietzsche's main concerns from his influential critique of modern culture and his reinterpretation of Greek antiquity. Pessimism and affirmation, truth and illusion, art and science, scholarship and its limits, decadence and historicism. Focus on The Birth of Tragedy and the Untimely Meditations. In English

3-5 units, Aut (Dornbach, M)

GERGEN 229. German Cinema

(Same as GERGEN 129) History of German cinema in the Weimar Republic, Nazi era, and the immediate aftermath of WWII. German thought, political valences, and social potential as portrayed in film.

5 units, not given next year

GERGEN 230. Truth in Art

Does art disclose an ultimate truth or does it help people avoid, endure, or affirm a truth which would otherwise be hard to bear? How modern thinking about art is defined by the tension between the idea that pleasure in art is disinterested and outside striving for true knowledge or ethical orientation and the idea that art offers some kind of deeper insight into people's place in the world. How these tensions play out in Kant, Schopenhauer, Nietzsche, Heidegger, and Adorno. In English.

3-5 units, not given this year

GERGEN 248. A Brief History of Misogyny

(Same as GERGEN 148) Genealogy of philosophical misogyny in 19th- and 20th-century German thought from German idealism. Authors include Schopenhauer, Nietzsche, Weininger, and the George circle. In English.

3-5 units, not given this year

GERGEN 265. Art and Nature

The role of nature in aesthetic experience and artistic creativity; the historically changing relation between aesthetic attitudes toward nature and art. Readings in English by Winckelmann, Kant, Schelling, Hegel, and Adorno.

3-5 units, Spr (Staff)

GERGEN 270A. Postwar: German Culture after World War II

(Same as GERGEN 170A) How did German culture react to WW II, the Holocaust, and the exile of Germans from E. Europe? Questions of representations, political debate, and the future of Germany in Europe. German cinema, architecture, and art related to the subject. Readings include: Adorno, Grass, Habermas, Kluge, Bachmann, Jelinek, and Beyer. Recommended: German, but not required.

3-5 units, not given this year

GERGEN 283. Scenarios of Dissolution in the Modern Novel

(Same as GERGEN 183) How do novels capture chaos? 20th-century novels responding to catastrophes such as: the disintegration of the Austro-Hungarian monarchy (Musil, Roth); demise of the Third Reich (Mann); chaotic forces in an oppressive order (Bulgakov); corrosion of imperial confidence through fear of barbarian invaders (Coetzee); and transformation of masses into a mob destroying the body politic from within (Krasznahorkai).

4 units, not given this year

GERGEN 291A. Oedipus, Hamlet, Moses: Archetypes of the Hero

Texts that provided psychoanalysis with its foundational myths. Oedipus, Moses, and Hamlet as archetypes of the hero related to moments of emerging modernity: from mythos to logos, polytheism to monotheism, and action to thought. The interplay among knowledge, recognition, and desire; the role of sameness and alterity in the constitution of personal, familial, and national identities; and the relation between violence and the construction of history. Readings include: Exodus, Sophocles, Shakespeare, Freud, Aeschylus, Euripides, Cavafy, Hofmannsthal, and Wolf; theoreti-

cal and critical essays by Laplanche, Lyotard, Lacan, de Certeau, Kofman, Assmann, Said, and Cavell.

3-5 units, Spr (Douvaldzi, C)

GERGEN 306. Narrative, Visuality, Memory

(Same as GERGEN 206) Moments in the history of the relationship between the verbal and the visual: the classical ars memoriae; the ekphrasis debates of the 18th century; the emergence of a new visuality and mnemonic art as structuring principles for modernist narrative. Authors include Plato, Aristotle, Cicero, Augustine, Winckelmann, Lessing, Diderot, Goethe, Moritz, Flaubert, Rilke, Joyce, and Proust.

3-5 units, not given this year

GERGEN 367. Freud and the Apostle Paul

(Same as GERGEN 267) Intersections between Freud's psychoanalysis of society and Paul's political theology. Emphasis is on the issues of law, love, justice, community, and language. Readings include Freud and Paul, and theoretical essays by Taubes, Badiou, Santner, Agamben, Assmann, Zizek, and Boyarin.

3-5 units, not given this year

GERMAN LANGUAGE (GERLANG) COURSES

UNDERGRADUATE COURSES IN GERMAN LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GERLANG 1. First-Year German, First Quarter

Speaking, reading, writing, and listening. Authentic materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which German is spoken.

5 units, Aut (Staff), Win (Strachota, K), Spr (Nissler, P)

GERLANG 2. First-Year German, Second Quarter

Continuation of 1. Prerequisite 1 or equivalent.

5 units, Aut (Petig, W), Win (Staff), Spr (Strachota, K)

GERLANG 3. First-Year German, Third Quarter

Continuation of 2. Fulfills the University language requirement. Prerequiste 2 or equivalent.

5 units, Aut (Nissler, P), Win (Staff), Spr (Staff)

GERLANG 5A. Intensive First-Year German, Part A

Equivalent of 1,2,3 combined. Stanford graduate students restricted to 9 units register for 205A,B.

5 units, Sum (McQueen, K)

GERLANG 5B. Intensive First-Year German, Part B

Continuation of 5A. Fulfills the University language requirement. Prerequisite 5A or equivalent. Stanford graduate students restricted to 9 units register for 205B.

5 units, Sum (Staff)

GERLANG 10. Elementary German for Seniors and Graduate Students

Intensive. For students who need to acquire reading ability in German for the Ph.D. or for advanced research in their own field. 52 fulfills Ph.D. reading exam.

4 units, Win (Petig, W), Sum (Petig, W)

GERLANG 11P. Individually Programmed Beginning German

For those who wish to complete more or fewer than 5 units a quarter, have scheduling conflicts, or prefer to work independently. Self-paced work with text and tapes; instructor available for consultation on a regular basis. 3-unit minimum for beginners. Conversational practice available for additional unit.

1-12 units, Aut (Petig, W), Win (Strachota, K), Spr (Strachota, K)

GERLANG 20A. Beginning German Conversation

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 20B. Intermediate German Conversation

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 20C. Advanced German Conversation

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 20E. Fun Facts about Europe

(AU) (Staff)

1 unit, Win (Balint, L)

GERLANG 20K. Kuche Mitt (German Cooking Class)

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 20M. Mitt Movie Series

(AU)

1 unit, Aut (Balint, L), Win (Staff), Spr (Balint, L)

GERLANG 20P. Theme Projects

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 20T. Teaching German Conversation

(AU)

1 unit, Aut (Balint, L), Win (Balint, L), Spr (Balint, L)

GERLANG 21. Intermediate German I

Reading short stories, and review of German structure. Discussions in German, short compositions, videos.

4 units, Aut (Petig, W)

GERLANG 21S. Intermediate German

Reading short stories, and review of German structure. Discussions in German, short compositions, videos. Prerequisite: one year of college German; or two years high school German or equivalent, or AP German.

4 units, Sum (Petig, W)

GERLANG 21W. Intermediate German I: German for Business and International Relations

Equivalent to 21, but focus is on business and the political and economic geography of Germany. CDs and videos. For students planning to do a business internship in a German-speaking country. Prerequisite: 3.

4 units, Aut (Balint, L)

GERLANG 22. Intermediate German II

Continuation of 21, with greater emphasis on reading and writing skills. Literary texts of major 20th-century writers in historical context.

4 units, Win (Petig, W)

GERLANG 22W. Intermediate German II: German for Business and International Relations

Equivalent to 22, but continuation of 21W. Recommended for students planning to do a business internship in a German-speaking country. Prerequisite: 21 or 21W.

4 units, Win (Gingrich, B)

GERLANG 52. Readings in Humanities

For undergraduates and graduate students with a knowledge of German who want to acquire reading proficiency. Readings from scholarly works and professional journals. Recommended for students who need to pass the Ph.D. reading exam. Prerequisite: one year of German, or 10, or equivalent.

4 units, Spr (Petig, W)

GERLANG 99. Language Specials

Prerequisite: consent of instructor.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERLANG 100. Hundert Deutsche Jahre: One Hundred German Years

Hones German language skills while introducing the history and culture of Germany as experienced by ordinary people over the course of the 20th century. Themes include Germans and democracy, money, Hitler, books, the Wall, and food. Video series, parallel readings, discussion in German. Extra listening, reading, or speaking for fourth unit.

3-4 units, Win (Strachota, K)

GERLANG 101. Advanced Language Study I

Short fictional and expository readings, discussions, compositions. Review of grammatical structures. Vocabulary building with emphasis on common idiomatic expressions and troublesome lexical distinctions.

3-4 units, not given this year

GERLANG 102. Advanced Language Study II

Continuation of 101.

3-4 units, not given this year

GERLANG 105. Advanced Business German
For students planning to work in a German-speaking country and for preparation of the International Business German exams. Case studies of typical business situations with accompanying videos, listening comprehension exercises, and class simulations. Business correspondence and reports in German. Prerequisite: 22 or equivalent.
4 units, Spr (Petig, W)

GERLANG 110. German Newspapers
For intermediate and advanced students. Articles from current newspapers and magazines, reading comprehension strategies with online news updates, and vocabulary. Writing practice if desired. May be repeated once for credit
3-4 units, Spr (Strachota, K)

GERLANG 111. Television News from Germany
For intermediate and advanced students. Current news reports and features for listening comprehension and vocabulary. Extra listening, speaking, or writing practice for fourth unit.
3-4 units, not given this year

GERLANG 199. Individual Reading
Prerequisite: consent of instructor.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN GERMAN LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GERLANG 205A. Intensive First-Year German
Equivalent of 1,2,3 combined. Stanford graduate students restricted to 9 units may take 205A and B for a total of 9 units.
4-5 units, Sum (Staff)

GERLANG 210. Elementary German for Graduate Students
Restricted to Stanford graduate students. Prerequisite: consent of instructor.
3-4 units, Sum (Staff)

GERLANG 395. Graduate Studies in German
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

GERLANG 399. Independent Study
Prerequisite: consent of instructor.
1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERMAN LITERATURE (GERLIT) COURSES

UNDERGRADUATE COURSES IN GERMAN LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GERLIT 110. Women and Protest Literature in Twentieth Century Germany and China
(Same as COMPLIT 136) An examination of works of fiction by women writers in German and China, the authors' responses to similar conditions such as the rise of Communism, and their treatment of gender, modernity, tradition, identity, and individual vs. collective interests. Readings are in English translation. Film adaptations are viewed and discussed as well.
3-5 units, Win (Staff)

GERLIT 120. Law, Justice, and the Literary Imagination
Have law and poetry risen from the same bed, as Jakob Grimm suggested in his essay Von der Poesie im Recht? Are there intrinsic connections between the legal and the literary? How narrative and drama articulate the relationship between law and justice, and represent the crisis of the legal system. Goal is to enhance reading fluency and textual analysis skills. Readings include texts by Schiller, Kleist, Kafka, Wedekind, and Brecht.
4 units, Spr (Staff)

GERLIT 121. The Viennese Coffeehouse
The cultural and literary significance of fin de siécle Vienna's most enduring symbol: the coffeehouse. What was the function of the café in aesthetic, literary and political debates central to Vienna at the turn of the century? How did coffeehouse and newspaper culture influence developments in modernist prose? Texts by Hermann Bahr, Arthur Schnitzler, Karl Kraus, Peter Altenberg, Felix Salten, Sigmund Freud, Egon Friedell, and Alfred Polgar, in English translation; German texts available upon request.
3-5 units, not given this year

GERLIT 123N. The Brothers Grimm and Their Fairy Tales
(Stanford Introductory Seminar) Preference to freshmen. Historical, biographical, linguistic, and literary look at the Kinder- and Hausmärchen of Jacob and Wilhelm Grimm. Readings from the fairy tales, plus materials in other media such as film and the visual arts. Small group performances of dramatized fairy tales. In German. Prerequisite: GERLANG 3 or equivalent. GER:DB-Hum
1-4 units, Spr (Robinson, O)

GERLIT 127. Uncanny Literature in the Nineteenth Century
From ghost children and animated statues, the walking dead to machine women and doppelgangers, 19th-century German literature teems with things that go bump in the night. The history of this tradition of fantastic literature in Germany, its origins, main authors, and defining features. Authors include E.T.A. Hoffmann, Wilhelm Hauff, Friedrich Schiller, Joseph von Eichendorff and Jeremias Gotthelf. Readings and writing in German. GER:DB-Hum
4 units, not given this year

GERLIT 127A. The German Ballad
History of the German ballad, from Goethe and Schiller, to Romantic and realist poets. Additional reading contextualize the German ballad in the European context. Musical ballads and song arrangements also considered. WIM
3-4 units, Aut (Daub, A)

GERLIT 130. Brecht and Modern Aesthetics
Bertolt Brecht's poetic and dramatic works, and analysis of his contribution to modern paradigms of poetic and dramatic practice. Readings in German include poetry, dramas such as Baal, Im Dickicht der Staedte, Die Dreigroschenoper, Aufstieg und Fall der Stadt Mahagonny, Mutter Courage und ihre Kinder, and theoretical writings on lyric poetry and drama.
3-3 units, not given this year

GERLIT 131. Goethe: Poetic Vision and Vocation in the Age of Reason
Introduction to Goethe's major works, reading across genres of poetry, drama, the novel, and autobiography; critical writings on art, nature, and aesthetics. Central trends in Goethe's thought; the interrelatedness of poetic vision and philosophical thinking in his works. Goethe in relation to other intellectual and philosophical movements of the period, including romanticism. GER:DB-Hum
3-5 units, not given next year

GERLIT 131A. Immigrant/Minority Literature and the Emergence of Multiculturalism in Germany
Immigrant culture and literature in Germany across genres, including stories, drama, memoirs, and film. What do immigrants in Germany write about? What role does immigrant literary culture play in the formation of notions of cultural difference and dialogue? How do the dynamics of ethnic and cultural diversity influence concepts and notions of culture and nationhood in Germany? GER:DB-Hum
3 units, not given this year

GERLIT 131B. German Lyric and the Oriental Tradition
German lyric and Oriental models: German poets' encounter with Persian and Arab literary culture; adaptation and transformation of poetic forms and stories; theories of lyric. Readings include poets such as Goethe (West-oestlicher Divan), Rueckert (Oestliche Rosen), Platen (Ghaselen), and Heine (poems) as well as Hafiz (poems in German translation). The development of informed reading skills through close analysis of poems and the idea of lyric poetry as a transcultural and transnational phenomenon, as well as lyric's relationship to music both in the context of Germany and the Orient. GER:DB-Hum
3-5 units, Win (Shamel, M)

GERLIT 131C. Eighteenth-Century Literature and Culture
Key topics in the age of reason: how does the enlightenment contribute to rethinking of love, religion, power, and freedom. Cultural modernization and the emergence of aesthetic autonomy. Readings

and discussions of major works from the classical age of German literature. Tests by Lessing, Goethe, and Schiller.

4 units, Aut (Berman, R)

GERLIT 132. Nineteenth-Century Literature and Culture

Major authors including Kleist, Buechner, Keller, and Storm. Readings in German, discussion in German and English.

4 units, Win (Staff)

GERLIT 133Q. Modernism and Fiction

Preference to sophomores. Innovative ideas and narrative forms in German modernism. International and specifically German features. Problems of narration. Texts such as Musil's Törless, Mann's Tod in Venedig, Kafka's Die Verwandlung, and Broch's Pasenow. Close reading technique. Prerequisite: reading knowledge of German. GER:DB-Hum

4 units, not given this year

GERLIT 135. Outsiders and Outcasts: introduction to German Prose Fiction

Close reading and discussion of literary works by Hebel, Tieck, Kleist, Hoffmann, Heine, Keller, Storm, R. Walser, and Kafka. Attention paid to writers' divergent responses to the artistic, ethical, and political challenges of modernity. Readings, discussion, and writing assignments in German; length of assignments adjusted to students' linguistic competence. Prerequisite: German language sequence at Stanford or equivalent. GER:DB-Hum, WIM

4 units, Win (Dornbach, M)

GERLIT 136. Berlin Topographies in the 20th Century

Development of Berlin¿s spatial imaginaries from the boulevards of the late 19th century to the Weimar Republic's urban agendas, and to the repeated reconstructions by the Nazis, the GDR and Berlin Republic. Sources: Walter Benjamin, Siegfried Kracauer, Berthold Brecht, Peter Weiss, Mascha Kaleko, Peter Schneider, Blixa Bargeld, Wolf Biermann, Christoph Hein, Monika Maron, Thomas Hettche, and Wim Wenders. In German. GER:DB-Hum

4 units, not given this year

GERLIT 137. Introduction to German Poetry

Introduction to the reading and interpretation of lyrical poetry from the 18th century to present. Major poets writing in German including Gryphius, Goethe, Hölderlin, Novalis, Eichendorff, Heine, Rilke, Lasker-Schüler, Trakl, Benn, Celan, Brecht, Enzensberger, and Falkner. Close reading technique. Interpretive tools and theoretical concepts. Poetic form, voice, figural language, and the interaction of sensory registers. In German. GER:DB-Hum

4 units, Aut (Dornbach, M)

GERLIT 138. Introduction to Germanic Languages

(Same as GERGEN 38A) The oldest attested stages of the Germanic language family, including Gothic, Old Norse, Old Saxon, Old English, Old Frisian, Old Low Franconian (Old Dutch), and Old High German. The linguistic interrelationships, prehistory, Germanic tribal groupings, and literature. GER:DB-Hum

4 units, not given this year

GERLIT 139. Love, Marriage and Passion in German Literature of the 19th and 20th Centuries

(Same as GERLIT 339) The thesis that love relationships, in shifting social, cultural, and communication contexts, reflect and determine the dominant value system of a society. How the concepts of romantic, passionate, and pragmatic love evolved and competed with one another in texts by Goethe, Schlegel, Keller, Sacher-Masoch, Fontane, and Böll. In German. GER:DB-Hum

3-5 units, not given this year

GERLIT 148. Heart to Heart: Theories of Expression at the Turns of Two Centuries

(Same as GERLIT 248) Paradigms of expression around 1800 and 1900, from Empfindsamkeit (sensibility) to German Expressionism. The heart that overflows into speech in the works of Klopstock, Goethe, Tieck, and Kleist, and the reformulation a century later of this idea as avant garde practice and modernist credo. Readings of poets, philosophers, and artists on relationships between inside and out, heart and voice, emotion and language, and self and art. Discussion in English. GER:DB-Hum

3-5 units, not given this year

GERLIT 150C. Postwar German Culture and Thought: 1945 to the Present

(Same as GERLIT 250C) How German culture and thought confronted the legacy of National Socialism, German guilt, and the possibility of a new beginning. German culture and the memory of communism (the German Democratic Republic) after 1989. Fiction of Thomas Mann, Gunter Grass, Alexander Kluge, and Hans Ulrich Treichel; poetry of Paul Celan and Ingeborg Bachmann; philosophical essays of Martin Heidegger, Theodor Adorno, Jürgen Habermas; films of Rainer Werner Fassbinder, Florian Henkel (The Life of Others), and Oliver Hirschbiegel (Downfall).

3-5 units, Spr (Eshel, A)

GERLIT 151. German Underworlds

(Same as GERLIT 251) German theories about what lies beneath: is it hell or the subterranean foundations that keep the world from collapsing? Cosmic architecture and the question of the inferno in Kant, Novalis, Wagner, Marx, Freud, Kafka, and the films of Fritz Lang.

3-5 units, not given this year

GERLIT 163. Readings in 19th-Century German Literature

(Same as GERLIT 263) Works by Goethe, Tieck, Kleist, Hoffmann, Heine, Büchner, Grillparzer, Droste-Hülshoff, Stifter, and Keller. Their divergent responses to artistic, ethical, and political challenges of modernity. Prerequisite: GERLANG 3 or equivalent. In German. GER:DB-Hum

4 units, not given this year

GERLIT 189A. Honors Research

Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.

5 units, Win (Staff)

GERLIT 189B. Honors Research

Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.

2 units, Spr (Staff)

GERLIT 190. German Capstone: Goethe's Faust

One of the central texts of the German literary tradition. Faust I and II read, performed, listened to, memorized, and recited. Different ways of responding to them in writing. (WIM)

3-5 units, Win (Staff)

GERLIT 197. Theories of Art after Idealism

(Same as GERLIT 297) Key responses to the failure of idealism to integrate artistic creation and aesthetic experience into a philosophical system. Works by Schopenhauer, Kierkegaard, Nietzsche, Dilthey, and Lukács.

3-5 units, not given this year

GERLIT 199. Independent Reading

36 hours of reading per unit, weekly conference with instructor. May be repeated for credit. Prerequisite: consent of instructor.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERLIT 206. Narrative, Visuality, Memory

(Same as GERLIT 306) Moments in the history of the relationship between verbal and visual: the classical ars memoriae; the ekphrasis debates of the 18th century; and the emergence of a new visuality and mnemonic art as structuring principles for modernist narrative. Authors include Plato, Aristotle, Cicero, Augustine, Winkelmann, Lessing, Diderot, Goethe, Moritz, Flaubert, Rilke, and Proust. GER:DB-Hum

3-5 units, not given this year

GERLIT 223. Literary Diaries of Classic Modernity

(Same as COMPLIT 223) Focus is on self-analysis in works of key modern writers. Since Montaigne's Essais and Rousseau's Confessions, analysis of the self has been a central topic for modern literature. Texts include Baudelaire's Intimate Journals, Kafka's Diaries, Gide's Journals, Woolf's Moments of Being, Benjamin's Berlin Childhood, and Pavese's Diaries. Analysis of the self as polarizing between the imagination of a utopian childhood and self-deprivation.

3-5 units, not given this year

GERLIT 241. Deutsche Geistesgeschichte I: German Aesthetic Thought, 1790-1872

The seminal tradition of writing about art including the German idealists (Kant, Schelling, Hegel, and Schiller), romantics (Schlegel, Novalis, and Hoffmann), and Schopenhauer, Kierkegaard, and Nietzsche. In English. GER:DB-Hum

4 units, not given this year

GERLIT 242. Narrative and Ethics
(Same as COMPLIT 226) Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. GER:EC-EthicReas
3-5 units, Win (Eshel, A)

GRADUATE COURSES IN GERMAN LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GERLIT 133. Twentieth Century and Contemporary Literature and Culture
This course is designed to provide students with a representative overview of German literature, film and music from World War I to the early twenty-first century. It draws on major texts from many of the twentieth century's great literary and artistic movements, from Expressionism and New Objectivity, via the Gruppe 47 to pop art and postmodernism. In keeping with German Studies Department's new pilot program, this course will be taught in English and in German - particular periods or literary or cultural movements will be discussed in English, while individual text will be discussed (and read) entirely in German. German language proficiency is therefore assumed, as is some familiarity with the rough outlines of German history in the 20th century.
3-5 units, Spr (Daub, A)

GERLIT 217. Hölderlin's Poetry
(Same as COMPLIT 217) A discussion of key poems by Friedrich Hölderlin with regard to themes including the utopian fatherland as mythological landscape; the idea of the Greek gods; the concept of poetry as event; and the emphatic ""now"". The seminar also explores the relationship between the philosophy of history and poetic metaphor.
3-5 units, not given this year

GERLIT 219. German Utopias and Dystopias in the 20th Century
The fraught relationship of Geist and politics in 20th-century visions of a utopian republic of letters, mostly from Germany's conservative intellectuals: the George-circle's idea of a secret Germany, the conservative revolution of Hugo von Hofmannsthal, and Mann's Reflections of a Non-Political Man are the most influential such attempts at an aesthetic politics. Other texts instead interrogate and at times parody their attempts, for instance Hesse's Glass Bead Game and Arno Schmidt's Egghead Republic.
3-5 units, Win (Daub, A)

GERLIT 232. Realistic Fictions
(Same as COMPLIT 239) Realistic narratives in nineteenth-century literature. Structures of representation, temporality, and closure. Realism, history and political economy. Realism, modernism, and 20th-century revisions. Texts by authors such as Keller, Stifter, Fontane, Seghers, Lukacs, and Adorno.
3-5 units, Aut (Berman, R)

GERLIT 246. Memory, History, and the Contemporary Novel
(Same as COMPLIT 221) How the watershed events of the 20th century, the philosophic linguistic turn, and the debate regarding the end of history left their mark on the novel. How does the contemporary novel engage with the past? How does its interest in memory and history relate to late- or postmodern culture of time or to political and ethical concerns? Novels by Toni Morrison, W. G. Sebald, J. M. Coetzee, Kazuo Ishiguro, and A. B. Yehoshua; theoretical works by Nietzsche, Freud, Heidegger, Hannah Arendt, Walter Benjamin, Fredric Jameson, Paul Ricoeur Awishai Margalit, and Walter Benn Michaels.
3-5 units, Aut (Staff)

GERLIT 248. Heart to Heart: Theories of Expression at the Turns of Two Centuries
(Same as GERLIT 148) Paradigms of expression around 1800 and 1900, from Empfindsamkeit (sensibility) to German Expressionism. The heart that overflows into speech in the works of Klopstock, Goethe, Tieck, and Kleist, and the reformulation a century later of this idea as avant garde practice and modernist credo. Readings of poets, philosophers, and artists on relationships between inside and out, heart and voice, emotion and language, and self and art. Discussion in English.
3-5 units, not given this year

GERLIT 250A. Modern Drama
Problems of drama as genre, especially in relationship to problems of modernism. Transitions from classical and popular theater. New structures of action and conflict; epic theater; competition with film; transformed theatrical practices. Authors: Nestroy, Hauptmann, Hofmannsthal, Brecht, and Horvath. (Satisfied by enrollment in GERLIT 369 in 2008-09.)
3-5 units, not given this year

GERLIT 250B. German Romanticism and Its Repercussions
Works by Novalis, the Schlegel brothers, Tieck, Wackenroder, Hoffmann, Klingemann. Theory of the subject; transformative politics and conservative-religious retreat into inwardness; the fragment form and the novel; reflection, play, irony; the productive self-movement of language; the hieroglyph of nature; animating effects of Romantic desire and its impasses; interactions among literature, music, and painting. Ambivalent and critical responses to Romanticism (Hegel, Heine, Nietzsche) and recent revivals (Benjamin, Lacoue-Labarthe, Nancy, and Frank). Readings in German, discussion in English.
3-5 units, not given this year

GERLIT 250C. Postwar German Culture and Thought: 1945 to the Present
(Same as GERLIT 150C) How German culture and thought confronted the legacy of National Socialism, German guilt, and the possibility of a new beginning. German culture and the memory of communism (the German Democratic Republic) after 1989. Fiction of Thomas Mann, Gunter Grass, Alexander Kluge, and Hans Ulrich Treichel; poetry of Paul Celan and Ingeborg Bachmann; philosophical essays of Martin Heidegger, Theodor Adorno, Jürgen Habermas; films of Rainer Werner Fassbinder, Florian Henkel (The Life of Others), and Oliver Hirschbiegel (Downfall).
3-5 units, Spr (Eshel, A)

GERLIT 251. German Underworlds
(Same as GERLIT 151) German theories about what lies beneath: is it hell or the subterranean foundations that keep the world from collapsing? Cosmic architecture and the question of the inferno in Kant, Novalis, Wagner, Marx, Freud, Kafka, and the films of Fritz Lang.
3-5 units, not given this year

GERLIT 255. Middle High German
Introduction to medieval German language and culture. Readings include Hartmann von Aue and Gottfried von Strassburg; genres include Minnesang, epic, and romance. Grammar review; emphasis is on rapid and accurate reading.
3-5 units, not given this year

GERLIT 256. Old High German
Introduction to the grammar and the texts of the earliest attested stage of high German
3-4 units, not given this year

GERLIT 257. Gothic
Introduction to the grammar, texts, and history of this earliest extensively-documented Germanic language, a relative of German and English. Issues surrounding the Germanic parent language.
4 units, not given this year

GERLIT 258. German Dialects
Linguistic characteristics of dialect areas. History of the study of language variation in Germany; traditional dialect grammars; dialect-geographical revolution; and insights of modern sociolinguistics. Sources include native speakers, professionally-made tapes with transcripts, and secondary readings.
3-4 units, Win (Robinson, O)

GERLIT 263. Readings in 19th-Century German Literature
(Same as GERLIT 163) Works by Goethe, Tieck, Kleist, Hoffmann, Heine, Büchner, Grillparzer, Droste-Hülshoff, Stifter, and Keller. Their divergent responses to artistic, ethical, and political challenges of modernity. Prerequisite: GERLANG 3 or equivalent. In German.
4 units, not given this year

GERLIT 297. Theories of Art after Idealism
(Same as GERLIT 197) Key responses to the failure of idealism to integrate artistic creation and aesthetic experience into a philoso-

phical system. Works by Schopenhauer, Kierkegaard, Nietzsche, Dilthey, and Lukács.

3-5 units, not given this year

GERLIT 298. Individual Work

Open only to German majors and to students working on special projects, including written reports for internships. Honors students use this number for the honors essay. May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERLIT 306. Narrative, Visuality, Memory

(Same as GERLIT 206) Moments in the history of the relationship between verbal and visual: the classical ars memoriae; the ekphrasis debates of the 18th century; and the emergence of a new visuality and mnemonic art as structuring principles for modernist narrative. Authors include Plato, Aristotle, Cicero, Augustine, Winkelmann, Lessing, Diderot, Goethe, Moritz, Flaubert, Rilke, and Proust.

3-5 units, not given this year

GERLIT 339. Love, Marriage and Passion in German Literature of the 19th and 20th Centuries

(Same as GERLIT 139) The thesis that love relationships, in shifting social, cultural, and communication contexts, reflect and determine the dominant value system of a society. How the concepts of romantic, passionate, and pragmatic love evolved and competed with one another in texts by Goethe, Schlegel, Keller, Sacher-Masoch, Fontane, and Böll. In German.

3-5 units, not given this year

GERLIT 369. Introduction to Graduate Studies: Criticism as Profession

(Same as COMPLIT 369, FRENGEN 369, ITALGEN 369) Major texts of modern literary criticism in the context of professional scholarship today. Readings of critics such as Lukács, Auerbach, Frye, Ong, Benjamin, Adorno, Szondi, de Man, Abrams, Bourdieu, Vendler, and Said. Contemporary professional issues including scholarly associations, journals, national and comparative literatures, university structures, and career paths.

5 units, Aut (Berman, R)

GERLIT 399. Independent Study

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERLIT 400. Dissertation Research

For graduate students in German working on dissertations only.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERLIT 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HEALTH RESEARCH AND POLICY (HRP) COURSES

UNDERGRADUATE COURSES IN HEALTH RESEARCH AND POLICY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

HRP 89Q. Introduction to Cross Cultural Issues in Medicine

(Stanford Introductory Seminar) Preference to sophomores. Introduction to social factors that impact health care delivery, such as ethnicity, immigration, language barriers, and patient service expectations. Focus is on developing a framework to understand culturally unique and non-English speaking populations in the health care system. GER:EC-AmerCul

3 units, Win (Corso, I)

HRP 199. Undergraduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN HEALTH RESEARCH AND POLICY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HRP 206. Research Methods for Meta-Analysis

(Same as STATS 211) Meta-analysis as a quantitative method for combining the results of independent studies enabling researchers to evaluate available evidence. Examples of meta-analysis in medicine, education, and social and behavioral sciences. Statistical methods include nonparametric methods, contingency tables, regression and analysis of variance, and Bayesian methods. Project involving an existing published meta-analysis. Prerequisite: basic sequence in statistics.

3 units, Win (Olkin, I)

HRP 207. Introduction to Concepts and Methods in Health Services and Policy Research I

Primarily for medical students in the Health Services and Policy Research scholarly concentration. Topics include health economics, statistics, decision analysis, study design, quality measurement, cost benefit and effectiveness analysis, and evidence based guidelines.

2 units, Aut (Haberland, C)

HRP 208. Introduction to Concepts and Methods in Health Services and Policy Research II

Primarily for medical students in the Health Services and Policy Research scholarly concentration; continuation of 207. Topics include health economics, statistics, decision analysis, study design, quality measurement, cost benefit and effectiveness analysis, and evidence based guidelines. Recommended: 207.

2 units, Win (Haberland, C)

HRP 209. FDA's Regulation of Health Care

(Same as LAW 458) Open to law and medical students; other graduate students by consent of instructor. The FDA's regulatory authority over drugs, biologics, medical devices, and dietary supplements. The nature of the pharmaceutical, biotech, medical device, and nutritional supplement industries.

2-3 units, not given this year

HRP 210. Health Law and Policy

(Same as Law 313) Open to law , medicine, business, and graduate students. Focus this term is on the physician/patient relationship, medical ethics, and public health law.

3 units, Aut (Staff)

HRP 211. Law and the Biosciences

(Same as LAW 368) Legal, social, and ethical issues arising from advances in neuroscience, including effects upon law and society through improvements in predicting illnesses and behaviors, reading minds through neuroimaging, understanding responsibility and consciousness, treating criminal behavior, and cognitive enhancement. May be repeated for credit.

3 units, not given this year

HRP 212. Cross Cultural Medicine

Developing interviewing and behavioral skills needed to facilitate culturally relevant health care across all population groups. Discussions focus on explicit and implicit cultural influences operating in formal and informal medical contexts.

3 units, Spr (Corso, I)

HRP 214. Scientific Writing

Step-by-step through the process of writing and publishing a scientific manuscript. How to write effectively, concisely, and clearly. Preparation of an actual scientific manuscript. Students are encouraged to bring a manuscript on which they are currently working to develop and polish throughout the course.

2-3 units, Win (Sainani, K)

HRP 215. Scientific Writing for Basic and Translational Scientists

Teaches students in the basic sciences how to write clearly, concisely, and effectively. Focuses on the process of writing and publishing a scientific manuscript. Not intended for epidemiology graduate students.

2-3 units, Sum (Sainani, K)

HRP 216. Analytical and Practical Issues in the Conduct of Clinical and Epidemiologic Research
Topics include: advanced aspects of study design and data analyses; development of health measurement instruments; methods of summarizing literature and quantifying effect sizes; and multivariable nature of health events in human populations. 3 units requires a term paper. Prerequisites: 225, and 258 or 261, or consent of instructor.

2-3 units, Spr (Popat, R)

HRP 220. BIOTECHNOLOGY LAW AND POLICY
(Same as LAW 440) Open to all law or medical students; other graduate students by consent of instructor. Focus is on the biotechnology industry, with discussion of the med tech or medical device industry and the pharmaceutical industry. The life cycle of a biotech firm, from a good idea to a start-up company to FDA approval and beyond. Guest speakers. In addition to a final exam, students are required to participate in a group project during the term, making law and business recommendations about a biotech firm.

3 units, Spr (Staff)

HRP 221. Law and the Biosciences: Genetics
(Same as LAW 480) Open to all law or medical students; other graduate students by consent of the instructor. Ethical, legal, and social issues arising primarily from advances in knowledge of human genetics. May also include a section on stem cell research.

3 units, Spr (Staff)

HRP 223. Epidemiologic Analysis: Data Management and Statistical Programming
The skills required for management and analysis of biomedical data. Topics include importing and exporting data from multiple database systems, visualizing and cleaning data, data management for multicenter projects, and data security. Introduction to applied statistical programming relevant to epidemiologic and clinical research. No previous programming experience required.

2-3 units, Aut (Balise, R)

HRP 225. Design and Conduct of Clinical and Epidemiologic Studies
Intermediate-level. The skills to design, carry out, and interpret epidemiologic studies, particularly of chronic diseases. Topics: epidemiologic concepts, sources of data, cohort studies, case-control studies, cross-sectional studies, sampling, estimating sample size, questionnaire design, and the effects of measurement error. Prerequisite: introductory course in statistics or consent of instructor.

3-4 units, Aut (Popat, R)

HRP 226. Advanced Epidemiologic and Clinical Research Methods
The principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in clinical and epidemiologic studies. Prerequisite: 225 or consent of instructor.

3-4 units, Win (Popat, R)

HRP 228. Genetic Epidemiology
Reading of seminal papers in genetic epidemiology. Topics include human genetic variation, genetics of complex diseases, genome-wide association studies, and new genomic technologies. Provides a background for clinicians, epidemiologists, and other scientists to incorporate the study of genetic factors into human disease research. Prerequisite: HRP 225 or consent of instructor.

2 units, Spr (Sieh, W)

HRP 230. Cancer Epidemiology
Descriptive epidemiology and sources of incidence/mortality data; the biological basis of carcinogenesis and its implications for epidemiologic research; methodological issues relevant to cancer research; causal inference; major environmental risk factors; genetic susceptibility; cancer control; examples of current research; and critique of the literature. 3 units requires paper or project. Prerequisite: 225, or consent of instructor.

2-3 units, alternate years, not given this year

HRP 231. Epidemiology of Infectious Diseases
Principles of the transmission of the infectious agents (viruses, bacteria, rickettsiae, mycoplasma, fungi, and protozoan and helminth parasites). The role of vectors, reservoirs, and environmental factors. Pathogen and host characteristics that determine the spectrum of infection and disease. Endemicity, outbreaks, and epidemics of selected infectious diseases. Principles of control and surveillance.

3 units, Win (Maldonado, Y; Parsonnet, J)

HRP 234. Foundations of Pharmacoepidemiology
Historical development of the field, the drug development process and pharmacoepidemiology's role in it, pharmacovigilance/drug safety systems, epidemiology in outcomes research, the role of pharmacoepidemiology in risk management, and classic examples of pharmacoepidemiologic investigations.

2-3 units, not given this year

HRP 236. Epidemiology Research Seminar
Weekly forum for ongoing epidemiologic research by faculty, staff, guests, and students, emphasizing research issues relevant to disease causation, prevention, and treatment. May be repeated for credit.

1 unit, Aut (Henderson, V), Win (Sieh, W), Spr (Whittemore, A)

HRP 238. Genes and Environment in Disease Causation: Implications for Medicine and Public Health
(Same as HUMBIO 159) The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. Prerequisite: basic course in genetics; for undergraduates, Human Biology core or equivalent or consent of instructor.

2-3 units, not given this year

HRP 239. Understanding Statistical Models and their Social Science Applications
(Same as EDUC 260X, STATS 209) Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods

3 units, Win (Rogosa, D)

HRP 240. Rethinking Global Health
(Same as MED 230) Issues and players that shape global health today. How to develop a road map for thoughtful, responsible action. Topics include: the role of the physician and health care worker; health as a human right; successful interventions; children's and women's health; issues in immunization; economic development; and NGOs. Online interviews with influential global health leaders.

2-3 units, Spr (Goldhaber-Fiebert, J)

HRP 251. Design and Conduct of Clinical Trials
The rationale for phases 1-3 clinical trials, the recruitment of subjects, techniques for randomization, data collection and endpoints, interim monitoring, and reporting of results. Emphasis is on the theoretical underpinnings of clinical research and the practical aspects of conducting clinical trials.

3 units, Spr (Henderson, V; Lavori, P)

HRP 252. Outcomes Analysis
(Same as BIOMEDIN 251) Methods of conducting empirical studies which use large existing medical, survey, and other databases to ask both clinical and policy questions. Econometric and statistical models used to conduct medical outcomes research. How research is conducted on medical and health economics questions when a randomized trial is impossible. Problem sets emphasize hands-on data analysis and application of methods, including reanalyses of well-known studies. Prerequisites: one or more courses in probability, and statistics or biostatistics.

3 units, Spr (Bhattacharya, J)

HRP 256. Economics of Health and Medical Care
(Same as BIOMEDIN 156, BIOMEDIN 256, ECON 126) Graduate students with research interests should take ECON 248. Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and

managed care; international comparisons. Prerequisites: ECON 50 and ECON 102A or equivalent statistics. Recommended: ECON 51.

5 units, Aut (Bhattacharya, J)

HRP 258. Introduction to Probability and Statistics for Clinical Research

Open to medical and graduate students; required of medical students in the Clinical Research Scholarly Concentration. Tools to evaluate medical literature. Topics include random variables, expectation, variance, probability distributions, the central limit theorem, sampling theory, hypothesis testing, confidence intervals, correlation, regression, analysis of variance, and survival analysis.

3 units, Spr (Sainani, K)

HRP 259. Introduction to Probability and Statistics for Epidemiology

Topics: random variables, expectation, variance, probability distributions, the central limit theorem, sampling theory, hypothesis testing, confidence intervals. Correlation, regression, analysis of variance, and nonparametric tests. Introduction to least squares and maximum likelihood estimation. Emphasis is on medical applications.

4-5 units, Aut (Sainani, K)

HRP 260A. Workshop in Biostatistics

(Same as STATS 260A) Applications of statistical techniques to current problems in medical science.

1-2 units, Aut (Olshen, R)

HRP 260B. Workshop in Biostatistics

(Same as STATS 260B) Applications of statistical techniques to current problems in medical science.

1-2 units, Win (Olshen, R)

HRP 260C. Workshop in Biostatistics

(Same as STATS 260C) Applications of statistical techniques to current problems in medical science.

1-2 units, Spr (Sabatti, C; Olshen, R)

HRP 261. Intermediate Biostatistics: Analysis of Discrete Data

(Same as BIOMEDIN 233, STATS 261) Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference.

3 units, Win (Sainani, K)

HRP 262. Intermediate Biostatistics: Regression, Prediction, Survival Analysis

(Same as STATS 262) Methods for analyzing longitudinal data. Topics include Kaplan-Meier methods, Cox regression, hazard ratios, time-dependent variables, longitudinal data structures, profile plots, missing data, modeling change, MANOVA, repeated-measures ANOVA, GEE, and mixed models. Emphasis is on practical applications. Prerequisites: basic ANOVA and linear regression.

3 units, Spr (Sainani, K)

HRP 263. Advanced Decision Science Methods and Modeling in Health

(Same as MED 263) Advanced methods currently used in published model-based cost-effectiveness analyses in medicine and public health, both theory and technical applications. Topics include: Markov and microsimulation models, model calibration and evaluation, and probabilistic sensitivity analyses. Prerequisites: a course in probability, a course in statistics or biostatistics, a course on cost-effectiveness such as HRP 392, a course in economics, and familiarity with decision modeling software such as TreeAge.

3 units, Spr (Goldhaber-Fiebert, J)

HRP 280. Spanish for Medical Students

(Same as SPANLANG 121M) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on taking the medical history. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

3 units, Aut (Corso, I)

HRP 281. Spanish for Medical Students

(Same as SPANLANG 122M) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on performing a physical examination. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

3 units, Win (Corso, I)

HRP 282. Spanish for Medical Students

(Same as SPANLANG 123M) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on different specialties and medical conditions. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

3 units, Spr (Corso, I)

HRP 283. Health Services Research Core Seminar

Presentation of research in progress and tutorials in the field of health services research.

1 unit, Aut (Haberland, C), Win (Haberland, C), Spr (Haberland, C)

HRP 290. Advanced Medical Spanish Oral Communication

Enrollment limited to medical students. Designed to further develop linguistic skills, covering all medical specialties according to student needs. Sessions also include topics on patient education and diseases, such as diabetes, asthma, TB, and CVDs.

3 units, Aut (Corso, I), Win (Corso, I), Spr (Corso, I)

HRP 296. Current Topics in Bioethics

(Same as LAW 596) The ethical, legal, and public policy issues arising from recent advances in biomedicine and the biosciences. Approaches to bioethical reasoning including casuistry, social justice, resource allocation, and individual rights in areas such as refusal of treatment conception. Topics include: the use of forensic genetics in criminal law, neuroscience and national security, race and ethnicity in genetic research, experimentation on human subjects and prisoners, privacy of medical and genetic information in the information age, synthetic biology, and do-it-yourself medical and genetic testing. No prior knowledge in science, medicine, philosophy or related disciplines is required.

3 units, Spr (Farahany, N)

HRP 299. Directed Reading in Health Research and Policy

Epidemiology, health services research, preventive medicine, medical genetics, public health, economics of medical care, occupational or environmental medicine, international health, or related fields. May be repeated for credit. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HRP 351. Health Care Technology: From Innovators to Providers to Patients

(Same as GSBGEN 351) How health care businesses use biotechnology, medical technology and information technology to improve patient outcomes and manage costs. New technologies commercialized by innovator biotech and pharmaceutical companies, device manufacturers, diagnostics developers, and health IT companies, and adopted by hospitals and physicians in patient care and paid for by third-party payers. Case studies: how innovators finance and manage new product development; clinical trial management and gaining regulatory approval; strategies to drive product adoption; business models to drive innovation; clinical and business models for adopting new technology; organizational change; criteria for reimbursement and coverage decisions; selective provider network design to manage added costs; and IT-intensive business models. Guest speakers and panelists.

4 units, not given this year

HRP 370. Medical Scholars Research

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HRP 391. Health Care Regulation, Finance and Policy

(Same as PUBLPOL 231) (SAME AS LAW 348) Provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the U.S. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured),

medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.

3 units, Win (Kessler, D)

HRP 392. Analysis of Costs, Risks, and Benefits of Health Care
(Same as BIOMEDIN 432) (Same as MGTECON 332) For graduate students. How to do cost/benefit analysis when the output is difficult or impossible to measure. How do M.B.A. analytic tools apply in health services? Literature on the principles of cost/benefit analysis applied to health care. Critical review of actual studies. Emphasis is on the art of practical application.

4 units, Aut (Garber, A; Owens, D)

HRP 399. Graduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HRP 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HRP 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY (HISTORY) COURSES

UNDERGRADUATE COURSES IN HISTORY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

HISTORY 6N. Utopia: History of Nowhere Land
(Stanford Introductory Seminar) What would the perfect society be? How would work be organized, and education, honor and profit be distributed? How would children be raised, and who would govern? Such questions have engaged philosophers, revolutionaries, and dreamers in every historical age. Examines utopian literature from ancient Greece through the modern age, focusing on the early modern period. GER:DB-Hum

4 units, Win (Stokes, L)

HISTORY 10B. Early Modern Europe
(Same as HISTORY 110B. History majors and others taking 5 units, register for 110B.) Survey of early modern European history from the Reformation through the Enlightenment. Topics include religious war, state building and revolt, exploration and colonialism, gender and society. GER:DB-SocSci, EC-GlobalCom

3 units, Aut (Stokes, L)

HISTORY 10C. Introduction to Modern Europe
(SAME as HISTORY 110C. History majors and others taking 5 units, register for 110C.) From the late 18th century to the present. How Europeans responded to rapid social changes caused by political upheaval, industrialization, and modernization. How the experience and legacy of imperialism and colonialism both influenced European society and put in motion a process of globalization that continues to shape international politics today.

3 units, Win (Daughton, J)

HISTORY 11N. The Roman Empire: Its Grandeur and Fall
(Stanford Introductory Seminar) (Same as CLASSHIS 24N) Preference to Freshmen. Prerequisite: IHUM 69A. Explore themes on the Roman Empire and its decline from the 1st through the 5th centuries C.E.. What was the political and military glue that held this diverse, multi-ethnic empire together? What were the bases of wealth and how was it distributed? What were the possibilities and limits of economic growth? How integrated was it in culture and religion? What were the causes and consequences of the conversion to Christianity? Why did the Empire fall in the West? How suitable is the analogy of the U.S. in the 21st century?

3 units, Spr (Saller, R)

HISTORY 17S. Princesses, Politicians, and Patronesses: Identities of Early Modern Noble Women
Noble women, often overlooked a political agents, were integral to the functioning of European political networks as intriguers, mothers, wife, patronesses, warriors, and chroniclers. Examines the writings of noble women (autobiography, personal correspondences, and a novel) with particular emphasis on behavioral expectations and practices, letter-writing and self-representation, networks (both familial and political), and cultural exchange and influence. From the mid-sixteenth to late eighteenth century (Catherine deMedici to Marie Antoinette). Cases from Italy, France, England, Spain, and Germany.

5 units, Spr (Taylor-Poleskey, M), given once only

HISTORY 20Q. Russia in the Early Modern European Imagination
(Stanford Introductory Seminar) Preference to sophomores. The contrast between the early modern image of Europe as free, civilized, democratic, rational, and clean against the notion of New World Indians, Turks, and Chinese as savage. The more difficult, contemporary problem regarding E. Europe and Russia which seemed both European and exotic. Readings concerning E. Europe and Russia from the Renaissance to the Enlightenment; how they construct a positive image of Europe and conversely a negative stereotype of E. Europe. Prerequisite: PWR 1. GER:DB-Hum, EC-GlobalCom

5 units, Win (Kollmann, N)

HISTORY 30C. Culture and Society in Reformation England
(Same as History 130C. History majors and others taking 5 units, register for 130C.) Focuses on the appeal of both Reformed and Catholic ideas in the political and cultural contexts of early modern Europe. Topics include: the Lutheran revolt; the spread of Protestant ideas; Calvin's Geneva; the English Reformation; Tridentine reform and the Jesuits; toleration and the underground churches; wars and religious violence; and the making of European confessional identities. Sources include sermons, religious polemic, autobiographies, graphic prints, poetry, and music.

3 units, not given this year

HISTORY 30S. Travel, Adventure, Blood, and Espionage: The British Cultural Imagination in Afghanistan, 1813-1907
The British Empire's encounters with nineteenth century Afghanistan, experienced by Britons as a fundamentally contested space of profound tension, daring journeys, gruesome massacres, and exotic adventures. Topics include the early adventurers, the First and Second Anglo-Afghan Wars, the Great Game, imperial angst, memory, and contemporary parallels. Sources include travel accounts, paintings, novels, military diaries, songs, an official manifesto, adventurers' memoirs, political polemics, prisoners' letters, newspaper editorials/ and letters to the editor, short stories and photographs.

5 units, Aut (Lundberg, C), given once only

HISTORY 31. Science, Technology and Art: The Worlds of Leonardo da Vinci
(Same as HISTORY 131) What did Leonardo actually know? How did he acquire that knowledge? Leonardo's interests and accomplishments in such fields as painting, architecture, engineering, physics, mathematics, geology, anatomy, and physiology, and more generally the nature of Renaissance science, art, and technology. The relationship between the society of 15th-century Italy and the work of the man from Vinci: why did this world produce a Leonardo? How to use him to understand creativity, innovation, and invention in the Renaissance and beyond. What was his legacy and how did he become a myth? For students interested in the history of science, medicine, and technology and for students interested in the history and art of Renaissance Italy.

3-5 units, Win (Findlen, P)

HISTORY 31Q. British History Revealed by the Arts of the 20th Century
(Stanford Introductory Seminar) Discusses various art forms as works of their own but more importantly in the context of this course how they relate to British society. Students will select a particular work of art within the genre for the week-- building, novel, poem, image, musical piece, movie, etc.-- and report how it illuminates the history of Britain in the first half of the 20th century. Preference to sophomores, then freshman.

4 units, Spr (Stansky, P)

HISTORY 32A. Enlightenment and the Arts
(Same as HISTORY 132A. History majors and others taking 5 units, enroll in 132A.) Novels, poetry, music, paintings, and architecture, and what they reveal about the society that produced them.

3 units, Spr (Lougee Chappell, C)

HISTORY 32S. Gender and European Imperial Crisis through Media: 1880-2000
Focuses on gender as a critical idiom for examining the issues that afflicted European empires in the late nineteenth and twentieth centuries. Examines how European women and operative ideas about gender roles and norms were implicated in both the large and small crises that destabilized European colonial projects. Topics include feminism, the domestic sphere, women's activism,wars, and humanitarian crises.

5 units, Win (Monkman, L), given once only

HISTORY 33A. Blood and Roses: The Age of the Tudors
(Same as HISTORY 133A. History majors and others taking 5 units, register for 133A.) English society and state from the Wars of the Roses to the death of Elizabeth. Political, social, and cultural upheavals of the Tudor period and the changes wrought by the Reformation. The establishment of the Tudor monarchy; destruction of the Catholic church; rise of Puritanism; and 16th-century social and economic changes. GER:DB-Hum

3 units, not given this year

HISTORY 33B. Revolutionary England: The Stuart Age
(Same as HISTORY 133B. History majors and others taking 5 units, register for 133B.) From the accession of King James I in 1603 to the death of Queen Anne in 1714: a brutal civil war, the execution of one anointed king, and the deposition of another. Topics include the causes and consequences of the English Revolution, the origins of Anglo-American democratic thought, the rise and decline of Puritanism, and the emergence of England as an economic and colonial power. (Como)

3 units, Win (Como, D)

HISTORY 33S. The France of Louis XIV
Louis XIV's reign as the foundation of France's modern global eminence despite the imposition of governing practices that undermined France's chance of effective modernization. Sources include 17th-century documents and a computer simulation in game format to define the problems faced by the Sun King and his contemporaries in an era of economic, political, and social change. GER:DB-Hum

5 units, not given this year

HISTORY 35N. Industrial Revolution: History, Ethics & Consequences of Mod. Economic Development
(Stanford Introductory Seminar) Explores the enduring controversies surrounding the transformation of the British economy in the 18th century. Using iron, coal, steam, and cotton as examples, we will explore the historical and economic debates about its reach, speed, and relationship to other aspects of British and world history. Topics include: the social, political, environmental, and cultural consequences in Britain and the expanding British empire as well as an ethical assessment of the Industrial Revolution and the lessons it has offered for the theory and practice of economic development ever since. Readings will include historical and economic literature as well as contemporary accounts. GER:DB-SocSci

5 units, Spr (Satia, P)

HISTORY 36N. Gay Autobiography
(Stanford Introductory Seminar) Preference to freshmen. Gender, identity, and solidarity as represented in nine autobiographies: Isherwood, Ackerley, Duberman, Monette, Louganis, Barbin, Cammermeyer, Gingrich, and Lorde. To what degree do these writers view sexual orientation as a defining feature of their selves? Is there a difference between the way men and women view identity? What politics follow from these writers' experiences? GER:DB-Hum, EC-Gender

4 units, Spr (Robinson, P)

HISTORY 37S. Youth in Modern Europe, 1762-1968
What did it mean to be young in 18th-, 19th-, and 20th-century Europe? Why did generational revolt become such a powerful cultural symbol in modern times, invoked by revolutionaries and reactionaries alike? Music (classical, jazz, rock), manifestos, films, literature, memoirs, and art about how experiences of young men and women, as well as ideas about them, were transformed by the political, social, economic, and cultural revolutions of modern Europe. From the Enlightenment and French Revolution to the student movements of 1968.

5 units, Spr (Heller, D), given once only

HISTORY 38A. Germany and the World Wars, 1870-1990
(Same as HISTORY 138A. Majors and others taking 5 units, enroll in 138A.) Germany's history from Bismarck's wars of unification through the end of the Cold War. The radicalizing relationship between international conflict, social upheaval, and state transformation with a focus on the clashes of the Second Empire, the road to WW I, interwar instability, the rise of Nazism, WW II, the Holocaust, the division of communist E. and capitalist W. Germany, and the fall of the Iron Curtain.

3 units, Spr (Sheffer, E)

HISTORY 39. Modern Britain and the Empire
(Same as HISTORY 139. History majors and others taking 5 units, register in 139.) From American Independence to the latest war in Iraq. Topics include: the rise of the modern British state and economy; imperial expansion and contraction; the formation of class, gender, and national identities; mass culture and politics; the world wars; and contemporary racial politics. Focus is on questions of decline, the fortunes and contradictions of British liberalism in an era of imperialism, and the weight of the past in contemporary Britain. GER:EC-GlobalCom

3 units, Spr (Satia, P)

HISTORY 40. World History of Science, Technology and Medicine: From Prehistory to the Scientific Revolution
(Same as HISTORY 140. History majors and others taking 5 units, register for 140.) The earliest developments in science, the prehistoric roots of technology, the scientific revolution, and global voyaging. Theories of human origins and the oldest known tools and symbols. Achievements of the Mayans, Aztecs, and native N. Americans. Science and medicine in ancient Greece, Egypt, China, Africa, and India. Science in medieval and Renaissance Europe and the Islamic world including changing cosmologies and natural histories. Theories of scientific growth and decay; how science engages other factors such as material culture and religions. GER:DB-SocSci

3 units, not given this year

HISTORY 41A. The Emergence of Medicine: The Middle Ages and Renaissance
(Same as HISTORY 141A. History majors and others taking 5 units, register for 141A.) How did medicine emerge as a distinctive body of knowledge and a profession? The history of medicine from ca. 1000 to 1750. Topics: new ways of examining and treating the body; the religious and cultural significance of disease; the development of hospitals; and the rise of public health systems. Comparison of the status of medicine in Europe and the Islamic world. The work of key figures such as Vesalius and Harvey. GER:DB-SocSci

3 units, not given this year

HISTORY 42. Darwin in the History of Life
(Same as HISTORY 142. History majors and others taking 5 units, register for 142.) Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evo-devo, neocatastrophism, and the new technological frontier of biomimicry. GER:DB-SocSci

3 units, not given this year

HISTORY 43S. Pirates, Merchants, & Local Cosmopolitans: Voyages through Indian Ocean History, 1100-1945
Explores the Indian Ocean world, a home and travel destination of people of diverse ethnic, religious, and cultural backgrounds. Examines the lives of pirates, merchants, slaves, and others by analyzing sources such as trial records, maps, travel narratives, music, life histories, and postcards. Considers the content of primary sources as well as the biases and distortions.

5 units, Win (Hassell, S), given once only

HISTORY 45B. Africa in the Twentieth Century
(Same as HISTORY 145B. History majors and others taking 5 units, register for 145B.) The challenges facing Africans from when the continent fell under colonial rule until independence. Case studies of colonialism and its impact on African men and women drawn from West, Central, and Southern Africa. Novels,

plays, polemics, and autobiographies written by Africans. GER:DB-SocSci, EC-GlobalCom

3 units, Spr (Thornberry, E)

HISTORY 45S. Colonial Anthropologists and the Production of Knowledge about Africa: Inadvertent Imperialists

The history of colonial knowledge production about Africa through the lens of ethnography and anthropology. Topics include: colonial anthropologists, African intermediaries, colonial policy integrating ethnographic research gender, religion, legal practices, ethnicity, tribe, local economic and social processes, and colonial exhibitions as understood by colonial administrators in the twentieth century. How historians can use anthropology to make claims about the past in Africa.

5 units, Spr (Pettigrew, E), given once only

HISTORY 47. History of South Africa

(Same as HISTORY 147. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis. GER:DB-SocSci

3 units, Aut (Campbell, J)

HISTORY 48Q. South Africa: Contested Transitions

(Stanford Introductory Seminar) Preference to sophomores. The inauguration of Nelson Mandela as president in May 1994 marked the end of an era and a way of life for S. Africa. The changes have been dramatic, yet the legacies of racism and inequality persist. Focus: overlapping and sharply contested transitions. Who advocates and opposes change? Why? What are their historical and social roots and strategies? How do people reconstruct their society? Historical and current sources, including films, novels, and the Internet. GER:DB-Hum, EC-GlobalCom

3 units, Win (Samoff, J)

HISTORY 50A. Colonial and Revolutionary America

(Same as HISTORY 150A. History majors and others taking 5 units, register for 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution. GER:DB-SocSci, EC-AmerCul

3 units, Aut (Winterer, C)

HISTORY 50B. 19th Century America

(Same as HISTORY 150B. History majors and others taking 5 units, register in 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture. GER:DB-SocSci, EC-AmerCul

3 units, Win (Campbell, J)

HISTORY 50C. The United States in the Twentieth Century

(Same as HISTORY 150C. History majors and others taking 5 units, register for 150C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the changing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War. GER:DB-SocSci, EC-AmerCul

3 units, Spr (McGarry, D)

HISTORY 51S. Popular Violence in Nineteenth Century American Culture and Society

Social and cultural beginnings of nineteenth century American popular violence; popular memory, representations, and explanations of violence. Topics include westward expansion, White-American Indian relations, extermination, lynching, Reconstruction, urban culture, U.S. labor movement, sport, manliness, sex, gender, popular culture, American imperialism, historical memory, American identity, and public history. Sources include film, novels, newspapers, photographs, congressional testimony, and historical monographs.

5 units, Win (Viles, N), given once only

HISTORY 53S. Rebellion and Revolution in American History: From the Stamp Act to the Civil War

American rebellions and revolutions as well as American responses to similar events abroad. These episodes serve as windows into American ideas about democracy, equality, and liberty between the American Revolution and the Civil War. Topics include the American Revolution, Shays' Rebellion, American responses to the French and Haitian revolutions, American slave rebellions, and the Civil War. Sources include speeches, sermons, political pamphlets, editorials, letters, and cartoons.

5 units, Spr (Spillman, S), given once only

HISTORY 54. 19th-Century U.S. Cultural and Intellectual History, 1790-1860

(Same as HISTORY 154. History majors and others taking 5 units, register for 154.) How Americans considered problems such as slavery, imperialism, and sectionalism. Topics include: the political legacies of revolution; biological ideas of race; the Second Great Awakening; science before Darwin; reform movements and utopianism; the rise of abolitionism and proslavery thought; phrenology and theories of human sexuality; and varieties of feminism. Sources include texts and images. GER:DB-Hum, EC-AmerCul

3 units, not given this year

HISTORY 57. The Constitution: A Short History

(Same as POLISCI 128S) A broad survey of the Constitution, from its Revolutionary origins to the contemporary disputes over interpretation. Topics include the invention of the written constitution and interpretative canons; the origins of judicial review; the Civil War and Reconstruction as constitutional crises; the era of substantive due process; the rights revolution; and the Constitution in wartime. GER:EC-AmerCul

5 units, not given this year

HISTORY 58N. Thomas Jefferson and His World

(Stanford Introductory Seminar) Thomas Jefferson was the most cosmopolitan American of his age, yet he was also the one member of his generation about whom Americans continue to have the most vexed feelings. This seminar explores the many facets of Jefferson's life and personality, considering such topics as his political ideas and actions, his ideas about religion, education, property, race, and slavery, and the problem of applying moral judgment to historical actors.

4 units, Win (Rakove, J)

HISTORY 58S. Indians, Degenerates, and Debtors: Perceptions of Failure in 19th Century America

Survey of American perceptions of economic and facial failure between 1800 and the first decades of the 20th century. Topics include failure as an idea, narratives of self-improvement, scientific racism, and federal policy. Focus on how failure was created and how it linked groups, such as immigrants and Indians, in ways that were both unexpected and significant.

5 units, Spr (Hoy, B), given once only

HISTORY 59. Introduction to Asian American History

The historical experience of people of Asian ancestry in the U.S. Immigration, labor, community formation, family, culture and identity, and contemporary social and political controversies. Readings: interpretative texts, primary material, and historical fiction. GER:DB-SocSci, EC-AmerCul

5 units, not given this year

HISTORY 60S. Beyond the Nation: International Social Movements in the U.S. from World War I to World War II

Anarchism, socialism, feminism, pacifism, pan-Africanism. These and other international social movements thrived in the U.S. between WW I and WW II, a period usually characterized as isolationist. How did these movements' members, including Emma Goldman, Jane Addams, W.E.B. DuBois, and John DosPassos, articulate their goals both to themselves and to a broader public that was often suspicious of internationalism? Sources include speeches and manifestos, national and international newspapers letters, novels, film, archival documents, and international decrees.

5 units, Aut (Marino, K), given once only

HISTORY 61S. California Politics since the 1960s

The rise of modern political conservatism and its interplay with liberalism and the liberal state. Metropolitan development, civil

rights, the welfare state, law and order, and immigration. Grassroots, spatial, cultural, institutional, and biographical approaches to political history. The methodological challenges of writing academic history about the recent past. Media sources, public ballot proposition campaign materials, political speeches and essays, oral histories, government documents,court cases, maps, photographs, film, television, and music.

5 units, Aut (Richter, K), given once only

HISTORY 62N. The Atomic Bomb in Policy and History

(Stanford Introductory Seminar) Preference to freshmen. Emphasis is on declassified files from WW II and recent interpretations. Why did the U.S. drop A-bombs on Japan? Were there viable alternatives, and, if so, why were they not pursued? What did the use of the A-bombs mean then and later? How have postwar interpreters explained, and justified or criticized, the A-bombings? Approaches from history, international relations, American studies, political science, and ethics address the underlying conceptions, the roles of evidence, the logic and models of explanation, ethical values, and cultural/social influences. GER:DB-SocSci

5 units, Spr (Bernstein, B)

HISTORY 62S. Food Ways: The Politics, Culture, and Ecology of Food in American History

What did people eat, why did they eat it, and what were the consequences? This question asked of many periods and places in American history. How historians use many types of evidence and analysis in writing history. Focus on primary sources and interpretations. Topics include the cultural, political, and environmental meanings and consequences of food.

5 units, Win (Robichaud, A), given once only

HISTORY 64C. From Freedom to Freedom Now!: African American History, 1865-1965

(Same as AFRICAAM 64C) (Same as HISTORY 164C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music. GER:DB-SocSci, EC-AmerCul

3 units, Spr (Hobbs, A)

HISTORY 70. Culture, Politics, and Society in Latin America

Introduction to the political and social history of Latin America. Emphasis is on interactions among institutional change, social structure, and political movements, emphasizing the environment and cultural values. GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

HISTORY 70A. Colonial Latin America

(Same as HISTORY 170. History majors and others taking 5 units, register for 170.) 16th-19th centuries. Indigenous cultures. The arrival of Europeans and its impact on native and European societies. Culture, religion and institutions, and everyday life. The independence period and the formation of new nations. Readings include primary and secondary sources. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Herzog, T)

HISTORY 82C. From Prophet to Empire: The Making of the Muslim Middle East, 600-1500

(Same as HISTORY 182C. Majors and other taking 5 units, register for 182C.) Traces the establishment of a Muslim religious and political presence in the Middle East from the formative years of conquest in Arabia and early experiments in state formation to the emergence of empires defining the early modern world. Explores the construction of a remarkable social, intellectual and artistic culture out of the various indigenous and imported elements then available.

3 units, Aut (Ferguson, H)

HISTORY 82N. Modern Islamic Movements

(Stanford Introductory Seminar) Muslim political mobilization in local and global settings. Topics include: Pan-Islam, the Muslim Brothers, Khomeinism, Hezbollah, al-Qaeda, the Taliban, and the geopolitics of social movements.

5 units, Aut (Crews, R)

HISTORY 91C. Early Imperial China

(Same as HISTORY 191C. History majors and others taking 5 units, register for 191C.) The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy,and literature. Also examines the nature of empire as a distinctive political form. GER:DB-Hum

3 units, Spr (Lewis, M)

HISTORY 91D. China: The Northern and Southern Dynasties

(Same as HISTORY 191D. History majors and others taking 5 units, register for 191D.) Examines one of the most dynamic periods of Chinese history with the emergence of the institutional religions (Buddhism and Daoism), the development of the garden as an art form, the rise of landscape as a theme of verse and art, the invention of lyric poetry, and the real beginnings of the southward spread of Chinese civilization. GER:DB-Hum

3 units, not given this year

HISTORY 92A. The Historical Roots of Modern East Asia

(Same as HISTORY 392E) Focus is on China and Japan before and during their transition to modernity. The populous, urbanized, economically advanced, and culturally sophisticated Ming empire and Muromachi shogunate in the 16th century when Europeans first arrived. How the status quo had turned on its head by the early 20th century when European and American steamships dominated the Pacific, China was in social and political upheaval, and Japan had begun its march to empire. GER:DB-SocSci, EC-GlobalCom

4-5 units, not given this year

HISTORY 92S. What is China; Who are Chinese?: Cultural Identity in Ancient and Medieval China

What did it mean to be Chinese in ancient and medieval times; how did this identity differ from that of contemporary China; and how did other social in-groups overlap upon a Chinese individual? Primary source readings evidence a multiplicity of definitions: cultural, political, geographic, familial, and religious. These ancient sources challenge modern notions of China's perpetual unification, its ethnic homogeneity, its insular nature, and the distinction between native and conquest dynasties.

5 units, Aut (Felt, D), given once only

HISTORY 93. Late Imperial China

(Same as HISTORY 193. History majors and others taking 5 units, register for 193.) A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism. GER:DB-Hum

3 units, Aut (Sommer, M)

HISTORY 94B. Japan in the Age of the Samurai

(Same as HISTORY 194B. History majors and others taking 5 units, register for 194B.) From the Warring States Period to the Meiji Restoration. Topics include the three great unifiers, Tokugawa hegemony, the samurai class, Neoconfucian ideologies, suppression of Christianity, structures of social and economic control, frontiers, the other and otherness, castle-town culture, peasant rebellion, black marketing, print culture, the floating world, National Studies, food culture, samurai activism, black ships, unequal treaties, anti-foreign terrorism, restorationism, millenarianism, modernization as westernization, Japan as imagined community. GER:DB-Hum

3 units, Aut (Wigen, K)

HISTORY 94S. Rebels, Boxers and Bandits: Violent Resistance in Late Imperial China

In the mid-19th century a man claiming to be Jesus Christ's younger brother led a rebellion that killed 20 million. In 1900, the Boxers United in Righteousness staged a bloody uprising. Bandits, something in Western women's clothing, raided across the country. How did these rebels, Boxers and bandits see themselves? How were they represented by others? What were their relations to the state? Do they mean anything? Are they important?

5 units, not given this year

HISTORY 95. Modern Korean History

(Same as HISTORY 195. History majors and others taking 5 units, register for 195.) Themes include status, gender, and monarchy in

the Choson dynasty; intellectual life and social transformation in the 19th century; the rise of Korean nationalism; Japan's colonial rule and Korean identities; culture, economy, and society in colonial Korea; the Korean War, and the different state building processes in North and South after the Korean War. GER:DB-Hum, EC-GlobalCom

3 units, Aut (Moon, Y)

HISTORY 95C. Modern Japanese History

(Same as History 195C. History majors and others taking 5 units, register for 195C.) Japan's modern transformation from the late 19th century to the present. Topics include: the Meiji revolution; industrialization and social dislocation; the rise of democracy and empire; total war and US occupation; economic miracle and malaise; Japan as soft power; and politics of memory. Readings and films focus on the lived experience of ordinary men and women across social classes and regions. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Uchida, J)

HISTORY 95N. Mapping the World: Cartography and the Modern Imagination

(Stanford Introductory Seminar) Preference to freshmen. Focus is on cutting-edge research. Topics: the challenge of grasping the globe as a whole; geography's roots in empire; maps as propaganda and as commodities; the cultural production of scale; and the cartography of imaginery worlds.Sources include resources in the Green Library Special Collections and in the Stanford Spatial History Lab. GER:DB-SocSci

5 units, Spr (Wigen, K)

HISTORY 96. The Idea of India

(Same as HISTORY 196. History majors and others taking 5 units, register for 196.) History and politics of the Indian subcontinent across two centuries of transformation. Topics: interactions among colonial power, nationalism, and modern institutions; S. Asia at the crossroads of world history in an age of empire, capitalism, and war; history and memory through political traditions, social movements, and religious experiences that shaped S. Asian modernity; from Edmund Burke to Gandhi; East India Company's statemaking to origins of nationality; Tagore to Iqbal; peasants and rebels to liberals and revolutionaries; decolonization and Partition. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Kumar, A)

HISTORY 98. The History of Modern China

(Same as HISTORY 198. History majors and others taking 5 units, register for 198.) Major historical transformations including the decline of the last imperial dynasty, the formation of the first Chinese republic, WW II, the rise of Communism, China under Mao, post-Mao reforms, and the Beijing Olympics of 2008. GER:DB-SocSci

3 units, Spr (Miller, L)

HISTORY 102. The History of the International System

World politics and international relations from the dominance of empires and nation states at the turn of the century to the present. The influence of communism, fascism, and anti-imperialism, and the emergence of society as a factor in international relations. Questions of sovereignty versus the new world order. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Sheehan, J)

HISTORY 103D. Human Society and Environmental Change

(Same as EARTHSYS 112, EESS 112) Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A

4 units, Aut (Naylor, R; Frank, Z; Pizarro Gariazzo, R)

HISTORY 103E. History of Nuclear Weapons

(Same as POLISCI 116) The development of nuclear weapons and policies. How existing nuclear powers have managed their relations with each other. How nuclear war has been avoided so far and whether it can be avoided in the future. GER:DB-SocSci

5 units, not given this year

HISTORY 104. Trials that Made History: Courtroom Martyrs and Villains from the Classical to Modern Period

Socrates, the Knights Templar, Galileo, Salem witchcraft, and the Scopes (monkey) trials. How trials reflect cultural conflicts and political climate. Tensions between individuals and the state and between science and religion that are evident in trials. The role of trials in public discourse. Trial as drama. Reading assignments are interdisciplinary and range from surviving trial transcripts to the work of literary scholars and filmmakers. GER:DB-Hum

5 units, not given this year

HISTORY 105. Gandhi, King, and Nonviolence

(Same as RELIGST 118) Lives, times, theory, and practice of Mohandas Gandhi and Martin Luther King, Jr.; their significance to issues of violence and nonviolence today. GER:DB-Hum

4 units, not given this year

HISTORY 106A. Global Human Geography: Asia and Africa

Global patterns of demography, economic and social development, geopolitics, and cultural differentiation, covering E. Asia, S. Asia, S.E. Asia, Central Asia, N. Africa, and sub-Saharan Africa. Use of maps to depict geographical patterns and processes. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Lewis, M)

HISTORY 106B. Global Human Geography: Europe and Americas

Patterns of demography, economic and social development, geopolitics, and cultural differentiation. Use of maps to depict geographical patterns and processes. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Lewis, M)

HISTORY 106C. Global Historical Geography

The sweep of human history through the medium of maps. The rise, expansion, and fall of kingdoms, empires, and other states; the spread of major religions; the paths of explorers, conquerors, and diseases; and the development and intensification of trade networks. Overview of the prehistoric period and ancient times, but focus is on the modern world. GER:DB-SocSci

5 units, not given this year

HISTORY 107. Introduction to Feminist Studies

(Same as CSRE 108, FEMST 101) Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analysis of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.

5 units, Aut (Freedman, E)

HISTORY 108. Mass Violence in Modern History

The evolution, varieties, and logic of mass violence in modern history. Social, political, ethno-national, revolutionary, and religious violence, and efforts to curtail them. The emergence of genocide as an international issue; colonial genocides in late 19th-century Africa; and the Armenian genocide in the Ottoman Empire; Nazi and Nazi inspired racial murder; Communist induced mass violence in the Soviet Union and Asia; ethnic cleansing in former Yugoslavia; the recent genocides in Rwanda and Sudan; and attempts to confront genocides and crimes against humanity in international courts and institutions. GER:DB-SocSci

5 units, Win (Weiner, A)

HISTORY 110B. Early Modern Europe

(Same as HISTORY 10B. History majors and others taking 5 units, register for 110B.) Survey of early modern European history from the Reformation through the Enlightenment. Topics include religious war, state building and revolt, exploration and colonialism, gender and society. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Stokes, L)

HISTORY 110C. Introduction to Modern Europe

(SAME as HISTORY 10C. History majors and others taking 5 units, register for 110C.) From the late 18th century to the present. How Europeans responded to rapid social changes caused by political upheaval, industrialization, and modernization. How the experience and legacy of imperialism and colonialism both influenced European society and put in motion a process of globalization that continues to shape international politics today. GER:DB-Hum

5 units, Win (Daughton, J)

HISTORY 110D. Europe in the High and Late Middle Ages, 1000-1500

Explores the history of Europe during the high and late medieval period, circa 1000-1500. This was a dynamic period of transformation for Europeans as they moved from an overwhelmingly agri-

cultural society, based upon strong local ties and limited exposure to the outside world to one that witnessed an era of religious crusades, the rise of urban communes, catastrophic epidemics, social unrest, a revival of Ancient learning, and the beginning of European expansion into the Americas and beyond.

5 units, Spr (Selwyn, J)

HISTORY 120B. The Russian Empire

From Peter the Great to the Bolsheviks. Russia as an empire; its varied regions, including the Caucasus, Central Asia, Ukraine, Poland, and the Baltics. Focus is on the politics and cultures of empire. Sources include novels, political tracts, paintings, music, and other primary sources. GER:DB-Hum

5 units, not given this year

HISTORY 120C. 20th-Century Russian and Soviet History

The Soviet polity from the 1917 Revolution to its collapse in 1991. Essentials of Marxist ideology; the Russian Empire in 1917. Causation in history; interpretations of the Revolution; state building in a socialist polity; social engineering through collectivization of agriculture, force-paced industrialization, and cultural revolution; terror as concept and practice; nationality policies in a multiethnic socialist empire; the routinization, decline, and collapse of the revolutionary ethos; and the legacy of the Soviet experiment in the new Russia. GER:DB-Hum

5 units, not given this year

HISTORY 125. 20th-Century Eastern Europe

Major historical trends in 20th-century E. European history. Empires and national movements. The creation of independent Eastern Europe after WW I; social movements and the emergence of dictatorships and fascism in the inter-war period. WW II, Stalinism, and destalinization in contemporary E. Europe. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Jolluck, K)

HISTORY 130A. The Rise of Scientific Medicine

Intellectual, social, and institutional dimensions, 19th and 20th centuries. How did medicine become scientific? What differences did science make to the practicing physician? Why did it displace other approaches to medicine? Topics: the development of experimental physiology, bacteriology, pharmacology, biomedical technology, nuclear medicine, biomedical imaging, computers in medicine, and prospects for bedside gene therapies; the effects of scientific developments on medical practice and therapy; the professionalization of medicine in comparative European and American contexts.

4-5 units, Spr (Horn, M)

HISTORY 131. Science, Technology and Art: The Worlds of Leonardo da Vinci

(Same as HISTORY 31) What did Leonardo actually know? How did he acquire that knowledge? Leonardo's interests and accomplishments in such fields as painting, architecture, engineering, physics, mathematics, geology, anatomy, and physiology, and more generally the nature of Renaissance science, art, and technology. The relationship between the society of 15th-century Italy and the work of the man from Vinci: why did this world produce a Leonardo? How to use him to understand creativity, innovation, and invention in the Renaissance and beyond. What was his legacy and how did he become a myth? For students interested in the history of science, medicine, and technology and for students interested in the history and art of Renaissance Italy.

3-5 units, Win (Findlen, P)

HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe

What war meant for foot soldiers and the peasants across whose fields they marched. Ordinary people's lives in the eras of Machiavelli, Shakespeare, the Reformation, and the scientific revolution. Topics include: birth, marriage, and death; city life and peasant culture; lay encounters with religious and intellectual ideas; war and crime; and gender and sexuality. GER:DB-Hum

5 units, not given this year

HISTORY 132A. Enlightenment and the Arts

(Same as HISTORY 32A. History majors and others taking 5 units enroll in 132A.) Gateway course for the History, Literature, and the Arts track of the History major. Novels, poetry, music, paintings, and architecture, and what they reveal about the society that produced them. GER:DB-Hum

5 units, Spr (Lougee Chappell, C)

HISTORY 133A. Blood and Roses: The Age of the Tudors

English society and state from the Wars of the Roses to the death of Elizabeth. Political, social, and cultural upheavals of the Tudor period and the changes wrought by the Reformation. The establishment of the Tudor monarchy; destruction of the Catholic church; rise of Puritanism; and 16th-century social and economic changes. GER:DB-Hum

5 units, not given this year

HISTORY 133B. Revolutionary England: The Stuart Age

(Same as HISTORY 33B. History majors and others taking 5 units, register for 133B.) From the accession of King James I in 1603 to the death of Queen Anne in 1714: a brutal civil war, the execution of one anointed king, and the deposition of another. Topics include the causes and consequences of the English Revolution, the origins of Anglo-American democratic thought, the rise and decline of Puritanism, and the emergence of England as an economic and colonial power. (Como) GER:DB-Hum

5 units, Win (Como, D)

HISTORY 135. History of European Law, Medieval to Contemporary

(Same as HISTORY 335) From the fall of the Roman Empire to the establishment of the EU. How law changed over time. Sources and nature of law, organization of legal systems, and relationships between law and society, law and lawmaker, law and the legal professions. GER:DB-SocSci

4-5 units, Aut (Herzog, T)

HISTORY 135A. Globalization and the Making of Modern Europe

How modern Europe came to be connected to the wider world through repeated cycles of expansion, circulation, and exchange from the mid-19th century to the present. Wateshed moments and the roles of colonialism, migration, commerce, warfare, telecommunications, and popular culture in redefining the place of Europe in a changing global landscape.

5 units, Spr (Naranch, B)

HISTORY 137. The Holocaust

(Same as HISTORY 337, JEWISHST 183, JEWISHST 383) The emergence of modern racism and radical anti-Semitism. The Nazi rise to power and the Jews. Anti-Semitic legislation in the 30s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry. GER:DB-Hum

4-5 units, Spr (Zipperstein, S)

HISTORY 137A. Europe, 1945-2002

Europe's transformation from the end of WW II to an expanded EU. Political, cultural, economic, and social history. Topics: postwar reconstruction, Cold War, consumer versus socialist culture, collapse of Communism, postcommunist integration. GER:DB-SocSci

5 units, not given this year

HISTORY 138A. Germany and the World Wars, 1870-1990

(Same as HISTORY 38A. Majors and others taking 5 units, enroll in 138A.) Germany's history from Bismarck's wars of unification through the end of the Cold War. The radicalizing relationship between international conflict, social upheaval, and state transformation with a focus on the clashes of the Second Empire, the road to WW I, interwar instability, the rise of Nazism, WW II, the Holocaust, the division of communist E. and capitalist W. Germany, and the fall of the Iron Curtain. GER:DB-SocSci

5 units, Spr (Sheffer, E)

HISTORY 139. Modern Britain and the Empire

(Same as HISTORY 39. History majors and others taking 5 units, register in 139.) From American Independence to the latest war in Iraq. Topics include: the rise of the modern British state and economy; imperial expansion and contraction; the formation of class, gender, and national identities; mass culture and politics; the world wars; and contemporary racial politics. Focus is on questions of decline, the fortunes and contradictions of British liberalism in an era of imperialism, and the weight of the past in contemporary Britain. GER:DB-Hum, EC-GlobalCom, EC-GlobalCom

5 units, Spr (Satia, P)

HISTORY 140. World History of Science: From Prehistory to the Scientific Revolution

(Same as HISTORY 40. History majors and others taking 5 units, register for 140.) The earliest developments in science, the prehis-

toric roots of technology, the scientific revolution, and global voyaging. Theories of human origins and the oldest known tools and symbols. Achievements of the Mayans, Aztecs, and native N. Americans. Science and medicine in ancient Greece, Egypt, China, Africa, and India. Science in medieval and Renaissance Europe and the Islamic world including changing cosmologies and natural histories. Theories of scientific growth and decay; how science engages other factors such as material culture and religions. GER:DB-SocSci

5 units, not given this year

HISTORY 140A. The Scientific Revolution

What do people know and how do they know it? What counts as scientific knowledge? In the 16th and 17th centuries, understanding the nature of knowledge engaged the attention of individuals and institutions including Copernicus, Galileo, Descartes, Newton, the early Royal Society, and less well-known contemporaries. New meanings of observing, collecting, experimenting, and philosophizing, and political, religious, and cultural ramifications in early modern Europe. GER:DB-Hum

5 units, not given this year

HISTORY 141A. The Emergence of Medicine: The Middle Age and the Renaissance

(Same as HISTORY 41A. History majors and others taking 5 units, register for 141A.) How did medicine emerge as a distinctive body of knowledge and a profession? The history of medicine from ca. 1000 to 1750. Topics: new ways of examining and treating the body; the religious and cultural significance of disease; the development of hospitals; and the rise of public health systems. Comparison of the status of medicine in Europe and the Islamic world. The work of key figures such as Vesalius and Harvey. GER:DB-SocSci

5 units, not given this year

HISTORY 142. Darwin in the History of Life

(Same as HISTORY 42. History majors and others taking 5 units, register for 142.) Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evo-devo, neocatastrophism, and the new technological frontier of biomimicry. GER:DB-SocSci

5 units, not given this year

HISTORY 144. Gender in Science, Medicine and Engineering

(Same as HISTORY 344) Men's and women's roles in science, medicine, and engineering over the past 200 years with a focus on the present. What are the efforts underway globally to transform science, medicine, and engineering into fields where women can flourish? How have science and medicine studied and defined males and females? Can gender analysis spark creativity in human knowledge? GER:DB-SocSci, EC-Gender

4-5 units, not given this year

HISTORY 145A. Africa Until European Conquest

Episodes in African history from the earliest records up until European partition of the continent, focusing on how knowledge about the natural, social, and spiritual worlds was linked to the exercise of power. The effects of technological innovations on states and other forms of social complexity; use of religious beliefs and practices to legitimate or critique authority. The effects of slave trades and imperial conquest on these forms of authority. WIM GER:DB-Hum, EC-GlobalCom

5 units, not given this year

HISTORY 145B. Africa in the 20th Century

(Same as HISTORY 45B. History majors and others taking 5 units, register for 145B.) The challenges facing Africans from when the continent fell under colonial rule until independence. Case studies of colonialism and its impact on African men and women drawn from West, Central, and Southern Africa. Novels, plays, polemics, and autobiographies written by Africans. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Thornberry, E)

HISTORY 147. History of South Africa

(Same as HISTORY 47. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis. GER:DB-SocSci

5 units, Aut (Campbell, J)

HISTORY 150A. Colonial and Revolutionary America

(Same as AMSTUD 150A) (Same as HISTORY 50A. History majors and others taking 5 units, register for HISTORY 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution. GER:DB-SocSci, EC-AmerCul

5 units, Aut (Winterer, C)

HISTORY 150B. 19th-Century America

(Same as AMSTUD 150B) (Same as HISTORY 50B. History majors and others taking 5 units, register for 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture. GER:DB-SocSci, EC-AmerCul, WIM

5 units, Win (Campbell, J)

HISTORY 150C. The United States in the Twentieth Century

(Same as AMSTUD 150C) (Same as HISTORY 50C. History majors and others taking 5 units, register for 150C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the changing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War. GER:DB-SocSci, EC-AmerCul

5 units, Spr (McGarry, D)

HISTORY 154. 19th-Century U.S. Cultural and Intellectual History, 1790-1860

(Same as HISTORY 54. History majors and others taking 5 units, register for 154.) How Americans considered problems such as slavery, imperialism, and sectionalism. Topics include: the political legacies of revolution; biological ideas of race; the Second Great Awakening; science before Darwin; reform movements and utopianism; the rise of abolitionism and proslavery thought; phrenology and theories of human sexuality; and varieties of feminism. Sources include texts and images. GER:DB-Hum, EC-AmerCul

5 units, not given this year

HISTORY 158. The United States Since 1945

Focus is on foreign policy and politics with less attention to social and intellectual history. Topics include nuclear weapons in WW II, the Cold War, the Korean and Vietnam wars, Eisenhower revisionism, the Bay of Pigs and Cuban missile crisis, civil rights and the black freedom struggle, the women's movement, the Great Society and backlash, welfare policy, conservatism and liberalism, the 60s anti-war movement, Watergate and the growth of executive power, Iran-Contra and Reagan revisionism, Silicon Valley, the Gulf War, the Clinton impeachment controversy, 2004 election, and 9/11 and Iraq war. GER:DB-SocSci, EC-AmerCul

4-5 units, not given this year

HISTORY 161. WOMEN IN MODERN AMERICA

(Same as AMSTUD 161, CSRE 162) The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements. GER:DB-SocSci, EC-Gender

4-5 units, Spr (Freedman, E)

HISTORY 163. A History of North American Wests
The history, peoples, and natural systems of a region that has never been contained within a single empire or nation state, but has been united by the movement of peoples, species, and things. Topics include smallpox, horses, gold, salmon, rivers, coal, and oil. GER:DB-SocSci

5 units, not given this year

HISTORY 164C. From Freedom to Freedom Now: African American History, 1865-1965
(Same as AMSTUD 164C) (Same as HISTORY 64C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music. GER:DB-SocSci, EC-AmerCul

5 units, Spr (Hobbs, A)

HISTORY 165. Mexican American History through Film
Focus is on the 20th century. Themes such as immigration, urbanization, ethnic identity, the role of women, and the struggle for civil rights. GER:DB-Hum, EC-AmerCul

4-5 units, not given this year

HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
(Same as AMSTUD 166) Focus is on political thought and protest movements after 1930. Individuals who have shaped and been shaped by modern African American struggles for freedom and justice. Sources include audiovisual materials. Research projects required for fifth unit. GER:DB-SocSci, EC-AmerCul

4-5 units, Win (Carson, C)

HISTORY 166B. Immigration in 20th Century America: Ethnicity, Race, Nation
How immigration of people from around the world and migration within the U.S. shaped American nation building and ideas about national identity in the 20th century. How ideas about race, gender, ethnicity, and citizenship with respect to particular groups led to policies both of exclusion and integration. How American views of race and citizenship in the post-Reconstruction era led to the passage of the Chinese Exclusion Act in 1882 and subsequently to broader exclusions of immigrants from other parts of Asia and Southern and Eastern Europe and Mexico. How WW II and the Cold War challenged racial ideologies and led to policies of increasing liberalization culminating in the passage of the 1965 Immigration Act, which eliminated quotas based on national origins and opened the door for new waves of immigrants, especially from Asian and Latin America.

5 units, Win (McKibben, C)

HISTORY 168. American History in Film: Since World War ll
U.S. society, culture, and politics since WW II through feature films. Topics include: McCarthyism and the Cold War; ethnicity and racial identify; changing sex and gender relationships; the civil rights and anti-war movements; and mass media. Films include The Best Years of Our Lives, Salt of the Earth, On the Waterfront, Raisin in the Sun, Medium Cool, and Broadcast News. GER:DB-Hum

3-4 units, Sum (Carroll, P)

HISTORY 170. Colonial Latin America
(Same as HISTORY 70A. History majors and others taking 5 units, register for 170.) 16th-19th centuries. Indigenous cultures. The arrival of Europeans and its impact on native and European societies. Culture, religion and institutions, and everyday life. The independence period and the formation of new nations. Readings include primary and secondary sources. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Herzog, T)

HISTORY 181B. Formation of the Contemporary Middle East
(Formerly 187B.) The history of the Middle East since WW I, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula, with attention to Turkey, Iran, and Israel. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Beinin, J)

HISTORY 182C. From Prophet to Empire: The Making of the Muslim Middle East, 600-1500
(Same as HISTORY 82C. Majors and other taking 5 units, register for 182C.) Traces the establishment of a Muslim religious and political presence in the Middle East from the formative years of conquest in Arabia and early experiments in state formation to the emergence of empires defining the early modern world. Explores the construction of a remarkable social, intellectual and artistic culture out of the various indigenous and imported elements then available. GER:DB-SocSci

5 units, Aut (Ferguson, H)

HISTORY 183. Modern Iran
Topics include: the Safavid and Qajar empires, European imperialism in Iran, the Iranian revolutions, Khomeinism, the Islamic Republic, recent film and literature, and the politics of Ahmadinejad.

5 units, Win (Crews, R)

HISTORY 185B. Jews in the Modern World
(Same as JEWISHST 185B) Possible themes: the restructuring of Jewish existence during the Enlightenment and legal emancipation at the end of the 18th century in W. Europe, the transformation of Jewish life in E. Europe under the authoritarian Russian regime, colonialism in the Sephardic world, new ideologies (Reform Judaism and Jewish nationalisms), the persistence and renewal of antisemitism, the destruction of European Jewry under the Nazis, new Jewish centers in the U.S., and the State of Israel. GER:DB-Hum, EC-GlobalCom

5 units, Win (Zipperstein, S)

HISTORY 186D. Jews, Citizenship, and Europe's Others
(Same as JEWISHST 186D) The paths of assimilation of Jews in Europe, and their integration as citizens is examined alongside other cases of Europe's Others, those who introduced diversity and challenged modes of assimilation. Looks at the development of Jews as citizens and compares the debates on the Jewish Question to other debates in Europe on the integration of other Others, such as former colonial subjects, immigrants, Gypsies, ans Muslims in the nineteenth and twentieth centuries.

5 units, Aut (Roberts, S)

HISTORY 187D. Zionism and Its Critics
(Same as JEWISHST 187D) Zionism from its genesis in the 1880s up until the establishment of the state of Israel in May, 1948, exploring the historical, ideological and political dimensions of Zionism. Topics include: the emergence of Zionist ideology in connection to and as a response to challenges of modernity; emancipation; Haskalah (Jewish enlightenment); other national and ideological movements of the period; the ideological crystallization of the movement; and the immigration waves to Palestine.

4-5 units, Aut (Dubnov, A)

HISTORY 191C. Early Imperial China
(Same as HISTORY 91C. History majors and others taking 5 units, register for 191C.) The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy,and literature. Also examines the nature of empire as a distinctive political form. GER:DB-Hum

5 units, Spr (Lewis, M)

HISTORY 191D. China: The Northern and Southern Dynasties
(Same as HISTORY 91D. History majors and others taking 5 units, register for 191D.) Examines one of the most dynamic periods of Chinese history with the emergence of the institutional religions (Buddhism and Daoism), the development of the garden as an art form, the rise of landscape as a theme of verse and art, the invention of lyric poetry, and the real beginnings of the southward spread of Chinese civilization. GER:DB-Hum

5 units, not given this year

HISTORY 192. China: The Early Empires
How China was transformed as a consequence of its political unification by the Qin dynasty. The geographical reorganization of China in the process of unification. The changing nature of rulership, cities, rural society, military organization, kinship structure, religion, literary practice, law, and relations to the outside world. The nature of empire as a political system. GER:DB-Hum

3-5 units, not given this year

HISTORY 193. Late Imperial China
(Same as HISTORY 93. History majors and others taking 5 units, register for 193.) A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism. GER:DB-Hum

5 units, Aut (Sommer, M)

HISTORY 194B. Japan in the Age of the Samurai
(Same as HISTORY 94B. History majors and others taking 5 units, register for 194B.) From the Warring States Period to the Meiji Restoration. Topics include the three great unifiers, Tokugawa hegemony, the samurai class, Neoconfucian ideologies, suppression of Christianity, structures of social and economic control, frontiers, the other and otherness, castle-town culture, peasant rebellion, black marketing, print culture, the floating world, National Studies, food culture, samurai activism, black ships, unequal treaties, anti-foreign terrorism, restorationism, millenarianism, modernization as westernization, Japan as imagined community. GER:DB-Hum

5 units, Aut (Wigen, K)

HISTORY 195. Modern Korean History
(Same as HISTORY 95. History majors and others taking 5 units, register for 195.) Themes include status, gender, and monarchy in the Choson dynasty; intellectual life and social transformation in the 19th century; the rise of Korean nationalism; Japan's colonial rule and Korean identities; culture, economy, and society in colonial Korea; the Korean War, and the different state buildling processes in North and South after the Korean War. GER:DB-Hum, EC-GlobalCom, EC-GlobalCom

5 units, Aut (Moon, Y)

HISTORY 195C. Modern Japanese History
(Same as HISTORY 95C. History majors and others taking 5 units, register for 195C.) Japan's modern transformation from the late 19th century to the present. Topics include: the Meiji revolution; industrialization and social dislocation; the rise of democracy and empire; total war and US occupation; economic miracle and malaise; Japan as soft power; and politics of memory. Readings and films focus on the lived experience of ordinary men and women across social classes and regions. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Uchida, J)

HISTORY 196. The Idea of India
(Same as HISTORY 96. History majors and others taking 5 units, register for 196.) History and politics of the Indian subcontinent across two centuries of transformation. Topics: interactions among colonial power, nationalism, and modern institutions; S. Asia at the crossroads of world history in an age of empire, capitalism, and war; history and memory through political traditions, social movements, and religious experiences that shaped S. Asian modernity; from Edmund Burke to Gandhi; East India Company's statemaking to origins of nationality; Tagore to Iqbal; peasants and rebels to liberals and revolutionaries; decolonization and Partition. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Kumar, A)

HISTORY 197. Southeast Asia: From Antiquity to the Modern Era
The history of S.E. Asia, comprising Indonesia, the Philippines, Malaysia, Singapore, Thailand, Vietnam, Burma, Cambodia, and Laos, from antiquity to the present. The spread of Indian cultural influences, the rise of indigenous states, and the emergence of globally linked trade networks. European colonization, economic transformation, the rise of nationalism, the development of the modern state, and the impact of globalization. GER:DB-Hum

5 units, Spr (Lewis, M)

HISTORY 198. The History of Modern China
(Same as HISTORY 98. History majors and others taking 5 units, register for 198.) Major historical transformations including the decline of the last imperial dynasty, the formation of the first Chinese republic, WW II, the rise of Communism, China under Mao, post-Mao reforms, and the Beijing Olympics of 2008. GER:DB-SocSci, DB-SocSci, EC-GlobalCom

5 units, Spr (Miller, L)

HISTORY 198B. The Construction of Modern China through Space and Time
An analysis of modern China through sequentially examining the diverse regions that constitute it. Beginning from the geographic structures that divided the regions, and those that drew them together it will then study each region under several major rubrics: (1) their economic, cultural, and demographic characteristics; (2) the time and manner in which they were incorporated into China (3) their long-term environmental development (water control, deforestation, desertification, etc.); and (4) how the above features shape many of the issues and tensions that define contemporary China.

3 units, Sum (Lewis, M)

HISTORY 201. Introduction to Public History in the U.S.,19th Century to the Present
(Same as HISTORY 301) Gateway course for the History and Public Service interdisciplinary track. Topics include the production, presentation, and practice of public history through narratives, exhibits, web sites, and events in museums, historical sites, parks, and public service settings in nonprofit organizations, government agencies, and educational institutions. GER:DB-SocSci

4-5 units, Aut (McKibben, C)

HISTORY 202. International History and International Relations Theory
(Same as HISTORY 306E, POLISCI 216E, POLISCI 316) The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system. GER:DB-SocSci

5 units, not given this year

HISTORY 202C. Heretics to Headscarves
(Same as JEWISHST 182C, POLISCI 224H) Broad survey of religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.

5 units, Aut (Rakove, J)

HISTORY 203E. Global Catholicism
(Same as HISTORY 303E) Explores the rise of Catholicism as a global phenomenon, and investigates its multiple transformations as it spread to the Americas, Asia, and Africa. Topics will include the Reformation, Tridentine reform and the Jesuits, the underground churches in England and the Dutch Republic, the missions to Asia, the Spanish conquest of Latin America, conversion and indigenous religions, missionary imperialism and new religious movements in the non-European world.

4-5 units, Spr (Sena, M)

HISTORY 204E. Origins of Totalitarianism
(Same as HISTORY 307E) Modern revolutionary and totalitarian politics. Sources include monographs on the medieval, Reformation, French Revolutionary, and Great War eras. Topics: the essence of modern ideology, the concept of the body national, state terror, charismatic leadership, gender assignments, private and public spheres, and identities. GER:DB-SocSci, EC-GlobalCom

4-5 units, Spr (Weiner, A)

HISTORY 204F. The Modern Tradition of Non-Violent Resistance
During the twentieth century, peasants and menial laborers who comprised the majority of humanity launched liberation movements to secure citizenship rights. Mohandas K. Gandhi, Martin Luther King, Jr., and Nelson Mandela are among the leaders whose ideas continue to influence contemporary movements for global peace with social justice in a sustainable environment.

5 units, Aut (Carson, C)

HISTORY 204G. War, Culture, and Society in the Modern Age
(Same as HISTORY 304G) How Western societies and cultures have responded to modern warfare. The relationship between its destructive capacity and effects on those who produce, are subject

to, and must come to terms with its aftermath. Literary representations of WW I; destructive psychological effects of modern warfare including those who take pleasure in killing; changes in relations between the genders; consequences of genocidal ideology and racial prejudice; the theory of just war and its practical implementation; and how wars are commemorated. GER:DB-SocSci

5 units, not given this year

HISTORY 206. History and Geography of Contemporary Global Issues

The historical background and geographical context of contemporary global issues and events. Texts are a world atlas and regular reading of The New York Times and The Economist. Topics vary according to what is happening in the world. Student presentations. GER:DB-SocSci

5 units, Aut (Lewis, M)

HISTORY 207. Biography and History

(Same as HISTORY 308) The relationship between biographical and historical writing, primarily in Europe and America. Problems of methodology, evidence, dispassion, and empathy. Texts: biographies, critical literature on biographical work, and novels (A. S. Byatt's Possession, Bernard Malamud's Dubin's Lives) that illuminate the intellectual underpinnings of biographical labor. GER:DB-Hum

4-5 units, not given this year

HISTORY 207C. The Global Early Modern

(Same as HISTORY 307C) In what sense can we speak of ""globalization"" before modernity? What are the characteristics and origins of the economic system we know as ""capitalism""? When and why did European economies begin to diverge from those of other Eurasian societies? With these big questions in mind, the primary focus will be on the history of Europe and European empires, but substantial readings deal with other parts of the world, particularly China and the Indian Ocean.

4-5 units, Spr (Como, D)

HISTORY 208. Private Lives, Public Stories: Autobiography in Women's History

Changing contexts of women's lives and how women's actions have shaped and responded to those contexts. GER:DB-Hum, EC-Gender

5 units, not given this year

HISTORY 208A. Science and Law in History

(Same as HISTORY 308A) How the intertwined modern fields of science and law, since the early modern period, together developed central notions of fact, evidence, experiment, demonstration, objectivity, and proof. GER:DB-SocSci

4-5 units, not given this year

HISTORY 208B. Women Activists' Response to War

(Same as HISTORY 308B) Theoretical issues, historical origins, changing forms of women's activism in response to war throughout the 20th century, and contemporary cases, such as the Russian Committee of Soldiers Mothers, Bosnian Mothers of Srebrenica, Serbian Women in Black, and the American Cindy Sheehan. Focus is on the U.S. and Eastern Europe, with attention to Israel, England, and Argentina. GER:DB-Hum, EC-Gender

4-5 units, not given this year

HISTORY 208S. Facing the Past: The Politics of Retrospective Justice

Forms of injustice in history including slavery, genocide, ethnic cleansing, mass rape, forced religious conversion, and torture of prisoners. Mechanisms developed over the last century to define, deter, and alleviate the effects of such offenses, including war crimes tribunals, truth commissions, national apologies, and monetary reparations. Case studies chart the international field of retrospective justice, exploring the legal, political, and moral implications of confronting traumatic pasts. GER:DB-SocSci

5 units, Aut (Campbell, J)

HISTORY 209B. Concepts of the Political

(Same as HISTORY 309B) What is the present? Can it stand on its own, without invoking history and without promising a future? How did the 20th century make sense of itself, as violent and ruptured from all preceding centuries as it was, yet so prolific and promising in its revolutionary achievements and futures? The century through four concepts: time, ambiguity, cruelty, and crisis. 20th-century politics through what happened to dialectic, humanism, history, and Europe.

4-5 units, Spr (Kumar, A)

HISTORY 209C. Liberalism and Violence

What place does violence have in modern political thought? Liberalism eschews violence, yet condones moral war. Marxism justifies revolutionary violence. Anticolonialism invokes insurgency. Gandhi seeks truth in nonviolent suffering. Can modern politics and life be grasped without reference to violence? How is violence related to law and justice? Is there a theology of violence? Liberalism and its critics: Agamben, Arendt, Benjamin, Derrida, Fanon, Foucault, Gandhi, Heidegger, Nietzche, Schmitt, and Sorel. Biopolitics, civil society, friend/enemy, sovereignty, terror, and strikes. GER:EC-EthicReas

5 units, Win (Kumar, A)

HISTORY 209D. Postcolonialism and Universalism

(Same as HISTORY 309A) Key texts and motifs from postcolonial theory: empire, class, exile, suffering, textuality, archive in juxtaposition to 20th-century philosophical questions about universal history and the relevance of humanist inquiry.

4-5 units, Spr (Kumar, A)

HISTORY 209S. Research Seminar for Majors

Required of History majors. How to conduct original, historical research and analysis, including methods such as using the libraries and archives at Stanford and elsewhere, and working collaboratively to frame topics, identify sources, and develop analyses. Autumn quarter focuses on European Lit and Arts; winter quarter on U.S. History and Colonialism; spring quarter on modern Europe, ancient China and early modern Europe.

5 units, Aut (Lougee Chappell, C), Win (Uchida, J), Spr (Lewis, M)

HISTORY 211. Body, Gender, and Society in Medieval Europe

(Same as HISTORY 311) Historical, literary, theological, and anthropological sources. Issues: transformations in representations of the body, gender, sexuality, and in women¿s place in society or social representation in W. Europe from the 3rd-14th centuries. Were these processes related to one another and to social changes? Analytically straddles the realm between bodification of spiritual powers and control or manipulation of the body in society, from the cult of relics to asceticism. GER:DB-Hum, EC-Gender

4-5 units, not given this year

HISTORY 212. Holy Wars: Medieval Perspectives

(Same as HISTORY 312) Cultural and societal factors at play in Christian holy war from late antiquity to the early modern era. Topics include: the Crusades and their meanings; armed struggle against heresy; and the wars of religion. Prerequisite: consent of instructor. GER:DB-Hum

4-5 units, not given this year

HISTORY 216A. Muslims and Infidels: Islam and the Crusades

(Same as HISTORY 316A) The impact of the Crusades on the Muslim world and consciousness from the Middle Ages and to the present. Primary and secondary sources. Themes include: jihad; cultural interaction between Muslims and Christians in the Holy Land; and military, political, and ideological developments in the 12th and 13th centuries. Modern interpretations and debates about jihadist theology and global jihad. GER:DB-Hum

4-5 units, not given this year

HISTORY 221A. Men, Women, and Power in Early Modern Russia, 1500-1800

Social values, gender relations, and social change in an era of rapid change; challenges to established norms by new constructions of deviance (witchcraft, religious reform, and revolt) and new standards of civility; encounters with non-Russians and the construction of national consciousness. Social values as political ethos: patrimonial autocracy and the reality of female rule in the late 17th and 18th century. GER:DB-Hum, DB-Hum, EC-Gender

5 units, not given this year

HISTORY 221B. The Woman Question in Modern Russia
Russian radicals believed that the status of women provided the measure of freedom in a society and argued for the extension of rights to women as a basic principle of social progress. The social status and cultural representations of Russian women from the mid-19th century to the present. The arguments and actions of those who fought for women's emancipation in the 19th century, theories and policies of the Bolsheviks, and the reality of women's lives under them. How the status of women today reflects on the measure of freedom in post-Communist Russia. GER:DB-SocSci, EC-Gender

5 units, not given this year

HISTORY 222. Honor, Law, and Modernity
How Europe evolved from medieval to modern; focus is on standards for conflict resolution emphasizing insults to honor. How attitudes towards the self and society, and the state's relationship to individuals, changed from the 16th to 18th centuries in Europe and Russia. Traditional concepts of honor and patterns of settling disputes contrasted to early modern concepts of honor, private life, civility, and crime and punishment. GER:DB-Hum

5 units, not given this year

HISTORY 223. Art and Ideas in Imperial Russia
(Same as HISTORY 323) Poetry, novels, symphonic music, theater, opera, painting, design, and architecture: what they reveal about the politics and culture of tsarist Russia. GER:DB-Hum

4-5 units, not given this year

HISTORY 224A. The Soviet Civilization
(Same as HISTORY 424A) Socialist visions and practices of the organization of society and messianic politics; the Soviet understanding of mass violence, political and ethnic; and living space. Primary and secondary sources. Research paper or historiographical essay. GER:DB-SocSci

4-5 units, Win (Weiner, A)

HISTORY 224B. Modern Afghanistan
(Same as HISTORY 324B) Politics, society, and culture in Afghanistan from the 19th century to the present. Topics include state building, tribal politics, Islamic law, geopolitics, the Taliban, and the post-Taliban disorder. GER:DB-SocSci

4-5 units, Aut (Crews, R)

HISTORY 227. East European Women and War in the 20th Century
(Same as HISTORY 327) Thematic chronological approach through conflicts in the region: the Balkan Wars, WW I, WW II, and the recent wars in the former Yugoslavia. The way women in E. Europe have been involved in and affected by these wars compared to women in W. Europe in the two world wars. Women's involvement in war as members of the military services, the backbone of underground movements, workers in war industries, mothers of soldiers, subjects and supporters of war aims and propaganda, activists in peace movements, and objects of wartime destruction, dislocation, and sexual violation. GER:DB-SocSci, EC-Gender

4-5 units, Aut (Jolluck, K)

HISTORY 228. Circles of Hell: Poland in World War II
(Same as HISTORY 328) The experience and representation of Poland's wartime history from the Nazi-Soviet Pact of 1939 to the aftermath of Yalta in 1945. Nazi and Soviet ideology and practice regarding the Poles and the ways Poles responded, resisted, and survived. The self-characterization of Poles as innocent victims, and their involvement or complicity in the Holocaust, thus engaging in a current debate in Polish society. GER:DB-SocSci

5 units, not given this year

HISTORY 229. Poles and Jews
(Same as HISTORY 329) Focus is on the period since WW I. The place of the Jews in interwar Poland, WW II, surviving Jews after the war, Polish memorialization of the Holocaust, the reality and mythology of Jews in the communist apparatus, the manipulation of anti-Semitism by the communist government, and post-communist movement toward reconciliation. Memory and national mythology emphasizing Polish wartime behavior and the relationship of Jews to communism. The sources and uses of stereotypes, and the state of Polish-Jewish relations today. GER:DB-Hum, DB-Hum, EC-GlobalCom

4-5 units, not given this year

HISTORY 230A. The Witness in Modern History: Memoir, Reportage, Image
The rise of the witness as icon and debates about its reliability as a historical source. The power of eyewitness accounts to convict accused criminals, inspire indignation about war and genocide, and attract attention to humanitarian crises. Their notorious unreliability due to exaggeration and misapprehension. Sources include reportage, photography, and documentary film. Case studies include criminal cases, war, poverty, and natural disasters. GER:DB-Hum

5 units, not given this year

HISTORY 230D. Europe in the World, 1789-Present
(Same as HISTORY 330D) (Same as HISTORY 230D) The European conquest of parts of Africa, Asia, and the S. Pacific by merchants, missionaries, armies, and administrators had significant, and often cataclysmic, effects on indigenous political alliances, cultural practices, and belief systems. But were the effects of expansion entirely one-sided? What impact did the experiences of colonialism have on European politics, culture, and Europe's relations with the rest of the world? How interaction between Europe and the rest of the world redefined the political, racial, sexual, and religious boundaries of both Europe and its colonies and gave rise to today's more globalized society.

4-5 units, Aut (Daughton, J)

HISTORY 230F. Self-Policing, Denunciation, and Surveillance in Modern Europe
(Same as HISTORY 330F) How individual actions impact state machineries of power. The motives, pressures, and consequences of everyday collaboration from the French Revolution to Nazi Germany and Soviet bloc police states; popular outrage over such practices in the aftermath of these regimes. The phenomenon of anticipatory compliance, as people tended to perceive less freedom of action than actually existed, and the reciprocal intensification of real and imagined restrictions. The malleability of personal values and interests as represented in diaries, memoirs, secondary sources, and film; variety of individual and national responses.

4-5 units, Win (Sheffer, E)

HISTORY 231A. Charles Darwin and the Global 19th Century
(Same as HISTORY 331A) Uses the writings, life, and legacy of Charles Darwin as a vehicle for exploring the nature of global change in the nineteenth century. Examines the relationship between modern science, imperialism, and world travel by tracking Darwin's experiences and those of his contemporaries, focusing both of the emergence of evolutionary theory as well as the popular reception and political controversies surrounding Darwin's work.

4-5 units, Aut (Naranch, B)

HISTORY 231G. European Reformations
(Same as HISTORY 331G, RELIGST 236, RELIGST 336) Readings in and discussion of theological and social aspects of sixteenth century reformations: Luther, Radical Reform, Calvin, and Council of Trent, missionary expansion, religious conflict, creative and artistic expressions. Texts include primary sources and secondary scholarly essays and monographs.

4-5 units, Win (Stokes, L; Pitkin, B)

HISTORY 232D. Rome: The City and the World, 1350-1750
(Same as HISTORY 332D) What lies beyond the ruins of an ancient city? The history of Rome from the Renaissance to the age of the grand tour. Topics include: the political, diplomatic, and religious history of the papacy; society and cultural life; the everyday world of Roman citizens; the relationship between the city and the surrounding countryside; the material transformation of Rome as a city; and its meaning for foreigners. GER:DB-Hum

4-5 units, not given this year

HISTORY 232G. When Worlds Collide: The Trial of Galileo
(Same as HISTORY 332G) In 1633, the Italian mathematician Galileo was tried and condemned for advocating that the sun, not the earth, was the center of the cosmos. The Catholic Church did not formally admit that Galileo was right until 1992. Examines the many factors that led to the trial of Galileo and looks at multiple perspectives on this signal event in the history of science and religion. Considers the nature and definition of intellectual heresy in the sixteenth and early seventeenth centuries, and examines the writings of Galileo's infamous predecessor Giordano Bruno (burned at the stake in 1600). Looks closely at documents surrounding the

trial and related literature on Renaissance and Reformation Italy in order to understand the perspectives of various participants in this famous event. Focal point of seminar involves the examination of the many different histories that can be produced from Galileo's trial. What, in the end, were the crimes of Galileo? GER:DB-Hum

4-5 units, not given this year

HISTORY 233. Reformation, Political Culture, and the Origins of the English Civil War

(Same as HISTORY 333) English political and religious culture from the end of the Wars of the Roses to the Civil War of the 1640s. Themes include the growth of the size and power of the state, Reformation, creation of a Protestant regime, transformation of the political culture of the ruling elite, emergence of Puritanism, and causes of the Civil War. GER:DB-Hum

4-5 units, Spr (Como, D)

HISTORY 233B. Early Modern Sexualities

(Same as HISTORY 333B) History of sexuality in early modern Europe. Normative sexuality, heterosexual transgressions, and minority sexualities. Theoretical approaches to and debates about the history of sexuality, in particular prior to the 19th century. Tools for critiquing the heteronormativity of early modern sources and for reading those sources for evidence of sexual diversity. Readings include monographs and primary sources. GER:DB-SocSci, EC-Gender

4-5 units, not given this year

HISTORY 233C. Two British Revolutions

(Same as HISTORY 333C) Current scholarship on Britain,1640-1700, focusing on political and religious history. Topics include: causes and consequences of the English civil war and revolution; rise and fall of revolutionary Puritanism; the Restoration; popular politics in the late 17th century; changing contours of religious life; the crisis leading to the Glorious Revolution; and the new order that emerged after the deposing of James II. GER:DB-Hum

4-5 units, not given this year

HISTORY 233D. Strangers, Barbarians, and Infidels: Crosscultural Encounters in the Premodern World

(Same as HISTORY 333D) Considers pivotal encounters between and among diverse cultures (Asian, African, America, and European) throughout the premodern period, with emphasis on the period 1100-1700. How scholars have understood and theorized crosscultural encounters; historical examples. Primary and secondary sources used to examine historical conditions that led to these meetings, their impact on the individuals and societies involved, and the larger lessons of the encounter of cultures for present times. Why did Christian Europe emerge as the predominant global power by the 16th century? How did/does the experience of travel shape the perceptions of others? What was the significance of religious, economic, and political motivations for crosscultural encounters? What were the technological, environmental, and cultural effects of such meetings for the societies involved?

4-5 units, Aut (Selwyn, J)

HISTORY 233F. Political Thought in Early Modern Britain

1500 to 1700. Theorists include Hobbes, Locke, Harrington, the Levellers, and lesser known writers and schools. Foundational ideas and problems underlying modern British and American political thought and life. GER:DB-Hum

5 units, not given this year

HISTORY 233G. Catholic Politics in Europe, 1789-1992

What led to the creation of a specifically Catholic mass politics? How did these parties and movements interact with the Vatican and the wider Church? What accounts for political Catholicism's involvement in clerical-fascist states and its important role in shaping the EU? Sources focus on monographs. Research paper using primary sources. GER:DB-SocSci

5 units, not given this year

HISTORY 233K. The Invention of the Modern Republic

(Same as HISTORY 333K) Examines the history of republican thinking in the Atlantic World from the Renaissance to the French Revolution.

4-5 units, not given this year

HISTORY 234. Enlightenment Seminar

(Same as HISTORY 334, HISTORY 432A, HUMNTIES 324) The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

4-5 units, Win (Baker, K)

HISTORY 234F. Science, Technology, and Empire

(Same as HISTORY 334F) How modern Europe came to be connected to the wider world through repeated cycles of expansion, circulation, and exchange from the mid-nineteenth century to the present. Using weekly themes and in-depth discussions of ¿watershed¿ moments, the roles played by colonialism, migration, commerce, warfare, telecommunications, and popular culture in redefining the place of Europe in a changing global landscape will be explored.

4-5 units, Spr (Naranch, B)

HISTORY 236. The Ethics of Imperialism

Can a commitment to liberty, progress, and universal rights be reconciled with imperialism? The ethical underpinnings of empire; how modern Europeans provided ethical and political justifications for colonial expansion. How European ideals were used to defend and justify inequality, violence, and genocide. The ethics of American-driven globalization and humanitarianism. Texts include primary sources, philosophical treatises, and historical studies. GER:DB-Hum

5 units, not given this year

HISTORY 236A. Nations and Nationalism in East-Central Europe

(Same as HISTORY 336A) Explores one of the central problems in East-Central Europe in the past two centuries: the emergence of nationalist ideologies and modern nations. After introducing major theoretical treatments of nationalism through select canonical texts, will turn to case studies of several nations. Specific topics include the national revival movements, the rise of integral nationalism, minority problems and problems of multiethnic states, and the politics of population transfer and ethnic cleansing.

4-5 units, Win (Batinic, J)

HISTORY 236D. Cold War Europe

(Same as HISTORY 336D) Much more than a military and diplomatic confrontation, the Cold War was lived experience in Europe - shaping politics, society, culture and personal identity. Beginning at the end of World War II, traces the continent's division into eastern and western blocs, and ends with the fall of the Iron Curtain. Sources include memoirs, propaganda, novels, and film, as well as new scholarship on the Cold War.

4-5 units, Spr (Sheffer, E)

HISTORY 238K. Resistance and Collaboration in Hitler's Europe During World War II

(Same as HISTORY 328K) Nearly all European countries were subjected to military aggression by Nazi Germany and its allies. What prompted some Europeans to resist, while others accommodated the invaders? What did resistance and collaboration entail in Hitler's Europe? Examines how Europeans experienced and responded to Nazi occupation. Explores postwar memorializations of the war, investigates along the way relations among documents, historical scholarship, and public memory. Besides France, emphasis is on Southern and East-Central Europe.

4-5 units, Spr (Batinic, J)

HISTORY 239D. Capital and Empire

(Same as HISTORY 339D) Can empire be justified with balance sheets of imperial crimes and boons, a calculus of racism versus railroads? The political economy of empire through its intellectual history from Adam Smith to the present; the history of imperial corporations from the East India Company to Wal-mart; the role of consumerism; the formation of the global economy; and the relationship between empire and the theory and practice of development. GER:DB-SocSci

4-5 units, Win (Satia, P)

HISTORY 239F. Empire and Information

(Same as HISTORY 339F) How do states see? How do they know what they know about their subjects, citizens, economies, and geographies? How does that knowledge shape society, politics, identity, freedom, and modernity? Focus is on the British imperial state activities in S. Asia and Britain: surveillance technologies and information-gathering systems, including mapping, statistics, cultural schemata, and intelligence systems, to render geographies and

social bodies legible, visible, and governable. GER:DB-Hum, EC-GlobalCom

4-5 units, not given this year

HISTORY 239H. Colonialism and Empire in Modern Europe
To better understand the history of modern Europe within a global context, explores the following questions: What impact did more than a century of colonialism have on the social lives, cultural attitudes, political loyalties, and intellectual world views of European women and men during the nineteenth century? What accounts for the resiliency of empire during a period of rapid global change that witnessed the rise of modern democracy, economic liberalism, ethnic nationalism, and international socialism? GER:DB-SocSci

5 units, not given this year

HISTORY 242A. Technology and Society in the Modern World (1700 to Present)
(Same as HISTORY 342A) How do technology and society interact? What drives technological change? How does technology transfer across different cultures? Historical case studies of productive, military, domestic, information, and biomedical technologies from 1700 to the present. The evolution of artifacts and technological systems such as industrial machinery, weaponry, home appliances, computers, and contraceptives. How technology affects social change and, especially, how technological change is invariably shaped by historical and social circumstances. Students think historically about technology, and thus engage effectively with questions of technological change, or lack thereof.

4-5 units, Aut (Staff)

HISTORY 243C. 18th-Century Colonial Science and Medicine
(Same as HISTORY 343C) The exchange of knowledge, technologies, plants, peoples, disease, and medicines. Focus is on French, British, and Dutch interests in the West Indies; examples from elsewhere. Sources include primary and secondary texts on voyaging, colonialism, slavery, and environmental exchange. GER:DB-SocSci

4-5 units, not given this year

HISTORY 243J. Climate Change in the West: A History of the Future
(Same as EARTHSYS 143J) Global warming is changing the American West. But this region is no stranger to environmental change and human adaption to harsh environments. How can history create more clear thinking about the current crisis and choices for the future? The long history of climate change in the West, as well as current warming, through scientific research, historical sources, environmental histories, and visions for the future, including plans for mitigation and adaption, scientific predictions, and science fiction.

5 units, Spr (Christensen, J)

HISTORY 243S. Human Origins: History, Evidence, and Controversy
(Same as HISTORY 443A) Research seminar. Debates and controversies include: theories of human origins; interpretations of fossils, early art, and the oldest tools; the origin and fate of the Neanderthals; evolutionary themes in literature and film; visual rhetoric and cliché in anthropological dioramas and phyletic diagrams; the significance of hunting, gathering, and grandmothering; climatological theories and neocatastrophic geologies; molecular anthropology; the impact of racial theories on human origins discourse. Background in human evolution not required. GER:DB-SocSci

4-5 units, not given this year

HISTORY 244C. The History of the Body in Science, Medicine, and Culture
(Same as HISTORY 444C) The human body as a natural and cultural object, historicized. The crosscultural history of the body from the 18th century to the present. Topics include: sciences of sex and race; medical discovery of particular body parts; human experimentation, foot binding, veiling, and other bodily coverings; thinness and obesity; notions of the body politic. GER:DB-SocSci, EC-Gender

4-5 units, not given this year

HISTORY 245E. Health and Society in Africa
(Same as HISTORY 347E) The history of disease, therapeutic and diagnostic systems, and the definition of health in precolonial, colonial, and postcolonial Africa. The social and political histories of specific epidemics, including sleeping sickness, influenza, TB, mental illness, and AIDS. The colonial contexts of epidemics and the social consequences of disease. GER:DB-SocSci, EC-GlobalCom

4-5 units, not given this year

HISTORY 245G. Law and Colonialism in Africa
(Same as HISTORY 348D) Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases as a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority. GER:DB-SocSci

4-5 units, not given this year

HISTORY 246S. Research Seminar: African Nationalism and Beyond
(Same as HISTORY 446A) African intellectual, political, social and cultural institutions confronting issues of sovereignty, authority, heterarchy, and power during the 19th and 20th centuries. GER:DB-SocSci

4-5 units, not given this year

HISTORY 248S. African Societies and Colonial States
(Same as HISTORY 448A) The encounter between African societies and European colonialism in the colony or region of their choice. Approaches to the colonial state; tours of primary source collections in the Hoover Institution and Green Libraries. Students present original research findings and may continue research for a second quarter. GER:DB-SocSci

4-5 units, Win (Roberts, R)

HISTORY 249. History without Documents
(Same as HISTORY 349) Can history be written about places and times for which are no written sources, or for people in literate societies who left no written traces? Practical training in historical methods for non-documentary sources, including oral traditions and history, archaeology, ecological sources, historical linguistics, ethnography, rituals, myths, songs, and art. GER:DB-Hum

4-5 units, not given this year

HISTORY 250A. History of California Indians
(Same as CSRE 117S, NATIVEAM 117S) Demographic, political, and economic history of California Indians, 1700s-1950s. Processes and events leading to the destruction of California tribes, and their effects on the groups who survived. Geographic and cultural diversity. Spanish, Mexican, and Anglo-American periods. The mission system. GER:EC-AmerCul

5 units, Win (Shively, J)

HISTORY 251. Creating the American Republic
(Same as POLISCI 222P) Concepts and developments in the late 18th-century invention of American constitutionalism; the politics of constitution making and ratifying; emergence of theories of constitutional interpretation including originalism; early notions of judicial review. Primary and secondary sources.

5 units, not given this year

HISTORY 251C. The American Enlightenment
(Same as AMSTUD 251C) Eighteenth century America was like a laboratory for exciting new social, political, religious, scientific, and artistic theories that we collectively call ""the Enlightenment."" With readings in original texts and studies of material culture, examines ways in which eighteenth century Americans applied Enlightenment thinking to some of the most important problems and questions of their time. What was the best kind of government, and how could this be known? Was the new world of America fundamentally different or the same as Europe, and did animals, plants,and people improve or worsen there? What creatures (children, apes, women, slaves) were considered unreasonable in the Age of Reason, and why? What was the place of religion and passion in the Age of Reason? GER:DB-Hum

5 units, Win (Winterer, C)

HISTORY 251G. Topics in Constitutional History
(Same as AMSTUD 251, POLISCI 222S) Ideas of rights in American history emphasizing the problem of defining constitutional rights, the free exercise of religion, freedom of expression, and the contemporary debate over rights talk and the idiom of human rights. GER:DB-SocSci, EC-AmerCul

5 units, Win (Rakove, J)

HISTORY 254. Popular Culture and American Nature
Despite John Muir, Aldo Leopold, and Rachel Carson, it is arguable that the Disney studios have more to do with molding popular attitudes toward the natural world than politicians, ecologists, and activists. Disney as the central figure in the 20th-century American creation of nature. How Disney, the products of his studio, and other primary and secondary texts see environmentalism, science, popular culture, and their interrelationships. GER:DB-Hum

5 units, not given this year

HISTORY 255. Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice
The religious and political thought of Martin Luther King, Jr., using the documentary resources of the King Institute at Stanford. His social gospel Christianity and prophetic message of radical social transformation. Readings include the forthcoming The Papers of Martin Luther King, Jr., Volume VI: Advocate of the Social Gospel. GER:DB-Hum

5 units, not given this year

HISTORY 255B. Introduction to African and African American Studies
(Same as AFRICAAM 105) Interdisciplinary. Central themes in African American culture and history related to race as a definitive American phenomenon. African survivals and interpretations of slavery in the New World, contrasting interpretations of the Black family, African American literature, and art. Possible readings: Frederick Douglass, Harriet Jacobs, Booker T. Washington, W.E.B. DuBois, Richard Wright, Maya Angelou, James Baldwin, Malcolm X, Alice Walker, and bell hooks. Focus may vary each year. GER:DB-Hum, EC-AmerCul

5 units, not given this year

HISTORY 256. U.S.-China Relations: From the Opium War to Tiananmen
(Same as HISTORY 356) The history of turbulent relations, military conflict, and cultural clashes between the U.S. and China, and the implications for the domestic lives of these increasingly interconnected countries. Diplomatic, political, social, cultural, and military themes from early contact to the recent past. WIM GER:DB-SocSci, EC-GlobalCom

4-5 units, not given this year

HISTORY 258. Topics in the History of Sexuality: Sexual Violence
(Same as AMSTUD 258, CSRE 192E, HISTORY 358) Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence. GER:DB-SocSci, EC-Gender

4-5 units, Win (Freedman, E)

HISTORY 259A. Poverty and Homelessness in America
Service learning. Students participate in a two quarter internship at a local shelter for homeless individuals or families. Readings include historical, social science, and social commentary literature. Service Learning Course (certified by Haas Center). GER:DB-SocSci

4-5 units, not given this year

HISTORY 260. California's Minority-Majority Cities
(Same as HISTORY 360) Historical development and the social, cultural, and political issues that characterize large cities and suburbs where communities of color make up majority populations. Case studies include cities in Los Angeles, Santa Clara, and Monterey counties. Comparisons to minority-majority cities elsewhere in the U.S. Service Learning Course (certified by Haas Center). GER:DB-SocSci, EC-AmerCul

4-5 units, Spr (McKibben, C)

HISTORY 261. Race, Gender, and Class in Jim Crow America
How African American life and labor were redefined from 1890-1954. Topics include family life, work, leisure patterns, transnational relations, cultural expressions emphasizing literature and music, resistance and social activisim. Primary sources including visual materials, literature, and film; historical interpretations of the period. GER:DB-SocSci

5 units, not given this year

HISTORY 265. Writing Asian American History
(Same as HISTORY 365) Recent scholarship in Asian American history, with attention to methodologies and sources. Topics: racial ideologies, gender, transnationalism, culture, and Asian American art history. Primary research paper. GER:DB-SocSci, EC-AmerCul

5 units, not given this year

HISTORY 268E. American Foreign Policy and International History, 1941-2009
(Same as HISTORY 368E) Major events and interpretations from WW II to the war in Iraq. Issues of race, expansionism and power; nuclear weapons; and war. GER:DB-SocSci

4-5 units, not given this year

HISTORY 273. The European Expansion
(Same as HISTORY 373A) The relationship between European monarchies and their colonial domains from the 16th-18th centuries. Reasons for expansion, methods, and results. Case studies include the Spanish, Portuguese, Dutch, French, and English domains in Africa, Asia, and the Americas. Readings include primary and secondary sources.

4-5 units, not given this year

HISTORY 278A. Political Economy of Property Rights
(Same as POLISCI 242D) This course seeks to understand how property rights systems influence economic growth and the stewardship of resources. We are also interested in explaining the political process by which societies create property systems. In order to answer these questions we will read and discuss the work of political scientists, economists, and historians.

5 units, Win (Haber, S)

HISTORY 279. Latin American Development: Economy and Society, 1800-2000
(Same as HISTORY 379) The newly independent nations of Latin America began the 19th century with economies roughly equal to, or even ahead of, the U.S. and Canada. What explains the economic gap that developed since 1900? Why are some Latin American nations rich and others poor? Marxist, dependency, neoclassical, and institutionalist interpretive frameworks. The effects of globalization on Latin American economic growth, autonomy, and potential for social justice. GER:DB-SocSci, EC-GlobalCom

4-5 units, not given this year

HISTORY 281. Economic and Social History of the Modern Middle East
(Same as HISTORY 381) The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market are combined with possible case studies of Egypt, Iraq, and Palestine. GER:DB-SocSci

4-5 units, not given this year

HISTORY 281A. Twentieth-Century Iraq: A Political and Social History
The colonial experience, creation of the modern Iraqi state, and transition to military dictatorship. Political movements, religious and tribal elements, and their relation to the state. Geopolitical context. GER:DB-SocSci

5 units, not given this year

HISTORY 281B. Modern Egypt
(Same as HISTORY 381B) From just before the Napoleonic expedition of 1798 to the present. Topics: European imperialism, the political economy of cotton, rise of nationalism, gender and the nation, minorities, the coup of 1952, positive neutralism and the Cold War, and the neo-liberal reconstruction of Egypt. GER:DB-SocSci

4-5 units, not given this year

HISTORY 282. The United States and the Middle East since 1945
(Same as HISTORY 382) Since the end of WW II, U.S. interests in the Middle East have traditionally been defined as access to oil at a reasonable price, trade and markets, containing the influence of the Soviet Union, and the security of Israel. Is this the full range of U.S. interests? How has the pursuit of these interests changed over time? What forces have shaped U.S. policy? What is the impact of U.S. policy on the region itself? GER:DB-SocSci, EC-GlobalCom

4-5 units, Win (Beinin, J)

HISTORY 283. The New Global Economy, Oil, and Islamic Movements in the Middle East
(Same as HISTORY 383) The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market combined with case studies of Egypt, Iraq, and Palestine. GER:DB-SocSci
4-5 units, not given this year

HISTORY 284. The Ottoman Turks in Comparative Perspective: The Inner Life of a Eurasian Empire
(Same as HISTORY 384) The Ottoman Empire, one of the largest and most influential empires in world history, extended to three continents and survived for more than six centuries. But its history is often characterized as Oriental, despotic, and theocratic, reduced to a parade of capricious sultans, evil pashas, and hapless harem women. Comparative history used to challenge these views and to understand imperial longevity by tracing the ideological, fiscal, and military elements of state formation on both the European (Russia, Hungary, Spain) and Asian (Japan, China, Iran) continents. Situates the Ottomans' within their Eurasian heritage and explores the Empire's dynamic role in shaping early modern global systems. Chronological focus is neither on the origins of the empire nor on the Ottomans' final days, but rather on the 16th through 19th centuries when a notion of Ottoman-ness emerged in administrative practices, poetic and literary languages, and art.
4-5 units, Spr (Ferguson, H)

HISTORY 285F. Mediators of Tradition & Modernity: Comparative Jewish Women's History from 17th Century to Present
(Same as HISTORY 385F, JEWISHST 285F) Focuses on the single role of women as mediators between tradition and modernity in the Jewish home. While simultaneously the preservationists of certain traditions such as kashrut, Shabbat observance, or prayer, Jewish women also served as the medium of Jewish families' paths to assimilation. Looks at women in the West and East comparing their experiences in the face of modernity, caught between tradition and modernity, while simultaneously encouraging the assimilation and cultural improvement of their children.
5 units, Spr (Roberts, S)

HISTORY 286E. Jews in France from the Dreyfus Affair to World War II
(Same as HISTORY 386E, JEWISHST 286E, JEWISHST 386E) Examines the experience of Jews in France and their confrontations with antisemitism, discrimination, violence, assimilation, and integration from the Dreyfus Affair through Vichy and World War II. Popular and institutionalized antisemitism in France placed significant limits on the Jews' path to assimilation and shaped the ways in which they related to France and to Judaism.
4-5 units, Win (Roberts, S)

HISTORY 287D. Tel Aviv: Site, Symbol, City
(Same as HISTORY 387D, JEWISHST 287D, JEWISHST 387D) Tel Aviv, the first Israeli city, from a cultural history perspective combining high and low cultural texts. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's early years; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; as the site of the Israeli Zionist and post-Zionist intellectuals. Sources include art, cinema, and literature. GER:DB-Hum
4-5 units, Win (Dubnov, A)

HISTORY 287E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism
(Same as HISTORY 387E, JEWISHST 287E, JEWISHST 387E) Intellectual responses of Jewish thinkers to the age of extremes. Readings include a wide assemblage of twentieth-century thinkers, such as Theodor Adorno, Leo Strauss, Hannah Arendt, Isaiah Berlin, and Herbert Marcuse. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945.
4-5 units, Win (Dubnov, A)

HISTORY 287G. Jews in Colonial North Africa
(Same as HISTORY 387G, JEWISHST 287G, JEWISHST 387G) Under European imperialism, the relations between Jews ans Muslims in North Africa changed dramatically. Examines the complicated process of remaking Jewish identity under colonialism and the way in which citizenship, education, and assimilation separated Jews ans Muslims. Also looks at the spheres in which Jews and Muslims continued to coexist. Studies the impact of the rise of nationalism, anti-colonialism, Zionism, pan-Arabism, and antisemitism in the context of colonial North Africa.
4-5 units, Spr (Roberts, S)

HISTORY 287K. Gentlemen and Jews: History of the Jews of England
(Same as HISTORY 387K, JEWISHST 287K, JEWISHST 387K) Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?
4-5 units, Spr (Dubnov, A)

HISTORY 287S. Research Seminar in Middle East History
(Same as HISTORY 481, JEWISHST 287S, JEWISHST 481) Student-selected research topics. GER:DB-SocSci
4-5 units, Spr (Beinin, J)

HISTORY 288. Palestine and the Arab-Israeli Conflict
(Same as HISTORY 388, IPS 388, JEWISHST 288, JEWISHST 388) 1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin) GER:DB-Hum
4-5 units, Win (Beinin, J)

HISTORY 291A. Archaeology and Modernity in Asia: The Excavation of Ancient Civilizations in Modern Times
(Same as HISTORY 391A) The interplay in Asia between antiquity and modernity, civilization and nation state, and national versus colonial science. The recent excavation of artifacts and places associated with Asian civilization such as the terracotta warriors in China and Angkor Wat in Cambodia. How Asian states have grappled with modernity and colonialism as they simultaneously dug up their ancient pasts. GER:DB-SocSci
4-5 units, not given this year

HISTORY 291B. The City in Imperial China
(Same as HISTORY 391B) The evolution of cities in the early imperial, medieval, and early modern periods. Topics include physical structure, social order, cultural forms, economic roles, relations to rural hinterlands, and the contrast between imperial capitals and other cities. Comparative cases from European history. Readings include primary and secondary sources, and visual materials.
3-5 units, not given this year

HISTORY 291D. Colonialism and Collaboration in East Asia
(Same as HISTORY 391D) The roles and problems of collaboration in the rise, sustenance, and fall of empires. Themes include conceptual definitions of collaboration and empire, collaboration of traditional elites, accommodation of religious communities, assimilation and collaboration, local intermediaries, and class and empire. Regional focus is East Asia; also cases from other colonial situations. GER:DB-SocSci
4-5 units, Aut (Moon, Y)

HISTORY 291E. Maps, Borders, and Conflict in East Asia
(Same as HISTORY 391E) The nature of borders and border conflicts in N.E. Asia from the 17th to the early 20th century. Focus is on contact zones between China, Russia, Korea, and Japan. The geopolitical imperatives that drove states to map their terrain in variable ways. Cultural, diplomatic, and imperial contexts. European pressures and contributions to E. Asian cartography; the uses of maps in surveillance, diplomacy, identity, and war. Student projects focus on a contested border zone. GER:DB-SocSci
4-5 units, not given this year

HISTORY 292. The Two Koreas
(Same as HISTORY 392) Examines major themes and scholarly works to understand the origins, outbreak, and consequences of the

Korean War. One focus will be the division of Korea into ROK and DPRK and their subsequent developments. Themes include World War II in East Asia; Korean communist movements during Japanese colonial rule; the Cold War in East Asia; the roles of the US, China, and USSR in the Korean War; the ideas of key North and South Korean leaders, and the consolidation of the two Koreas after the Korean War. GER:DB-SocSci

4-5 units, Win (Moon, Y)

HISTORY 292D. Japan in Asia, Asia in Japan

(Same as HISTORY 392D) How Japan and Asia mutually shaped each other in the late 19th and 20th centuries. Focus is on Japanese imperialism in Asia and its postwar legacies. Topics include: pan-Asianism and orientalism; colonial modernization in Korea and Taiwan; collaboration and resistance; popular imperialism in Manchuria; total war and empire; comfort women and the politics of apology; the issue of resident Koreans; and economic and cultural integration of postwar Asia. GER:DB-SocSci, DB-SocSci, EC-GlobalCom

4-5 units, Spr (Uchida, J)

HISTORY 292F. Traditional Korea: History and Culture

(Same as HISTORY 392F) Korea before 1800 and how iconic features of Korean tradition were created and reinvented. Themes include Korea's ancient kingdoms, the aristocracy and military in the Koryo dynasty, the print culture and Korean alphabet, ideologies and religions, the social status system and the life of women, the kingship and court culture of the Choson dynasty, and Korea's place in premodern East Asia. The modern and contemporary debates.

4-5 units, Spr (Moon, Y)

HISTORY 293B. Homosexuality in Historical and Comparative Perspective

(Same as HISTORY 393B) Comparative history of homoerotic desire, relations, and identity through scholarship on different historical periods and parts of the world: the classical Mediterranean, early modern European cities, late imperial and modern China, Tokugawa and modern Japan, and the U.S. GER:EC-Gender

4-5 units, not given this year

HISTORY 293D. Empire and Cosmopolitanism: Traveling Ideas in Global Political Thought

(Same as HISTORY 393D) GER:DB-SocSci

4-5 units, not given this year

HISTORY 295F. Race and Ethnicity in East Asia

(Same as HISTORY 395F) Historical, cultural, political and theoretical perspectives. Commonly misunderstood as an ethnically homogeneous country, the People's Republic of China is home to 55 officially recognized minority groups, many of whom inhabit the strategic border regions of the country. How similar assumptions of ethnic and racial homogeneity in Taiwan, Japan, and Korea are being reexamined by scholars in disciplines including anthropology, history, and political science. GER:DB-SocSci

4-5 units, not given this year

HISTORY 295J. Chinese Women's History

The lives of women in the last 1,000 years of Chinese history. Focus is on theoretical questions fundamental to women's studies. How has the category of woman been shaped by culture and history? How has gender performance interacted with bodily disciplines and constraints such as medical, reproductive, and cosmetic technologies? How relevant is the experience of Western women to women elsewhere? By what standards should liberation be defined? GER:DB-Hum, EC-Gender

5 units, not given this year

HISTORY 296. Communism and Revolution in China

From the formation of the Chinese Communist Party (CCP) in 1921 through the 1949 founding of the People's Republic of China (PRC). Topics include: early theories of socialism in China; the relationship between Chinese communism and the Communist International and Soviet Union; agrarian reformulation of communism by Mao; the communist-nationalist civil war; the Communist Revolution of 1949; and the consolidation of communist power in the PRC. GER:DB-Hum

5 units, not given this year

HISTORY 299A. Senior Research I

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HISTORY 299B. Senior Research II

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HISTORY 299C. Senior Research III

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HISTORY 299H. Junior Honors Colloquium

Required of junior History majors planning to write a History honors thesis during senior year. Meets twice during quarter, including the first Friday class day of the quarter.

1 unit, Win (Sommer, M)

HISTORY 299M. Undergraduate Directed Research: Martin Luther King, Jr., Research and Education Institute

May be repeated for credit.

1-4 units, Aut (Carson, C), Win (Staff), Spr (Staff)

HISTORY 299S. Undergraduate Directed Research and Writing

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY 299W. Undergraduate Directed Writing

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY 299X. Design and Methodology for International Field Research

(Same as HISTORY 399A) Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys.

1 unit, Spr (Kollmann, N; Roberts, R)

GRADUATE COURSES IN HISTORY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HISTORY 158B. History of Education in the United States

(Same as AMSTUD 201, EDUC 201) How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching. (SSPEP)

3-5 units, Win (Gordon, L)

HISTORY 158C. History of Higher Education in the U.S.

(Same as AMSTUD 165, EDUC 165, EDUC 265) Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities. (SSPEP-APA)

3-5 units, Aut (Gordon, L)

HISTORY 237B. Teaching the Unteachable: Teaching and Representing the Holocaust

(Same as EDUC 253X) Theodore Adorno asked whether it was possible to write poetry after Auschwitz; whatever the answer, each year witnesses exponential growth in state-sponsored mandates to teach the Holocaust. How and to what end does catastrophe become curriculum? How to assess what students learn from these efforts. The Nazis' efforts to teach for hate, and contemporary parallels. Historical and educational sources, especially films and memoirs.

3-5 units, not given this year

HISTORY 255E. Education, Race, and Inequality in African American History, 1880-1990

(Same as CSRE 216X, EDUC 216X) Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis.

3-5 units, Aut (Gordon, L)

HISTORY 258D. School: What Is It Good For?

(Same as EDUC 207X) Focus is on authors who establish claims that the purposes, functions, impacts, and social roles of schooling promote human capital, citizenship, social reproduction, values transmission, social mobility, class equality, racial equality, social stratification, disciplinary power, and the pursuit of individual interests. Historical and sociological approaches.

3-4 units, Win (Labaree, D)

HISTORY 258E. History of School Reform: Origins, Policies, Outcomes, and Explanations
(Same as EDUC 220D) Required for students in the POLS M.A. program; others welcome. Focus is on 20th-century U.S. Intended and unintended patterns in school change; the paradox of reform that schools are often reforming but never seem to change much; rhetorics of reform and factors that inhibit change. Case studies emphasize the American high school. (SSPEP/APA)
3-5 units, Aut (Labaree, D)

HISTORY 258F. Education Schools: Historical and Sociological Perspectives
(Same as EDUC 231X) The lowly status of the education school in the United States is the issue that defines the starting point of this course. Topics include an exploration the historical development of this institution, its major social function, and the interaction between the two. The course touches on a variety of scholarly domains, including the history of education, sociology of education, higher education, and educational policy.
3-4 units, alternate years, not given this year

HISTORY 301. Introduction to Public History in the U.S.,19th Century to the Present
(Same as HISTORY 201) Gateway course for the History and Public Service interdisciplinary track. Topics include the production, presentation, and practice of public history through narratives, exhibits, web sites, and events in museums, historical sites, parks, and public service settings in nonprofit organizations, government agencies, and educational institutions.
4-5 units, Aut (McKibben, C)

HISTORY 303E. Global Catholicism
(Same as HISTORY 203E) Explores the rise of Catholicism as a global phenomenon, and investigates its multiple transformations as it spread to the Americas, Asia, and Africa. Topics will include the Reformation, Tridentine reform and the Jesuits, the underground churches in England and the Dutch Republic, the missions to Asia, the Spanish conquest of Latin America, conversion and indigenous religions, missionary imperialism and new religious movements in the non-European world.
4-5 units, Spr (Sena, M)

HISTORY 304. Approaches to History
Required of first-year History Ph.D. students.
4-5 units, Aut (Baker, K)

HISTORY 304G. War, Culture, and Society in the Modern Age
(Same as HISTORY 204G) How Western societies and cultures have responded to modern warfare. The relationship between its destructive capacity and effects on those who produce, are subject to, and must come to terms with its aftermath. Literary representations of WW I; destructive psychological effects of modern warfare including those who take pleasure in killing; changes in relations between the genders; consequences of genocidal ideology and racial prejudice; the theory of just war and its practical implementation; and how wars are commemorated.
5 units, not given this year

HISTORY 305. Graduate Workshop in Teaching
Required of first-year History Ph.D. students. Perspectives on pedagogy for historians: course design, lecturing, leading discussion, evaluation of student learning, use of technology in teaching lectures and seminars. Addressing today's classroom: sexual harassment issues, integrating diversity, designing syllabi to include students with disabilities.
1 unit, Spr (Kollmann, N)

HISTORY 306D. World History: Graduate Colloquium
How do historians engage the global scale in the classroom as well as in research? The world history canon including Toynbee, McNeill, Braudel, Wolf, and Wallerstein; contrasting approaches, recent research, and resources for teaching. Recommended: concurrent enrollment in HISTORY 306E.
4 units, not given this year

HISTORY 306E. International History and International Relations Theory
(Same as HISTORY 202, POLISCI 216E, POLISCI 316) The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.
5 units, not given this year

HISTORY 306F. Identities and Identification in the Atlantic World
How identities and processes of identification changed in Europe, Africa, and the Americas during the early modern period and as a result of the engagement of the inhabitants of these three continents in the Atlantic world.
4-5 units, not given this year

HISTORY 306G. Colonial Law
Examines the relationship between law and colonialism in Latin America, Africa and Asia during both the early modern and the modern period. By reading some of the seminal works that have been published on this issue, we will seek to understand how law both facilitated and limited colonialism and how colonialism, in turn, had modified the legal systems that had existed previously. Attention will also be given to law an an acculturating agent and to the legal arena as a sphere for conflict resolution, negotiation,and identity formation.
4-5 units, Aut (Herzog, T)

HISTORY 306K. World History Pedagogy Workshop
Students draft a syllabus and create a curriculum module for use in a world history lecture course. Corequisite: HISTORY 306D, recommended.
1 unit, not given this year

HISTORY 307A. Legal History Workshop
(Same as LAW 372.) Faculty and students from the Law school and the History department discuss research in the field of legal history. Guest speakers. Secondary literature relevant to the speaker's research. Undergraduates require consent of instructors.
4-5 units, Win (Herzog, T; Kessler, A)

HISTORY 307C. The Global Early Modern
(Same as HISTORY 207C) In what sense can we speak of ""globalization"" before modernity? What are the characteristics and origins of the economic system we know as ""capitalism""? When and why did European economies begin to diverge from those of other Eurasian societies? With these big questions in mind, the primary focus will be on the history of Europe and European empires, but substantial readings deal with other parts of the world, particularly China and the Indian Ocean.
4-5 units, Spr (Como, D)

HISTORY 307E. Origins of Totalitarianism
(Same as HISTORY 204E) Modern revolutionary and totalitarian politics. Sources include monographs on the medieval, Reformation, French Revolutionary, and Great War eras. Topics: the essence of modern ideology, the concept of the body national, state terror, charismatic leadership, gender assignments, private and public spheres, and identities.
4-5 units, Spr (Weiner, A)

HISTORY 308. Biography and History
(Same as HISTORY 207) The relationship between biographical and historical writing, primarily in Europe and America. Problems of methodology, evidence, dispassion, and empathy. Texts: biographies, critical literature on biographical work, and novels (A. S. Byatt's Possession, Bernard Malamud's Dubin's Lives) that illuminate the intellectual underpinnings of biographical labor.
4-5 units, not given this year

HISTORY 308A. Science and Law in History
(Same as HISTORY 208A) How the intertwined modern fields of science and law, since the early modern period, together developed central notions of fact, evidence, experiment, demonstration, objectivity, and proof.
4-5 units, not given this year

HISTORY 308B. Women Activists' Response to War
(Same as HISTORY 208B) Theoretical issues, historical origins, changing forms of women's activism in response to war throughout the 20th century, and contemporary cases, such as the Russian Committee of Soldiers Mothers, Bosnian Mothers of Srebrenica, Serbian Women in Black, and the American Cindy Sheehan. Focus is on the U.S. and Eastern Europe, with attention to Israel, England, and Argentina.
4-5 units, not given this year

HISTORY 309A. Postcolonialism and Universalism
(Same as HISTORY 209D) Key texts and motifs from postcolonial theory: empire, class, exile, suffering, textuality, archive in juxtaposition to 20th-century philosophical questions about universal history and the relevance of humanist inquiry.
4-5 units, Spr (Kumar, A)

HISTORY 309B. Concepts of the Political
(Same as HISTORY 209B) What is the present? Can it stand on its own, without invoking history and without promising a future? How did the 20th century make sense of itself, as violent and ruptured from all preceding centuries as it was, yet so prolific and promising in its revolutionary achievements and futures? The century through four concepts: time, ambiguity, cruelty, and crisis. 20th-century politics through what happened to dialectic, humanism, history, and Europe.
4-5 units, Spr (Kumar, A)

HISTORY 309E. History Meets Geography
Focus is on developing competence in GIS computer applications and applying it to historical problems. Previous experience with GIS not required. Recommended: complete the GIS tutorial in Branner Library before the course starts.
4-5 units, not given this year

HISTORY 309F. Historical Geography Colloquium: Maps in the Early Modern World
The significance of cartographic enterprise across the early modern world. Political, economic, and epistemological imperatives that drove the proliferation of nautical charts, domain surveys, city plans, atlases, and globes; the types of work such artifacts performed for their patrons, viewers, and subjects. Contributions of indigenous knowledge to imperial maps; the career of the map in commerce, surveillance, diplomacy, conquest, and indoctrination. Sources include recent research from Asia, Europe, and the Americas.
4-5 units, Aut (Wigen, K)

HISTORY 311. Body, Gender, and Society in Medieval Europe
(Same as HISTORY 211) Historical, literary, theological, and anthropological sources. Issues: transformations in representations of the body, gender, sexuality, and in women¿s place in society or social representation in W. Europe from the 3rd-14th centuries. Were these processes related to one another and to social changes? Analytically straddles the realm between bodification of spiritual powers and control or manipulation of the body in society, from the cult of relics to asceticism.
4-5 units, not given this year

HISTORY 312. Holy Wars: Medieval Perspectives
(Same as HISTORY 212) Cultural and societal factors at play in Christian holy war from late antiquity to the early modern era. Topics include: the Crusades and their meanings; armed struggle against heresy; and the wars of religion. Prerequisite: consent of instructor.
4-5 units, not given this year

HISTORY 313. Core Colloquium in Medieval European History
4-5 units, not given this year

HISTORY 316A. Muslims and Infidels: Islam and the Crusades
(Same as HISTORY 216A) The impact of the Crusades on the Muslim world and consciousness from the Middle Ages and to the present. Primary and secondary sources. Themes include: jihad; cultural interaction between Muslims and Christians in the Holy Land; and military, political, and ideological developments in the 12th and 13th centuries. Modern interpretations and debates about jihadist theology and global jihad.
4-5 units, not given this year

HISTORY 317. Medieval Seminar: Classics and Key Works
(Same as HUMNTIES 322) Colloquium focused on key primary sources that allow entry into Medieval European culture. Readings include: Augustine, On Christian Doctrine; Gregory the Great, Moralia on the Book of Job; Beowulf; the Song of Roland; and Aquinas, Summa Theologica.
3-5 units, not given this year

HISTORY 319B. Secularity
Classic theories of secularity. Is a secular world possible? How does, historically seen, the notion of the secular emerge, impose itself, and get challenged? Readings include Max Weber, E. Durkheim, R.A. Markus, Carl Schmitt, and Hans Blumenberg, and studies bearing on the Middle Ages, English monastic secularization, the French Revolution, and 20th-century political religions.
4-5 units, not given this year

HISTORY 321A. Classics of Russian Historiography
Main trends of Russian intellectual history as seen through major historians' treatment of Muscovy: Romanticism, Slavophilism, Hegelianism, Populism, Social Democracy, New Idealism, and Marxism-Leninism.
4-5 units, not given this year

HISTORY 321B. Imperial Russian Historiography
4-5 units, not given this year

HISTORY 321C. Historiography of the Soviet Union
Major schools of interpretation of the Soviet phenomenon through works representative of a specific school, in chronological order, from the first major interpretation of the Soviet polity by Trotsky to postmodernist theories.
4-5 units, not given this year

HISTORY 322. Early Modern Russia in European Context
4-5 units, Win (Kollmann, N)

HISTORY 323. Art and Ideas in Imperial Russia
(Same as HISTORY 223) Poetry, novels, symphonic music, theater, opera, painting, design, and architecture: what they reveal about the politics and culture of tsarist Russia.
4-5 units, not given this year

HISTORY 323B. Research Methodologies in Early Modern Russian History
4-5 units, not given this year

HISTORY 324B. Modern Afghanistan
(Same as HISTORY 224B) Politics, society, and culture in Afghanistan from the 19th century to the present. Topics include state building, tribal politics, Islamic law, geopolitics, the Taliban, and the post-Taliban disorder.
4-5 units, Aut (Crews, R)

HISTORY 324F. The Caucasus and the Muslim World
The linkages connecting the societies of the Caucasus to Muslim communities in Iran, Russia, the Ottoman Empire and Turkey, S. Asia, and the Middle East.
4-5 units, not given this year

HISTORY 326C. Graduate Colloquium on Balkan History
Designed for History Ph.D. students to develop competence in the history and historiography of the modern Balkans, from the French Revolution to the present. Areas of study include the influence of empires on the region, the rise of nationalism and nation states, the dilemmas of independence, the emergence and decline of communism in the region, and the recurrence of war and ethnic conflict.
4-5 units, not given this year

HISTORY 327. East European Women and War in the 20th Century
(Same as HISTORY 227) Thematic chronological approach through conflicts in the region: the Balkan Wars, WW I, WW II, and the recent wars in the former Yugoslavia. The way women in E. Europe have been involved in and affected by these wars compared to women in W. Europe in the two world wars. Women's involvement in war as members of the military services, the backbone of underground movements, workers in war industries, mothers of soldiers, subjects and supporters of war aims and propaganda, activists in peace movements, and objects of wartime destruction, dislocation, and sexual violation.
4-5 units, Aut (Jolluck, K)

HISTORY 328. Circles of Hell: Poland in World War II
(Same as HISTORY 228) The experience and representation of Poland's wartime history from the Nazi-Soviet Pact of 1939 to the aftermath of Yalta in 1945. Nazi and Soviet ideology and practice regarding the Poles and the ways Poles responded, resisted, and survived. The self-characterization of Poles as innocent victims, and their involvement or complicity in the Holocaust, thus engaging in a current debate in Polish society.
5 units, not given this year

HISTORY 328K. Resistance and Collaboration in Hitler's Europe During World War II
(Same as HISTORY 238K) Nearly all European countries were subjected to military aggression by Nazi Germany and its allies.

What prompted some Europeans to resist, while others accommodated the invaders? What did resistance and collaboration entail in Hitler's Europe? Examines how Europeans experienced and responded to Nazi occupation. Explores postwar memorializations of the war, investigates along the way relations among documents, historical scholarship, and public memory. Besides France, emphasis is on Southern and East-Central Europe.

4-5 units, Spr (Batinic, J)

HISTORY 329. Poles and Jews

(Same as HISTORY 229) Focus is on the period since WW I. The place of the Jews in interwar Poland, WW II, surviving Jews after the war, Polish memorialization of the Holocaust, the reality and mythology of Jews in the communist apparatus, the manipulation of anti-Semitism by the communist government, and post-communist movement toward reconciliation. Memory and national mythology emphasizing Polish wartime behavior and the relationship of Jews to communism. The sources and uses of stereotypes, and the state of Polish-Jewish relations today.

4-5 units, not given this year

HISTORY 330. Core Colloquium on Early Modern Europe: Ancien Regime

Topics in the social, political, and religious history of Western Europe, 1550-1789, with an emphasis on France. May be repeated for credit.

4-5 units, not given this year

HISTORY 330A. Core Colloquium on Early Modern Europe

Historiographical survey from the Renaissance to the Enlightenment. Topics include the Reformations, European expansion, state and nation building, invention and scientific discovery, intellectual history, and gender. In-depth reviews determined by student interests.

4-5 units, Aut (Stokes, L)

HISTORY 330D. Europe in the World, 1789-Present

(Same as HISTORY 230D) The European conquest of parts of Africa, Asia, and the S. Pacific by merchants, missionaries, armies, and administrators had significant, and often cataclysmic, effects on indigenous political alliances, cultural practices, and belief systems. But were the effects of expansion entirely one-sided? What impact did the experiences of colonialism have on European politics, culture, and Europe's relations with the rest of the world? How interaction between Europe and the rest of the world redefined the political, racial, sexual, and religious boundaries of both Europe and its colonies and gave rise to today’s more globalized society.

4-5 units, Aut (Daughton, J)

HISTORY 330F. Self-Policing, Denunciation, and Surveillance in Modern Europe

(Same as HISTORY 230F) How individual actions impact state machineries of power. The motives, pressures, and consequences of everyday collaboration from the French Revolution to Nazi Germany and Soviet bloc police states; popular outrage over such practices in the aftermath of these regimes. The phenomenon of anticipatory compliance, as people tended to perceive less freedom of action than actually existed, and the reciprocal intensification of real and imagined restrictions. The malleability of personal values and interests as represented in diaries, memoirs, secondary sources, and film; variety of individual and national responses.

4-5 units, Win (Sheffer, E)

HISTORY 331A. Charles Darwin and the Global 19th Century

(Same as HISTORY 231A) Uses the writings, life, and legacy of Charles Darwin as a vehicle for exploring the nature of global change in the nineteenth century. Examines the relationship between modern science, imperialism, and world travel by tracking Darwin's experiences and those of his contemporaries, focusing both of the emergence of evolutionary theory as well as the popular reception and political controversies surrounding Darwin's work.

4-5 units, Aut (Naranch, B)

HISTORY 331B. Core Colloquium on Modern Europe: The 19th Century

The major historical events and historiographical debates of the long 19th century from the French Revolution to WW I.

4-5 units, not given this year

HISTORY 331D. Core Colloquium on Modern Europe: Intellectual History

4-5 units, not given this year

HISTORY 331G. European Reformations

(Same as HISTORY 231G, RELIGST 236, RELIGST 336) Readings in and discussion of theological and social aspects of sixteenth century reformations: Luther, Radical Reform, Calvin, and Council of Trent, missionary expansion, religious conflict, creative and artistic expressions. Texts include primary sources and secondary scholarly essays and monographs.

4-5 units, Win (Stokes, L; Pitkin, B)

HISTORY 332A. Power, Art, and Knowledge in Renaissance Italy

Defining features of the world of Leonardo, Machiavelli, and Michelangelo. Intersections of history, politics, art, and literature. The relationship between the Renaissance and the Reformation.

4-5 units, not given this year

HISTORY 332D. Rome: The City and the World, 1350-1750

(Same as HISTORY 232D) What lies beyond the ruins of an ancient city? The history of Rome from the Renaissance to the age of the grand tour. Topics include: the political, diplomatic, and religious history of the papacy; society and cultural life; the everyday world of Roman citizens; the relationship between the city and the surrounding countryside; the material transformation of Rome as a city; and its meaning for foreigners.

4-5 units, not given this year

HISTORY 332F. The Scientific Revolution

What do people know and how do they know it? What counts as scientific knowledge? In the 16th and 17th centuries, understanding the nature of knowledge engaged the attention of individuals and institutions including Copernicus, Galileo, Descartes, Newton, the early Royal Society, and less well-known contemporaries. New meanings of observing, collecting, experimenting, and philosophizing, and political, religious, and cultural ramifications in early modern Europe.

4-5 units, not given this year

HISTORY 332G. When Worlds Collide: The Trial of Galileo

(Same as HISTORY 232G) In 1633, the Italian mathematician Galileo was tried and condemned for advocating that the sun, not the earth, was the center of the cosmos. The Catholic Church did not formally admit that Galileo was right until 1992. Examines the many factors that led to the trial of Galileo and looks at multiple perspectives on this signal event in the history of science and religion. Considers the nature and definition of intellectual heresy in the sixteenth and early seventeenth centuries, and examines the writings of Galileo's infamous predecessor Giordano Bruno (burned at the stake in 1600). Looks closely at documents surrounding the trial and related literature on Renaissance and Reformation Italy in order to understand the perspectives of various participants in this famous event. Focal point of seminar involves the examination of the many different histories that can be produced from Galileo's trial. What, in the end, were the crimes of Galileo?

4-5 units, not given this year

HISTORY 333. Reformation, Political Culture, and the Origins of the English Civil War

(Same as HISTORY 233) English political and religious culture from the end of the Wars of the Roses to the Civil War of the 1640s. Themes include the growth of the size and power of the state, Reformation, creation of a Protestant regime, transformation of the political culture of the ruling elite, emergence of Puritanism, and causes of the Civil War.

4-5 units, Spr (Como, D)

HISTORY 333B. Early Modern Sexualities

(Same as HISTORY 233B) History of sexuality in early modern Europe. Normative sexuality, heterosexual transgressions, and minority sexualities. Theoretical approaches to and debates about the history of sexuality, in particular prior to the 19th century. Tools for critiquing the heteronormativity of early modern sources and for reading those sources for evidence of sexual diversity. Readings include monographs and primary sources.

4-5 units, not given this year

HISTORY 333C. Two British Revolutions

(Same as HISTORY 233C) Current scholarship on Britain,1640-1700, focusing on political and religious history. Topics include: causes and consequences of the English civil war and revolution;

rise and fall of revolutionary Puritanism; the Restoration; popular politics in the late 17th century; changing contours of religious life; the crisis leading to the Glorious Revolution; and the new order that emerged after the deposing of James II.

4-5 units, not given this year

HISTORY 333D. Strangers, Barbarians and Infidels: Cross-cultural Encounters in the Premodern World

(Same as HISTORY 233D) Considers pivotal encounters between and among diverse cultures (Asian, African, America, and European) throughout the premodern period, with emphasis on the period 1100-1700. How scholars have understood and theorized crosscultural encounters; historical examples. Primary and secondary sources used to examine historical conditions that led to these meetings, their impact on the individuals and societies involved, and the larger lessons of the encounter of cultures for present times. Why did Christian Europe emerge as the predominant global power by the 16th century? How did/does the experience of travel shape the perceptions of others? What was the significance of religious, economic, and political motivations for crosscultural encounters? What were the technological, environmental, and cultural effects of such meetings for the societies involved?

4-5 units, Aut (Selwyn, J)

HISTORY 333K. The Invention of the Modern Republic

(Same as HISTORY 233K) Examines the history of republican thinking in the Atlantic World from the Renaissance to the French Revolution.

4-5 units, not given this year

HISTORY 334. Enlightenment Seminar

(Same as HISTORY 234, HISTORY 432A, HUMNTIES 324) The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

4-5 units, Win (Baker, K)

HISTORY 334F. Science, Technology, and Empire

(Same as HISTORY 234F) How modern Europe came to be connected to the wider world through repeated cycles of expansion, circulation, and exchange from the mid-nineteenth century to the present. Wateshed moments and the roles played by colonialism, migration, commerce, warfare, telecommunications, and popular culture in redefining the place of Europe in a changing global landscape.

4-5 units, Spr (Naranch, B)

HISTORY 335. History of European Law, Medieval to Contemporary

(Same as HISTORY 135) From the fall of the Roman Empire to the establishment of the EU. How law changed over time. Sources and nature of law, organization of legal systems, and relationships between law and society, law and lawmaker, law and the legal professions.

4-5 units, Aut (Herzog, T)

HISTORY 336. Modern France

(Daughton)

4-5 units, not given this year

HISTORY 336A. Nations and Nationalism in East-Central Europe

(Same as HISTORY 236A) One of the central problems in East-Central Europe in the past two centuries: the emergence of nationalist ideologies and modern nations. Major theoretical treatments of nationalism through canonical texts; case studies of several nations. Topics include the national revival movements, the rise of integral nationalism, minority problems and problems of multiethnic states, and the politics of population transfer and ethnic cleansing.

4-5 units, Win (Batinic, J)

HISTORY 336D. Cold War Europe

(Same as HISTORY 236D) Much more than a military and diplomatic confrontation, the Cold War was lived experience in Europe, shaping politics, society, culture, and personal identity. Beginning at the end of WW II, traces the continent's division into eastern and western blocs, and ends with the fall of the Iron Curtain. Sources include memoirs, propaganda, novels, and film, as well as new scholarship on the Cold War.

4-5 units, Spr (Sheffer, E)

HISTORY 336E. Violence in History and Theory

Methodological challenges associated with defining and analyzing violence in late-19th- and 20th-century contexts. How people witnessed, coped with, and survived violent episodes. Cases of state violence, ethnic and religious conflict, warfare, genocide, and decolonization. The notion of everyday suffering in the contemporary world. Sources include anthropology, sociology, and history.

4-5 units, not given this year

HISTORY 337. The Holocaust

(Same as HISTORY 137, JEWISHST 183, JEWISHST 383) The emergence of modern racism and radical anti-Semitism. The Nazi rise to power and the Jews. Anti-Semitic legislation in the 30s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry.

4-5 units, Spr (Zipperstein, S)

HISTORY 337C. Street History: Learning the Past in School and Out

(Same as EDUC 356) Interdisciplinary. Since Herodotus, history and memory have competed to shape minds: history cultivates doubt and demands interpretation; memory seeks certainty and detests that which thwarts its aims. History and memory collide in modern society, often violently. How do young people become historical amidst these forces; how do school, family, nation, and mass media contribute to the process?

3-5 units, Win (Wineburg, S)

HISTORY 338A. Graduate Colloquium in Modern British History, Part I

Influential approaches to problems in British, European, and imperial history. The 19th-century British experience and its relationship to Europe and empire. National identity, the industrial revolution, class formation, gender, liberalism, and state building. Goal is to prepare specialists and non-specialists for oral exams.

4-5 units, Aut (Satia, P)

HISTORY 338B. Modern Britain, Part II

Themes include empire and racism, the crisis of liberalism, the rise of the welfare state, national identity, the experience of total war, the politics of decline, and modernity and British culture.

4-5 units, not given this year

HISTORY 339D. Capital and Empire

(Same as HISTORY 239D) Can empire be justified with balance sheets of imperial crimes and boons, a calculus of racism versus railroads? The political economy of empire through its intellectual history from Adam Smith to the present; the history of imperial corporations from the East India Company to Wal-mart; the role of consumerism; the formation of the global economy; and the relationship between empire and the theory and practice of development.

4-5 units, Win (Satia, P)

HISTORY 339F. Empire and Information

(Same as HISTORY 239F) How do states see? How do they know what they know about their subjects, citizens, economies, and geographies? How does that knowledge shape society, politics, identity, freedom, and modernity? Focus is on the British imperial state activities in S. Asia and Britain: surveillance technologies and information-gathering systems, including mapping, statistics, cultural schemata, and intelligence systems, to render geographies and social bodies legible, visible, and governable.

4-5 units, not given this year

HISTORY 339H. Modern European History in a Global Age
How scholars can write the history of modern Europe in a way that integrates global and transnational perspectives. Discussed the methodological challenges and merits of various approaches and reviews relevant theoretical and interdisciplinary models for how this can best be done. Topics include globalization, migration, internationalism, colonialism, post-colonialism, modern warfare, and the media.

4-5 units, not given this year

HISTORY 341A. The Emergence of Medicine: The Middle Ages and the Renaissance
How did medicine emerge as a distinctive body of knowledge and a profession? The history of medicine from ca. 1000 to 1750. Topics: new ways of examining and treating the body; the religious and cultural significance of disease; the development of hospitals; and the rise of public health systems. Comparison of the status of medicine in Europe and the Islamic world. The work of key figures such as Vesalius and Harvey. Students are required to attend the concurrent lectures of HISTORY 141A.

4-5 units, not given this year

HISTORY 342. Darwin in the History of Life
Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evo-devo, neocatastrophism, and the new technological frontier of biomimicry. Attendance at the lectures of HISTORY 142 is required.

4-5 units, not given this year

HISTORY 342A. Technology and Society in the Modern World (1700 to Present)
(Same as HISTORY 242A) How do technology and society interact? What drives technological change? How does technology transfer across different cultures? Historical case studies of productive, military, domestic, information, and biomedical technologies from 1700 to the present. The evolution of artifacts and technological systems such as industrial machinery, weaponry, home appliances, computers, and contraceptives. How technology affects social change and, especially, how technological change is invariably shaped by historical and social circumstances. Students think historically about technology, and thus engage effectively with questions of technological change, or lack thereof.

4-5 units, Aut (Staff)

HISTORY 343C. 18th-Century Colonial Science and Medicine
(Same as HISTORY 243C) The exchange of knowledge, technologies, plants, peoples, disease, and medicines. Focus is on French, British, and Dutch interests in the West Indies; examples from elsewhere. Sources include primary and secondary texts on voyaging, colonialism, slavery, and environmental exchange.

4-5 units, not given this year

HISTORY 344. Gender in Science, Medicine and Engineering
(Same as HISTORY 144) Men's and women's roles in science, medicine, and engineering over the past 200 years with a focus on the present. What are the efforts underway globally to transform science, medicine, and engineering into fields where women can flourish? How have science and medicine studied and defined males and females? Can gender analysis spark creativity in human knowledge?

4-5 units, not given this year

HISTORY 345A. Africa in the Era of the Slave Trade
The slave trade, including the trans-Saharan, Indian Ocean, and trans-Atlantic trades, constituted nearly a millennium of interaction with the wider world and set in motion transformations in African societies, polities, and cultures. Topics include the debates about slavery in Africa, the impact of the slave trade on African societies, state formation, economic change, religious change, and household change in the period before the scramble for Africa in the late 19th century.

4-5 units, not given this year

HISTORY 345B. African Encounters with Colonialism

4-5 units, Aut (Roberts, R)

HISTORY 346. The Dynamics of Change in Africa
(Same as AFRICAST 301A) Crossdisciplinary colloquium; required for the M.A. degree in African Studies. Addresses critical issues in African Studies by exploring intersections of the organization of power, structure of the economy, and patterns of social stratification. Interpretive debates on Africa's engagement with the slave trade, impact of colonialism, decolonization, democratization and civil wars, health and society, and Africa's engagement with globalization. The process of knowledge production and its social location, and the current state of knowledge.

4-5 units, Aut (Roberts, R)

HISTORY 347E. Health and Society in Africa
(Same as HISTORY 245E) The history of disease, therapeutic and diagnostic systems, and the definition of health in precolonial, colonial, and postcolonial Africa. The social and political histories of specific epidemics, including sleeping sickness, influenza, TB, mental illness, and AIDS. The colonial contexts of epidemics and the social consequences of disease.

4-5 units, not given this year

HISTORY 348D. Law and Colonialism in Africa
(Same as HISTORY 245G) Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases as a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority.

4-5 units, not given this year

HISTORY 349. History without Documents
(Same as HISTORY 249) Can history be written about places and times for which are no written sources, or for people in literate societies who left no written traces? Practical training in historical methods for non-documentary sources, including oral traditions and history, archaeology, ecological sources, historical linguistics, ethnography, rituals, myths, songs, and art.

4-5 units, not given this year

HISTORY 351A. Core in American History, Part I

4-5 units, Aut (Rakove, J)

HISTORY 351B. Core in American History, Part II

4-5 units, not given this year

HISTORY 351C. Core in American History, Part III

4-5 units, Win (Campbell, J)

HISTORY 351D. Core in American History, Part IV

4-5 units, not given this year

HISTORY 351E. Core in American History, Part V
Required of all first-year United States History Ph.D. students.

4-5 units, Spr (Hobbs, A)

HISTORY 351F. Core in American History, Part VI
Required of all first-year Ph.D. students in U.S. History.

4-5 units, not given this year

HISTORY 352B. History of American Law
(Same as LAW 318.) Modern history of American law, legal thought, legal institutions and the legal profession. Topics include law and regulation of corporate organizations and labor relations in the age of enterprise, law of race relations in the South and North, development of classical legalism, critiques of classical legalism, modern administrative state, organized legal profession, New Deal legal thought and legislation, legal order of the 50s, expansion of enterprise liability, civil rights movements from 1940, rights revolution of the Warren Court and Great Society.

5 units, Spr (Friedman, L)

HISTORY 353D. Approaches to American Legal History
(Same as LAW 651.) Legal history may once have been primarily devoted to exploring legal doctrines and key judicial opinions, and thus to be of interest mainly to legal scholars and lawyers. Now, the best writing in legal history resembles historical writing more generally, and the study of legal ideas and practices is increasingly integrated with social, intellectual, cultural, and political history. Examines recent writings in American legal history, ranging broadly across time and space to ask how the field reflects developments in historical writing more generally, and how the use of legal materials affects our understanding of major aspects of American history.

4-5 units, not given this year

HISTORY 356. U.S.-China Relations: From the Opium War to Tiananmen
(Same as HISTORY 256) The history of turbulent relations, military conflict, and cultural clashes between the U.S. and China, and the implications for the domestic lives of these increasingly interconnected countries. Diplomatic, political, social, cultural, and military themes from early contact to the recent past. WIM
4-5 units, not given this year

HISTORY 358. Topics in the History of Sexuality: Sexual Violence
(Same as AMSTUD 258, CSRE 192E, HISTORY 258) Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.
4-5 units, Win (Freedman, E)

HISTORY 360. California's Minority-Majority Cities
(Same as HISTORY 260) Historical development and the social, cultural, and political issues that characterize large cities and suburbs where communities of color make up majority populations. Case studies include cities in Los Angeles, Santa Clara, and Monterey counties. Comparisons to minority-majority cities elsewhere in the U.S. Service Learning Course (certified by Haas Center).
4-5 units, Spr (McKibben, C)

HISTORY 365. Writing Asian American History
(Same as HISTORY 265) Recent scholarship in Asian American history, with attention to methodologies and sources. Topics: racial ideologies, gender, transnationalism, culture, and Asian American art history. Primary research paper.
5 units, not given this year

HISTORY 368E. American Foreign Policy and International History, 1941-2009
(Same as HISTORY 268E) Major events and interpretations from WW II to the war in Iraq. Issues of race, expansionism and power; nuclear weapons; and war.
4-5 units, not given this year

HISTORY 370. Graduate Colloquium on Colonial Latin American History
Sixteenth to nineteenth centuries. Indigenous cultures. The arrival of Europeans and its impact on native and European societies. Culture, religion and institutions, and everyday life. The independence period and the formation of new nations.
4-5 units, not given this year

HISTORY 371. Graduate Colloquium: Explorations in Latin American Social History
(Same as HISTORY 470) How to use primary sources such as government records, estate inventories, and parish records for social history.
4-5 units, Aut (Frank, Z)

HISTORY 373A. The European Expansion
(Same as HISTORY 273) The relationship between European monarchies and their colonial domains from the 16th-18th centuries. Reasons for expansion, methods, and results. Case studies include the Spanish, Portuguese, Dutch, French, and English domains in Africa, Asia, and the Americas. Readings include primary and secondary sources.
4-5 units, not given this year

HISTORY 378A. The Logic of Authoritarian Government, Ancient and Modern
(Same as POLISCI 346S) If authoritarianism is less economically efficient than democracy, and if authoritarianism is a less stable form of political organization than democracy, then why are there more authoritarian governments than democracies? To address this paradox, focus is on theoretical and empirical literature on authoritarian governments, and related literatures on the microeconomic analysis of property rights and credible commitments.
5 units, not given this year

HISTORY 378E. Political Economy of Development
(Same as POLISCI 440B) Required of Political Science Ph.D. students with comparative politics as a first or second concentration; others by consent of the instructor. The origins of political and economic institutions and their impact on long run outcomes for growth and democracy. Emphasis is on the analysis of causal models, hypothesis testing, and the quality of evidence.
5 units, Win (Haber, S)

HISTORY 379. Latin American Development: Economy and Society, 1800-2000
(Same as HISTORY 279) The newly independent nations of Latin America began the 19th century with economies roughly equal to, or even ahead of, the U.S. and Canada. What explains the economic gap that developed since 1900? Why are some Latin American nations rich and others poor? Marxist, dependency, neoclassical, and institutionalist interpretive frameworks. The effects of globalization on Latin American economic growth, autonomy, and potential for social justice.
4-5 units, not given this year

HISTORY 381. Economic and Social History of the Modern Middle East
(Same as HISTORY 281) The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market are combined with possible case studies of Egypt, Iraq, and Palestine.
4-5 units, not given this year

HISTORY 381B. Modern Egypt
(Same as HISTORY 281B) From just before the Napoleonic expedition of 1798 to the present. Topics: European imperialism, the political economy of cotton, rise of nationalism, gender and the nation, minorities, the coup of 1952, positive neutralism and the Cold War, and the neo-liberal reconstruction of Egypt.
4-5 units, not given this year

HISTORY 382. The United States and the Middle East since 1945
(Same as HISTORY 282) Since the end of WW II, U.S. interests in the Middle East have traditionally been defined as access to oil at a reasonable price, trade and markets, containing the influence of the Soviet Union, and the security of Israel. Is this the full range of U.S. interests? How has the pursuit of these interests changed over time? What forces have shaped U.S. policy? What is the impact of U.S. policy on the region itself?
4-5 units, Win (Beinin, J)

HISTORY 383. The New Global Economy, Oil, and Islamic Movements in the Middle East
(Same as HISTORY 283) The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market combined with case studies of Egypt, Iraq, and Palestine.
4-5 units, not given this year

HISTORY 384. The Ottoman Turks in Comparative Perspective: The Inner Life of a Eurasian Empire
(Same as HISTORY 284) The Ottoman Empire, one of the largest and most influential empires in world history, extended to three continents and survived for more than six centuries. But its history is often characterized as Oriental, despotic, and theocratic, reduced to a parade of capricious sultans, evil pashas, and hapless harem women. Comparative history used to challenge these views and to understand imperial longevity by tracing the ideological, fiscal, and military elements of state formation on both the European (Russia, Hungary, Spain) and Asian (Japan, China, Iran) continents. Situates the Ottomans' within their Eurasian heritage and explores the Empire's dynamic role in shaping early modern global systems. Chronological focus is neither on the origins of the empire nor on the Ottomans' final days, but rather on the 16th through 19th centuries when a notion of Ottoman-ness emerged in administrative practices, poetic and literary languages, and art.
4-5 units, Spr (Ferguson, H)

HISTORY 385A. Core in Jewish History, 17th-19th Centuries
4-5 units, not given this year

HISTORY 385B. Core in Jewish History, 20th Century
4-5 units, not given this year

HISTORY 385F. Mediators of Tradition & Modernity: Comparative Jewish Women's History from 17th Century to Present
(Same as HISTORY 285F, JEWISHST 285F) Focuses on the single role of women as mediators between tradition and modernity in the Jewish home. While simultaneously the preservationists of certain traditions such as kashrut, Shabbat observance, or prayer, Jewish women also served as the medium of Jewish families' paths to assimilation. Looks at women in the West and East comparing their experiences in the face of modernity, caught between tradition and modernity, while simultaneously encouraging the assimilation and cultural improvement of their children.
5 units, Spr (Roberts, S)

HISTORY 386E. Jews in France from the Dreyfus Affair to World War II
(Same as HISTORY 286E, JEWISHST 286E, JEWISHST 386E) Examines the experience of Jews in France and their confrontations with antisemitism, discrimination, violence, assimilation, and integration from the Dreyfus Affair through Vichy and World War II. Popular and institutionalized antisemitism in France placed significant limits on the Jews' path to assimilation and shaped the ways in which they related to France and to Judaism.
4-5 units, Win (Roberts, S)

HISTORY 387D. Tel Aviv: Site, Symbol, City
(Same as HISTORY 287D, JEWISHST 287D, JEWISHST 387D) Tel Aviv, the first Israeli city, from a cultural history perspective combining high and low cultural texts. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's early years; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; as the site of the Israeli Zionist and post-Zionist intellectuals. Sources include art, cinema, and literature.
4-5 units, Win (Dubnov, A)

HISTORY 387E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism
(Same as HISTORY 287E, JEWISHST 287E, JEWISHST 387E) Intellectual responses of Jewish thinkers to the age of extremes. Readings include a wide assemblage of twentieth-century thinkers, such as Theodor Adorno, Leo Strauss, Hannah Arendt, Isaiah Berlin, and Herbert Marcuse. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945.
4-5 units, Win (Dubnov, A)

HISTORY 387G. Jews in Colonial North Africa
(Same as HISTORY 287G, JEWISHST 287G, JEWISHST 387G) Under European imperialism, the relations between Jews ans Muslims in North Africa changed dramatically. Examines the complicated process of remaking Jewish identity under colonialism and the way in which citizenship, education, and assimilation separated Jews ans Muslims. Also looks at the spheres in which Jews and Muslims continued to coexist. Studies the impact of the rise of nationalism, anti-colonialism, Zionism, pan-Arabism, and antisemitism in the context of colonial North Africa.
4-5 units, Spr (Roberts, S)

HISTORY 387K. Gentlemen and Jews: History of the Jews of England
(Same as HISTORY 287K, JEWISHST 287K, JEWISHST 387K) Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?
4-5 units, Spr (Dubnov, A)

HISTORY 388. Palestine and the Arab-Israeli Conflict
(Same as HISTORY 288, IPS 388, JEWISHST 288, JEWISHST 388) 1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)
4-5 units, Win (Beinin, J)

HISTORY 390. Han Chinese and the Global White: The Production of Ethnoracial Majorities, East and West
4-5 units, not given this year

HISTORY 390A. Major Topics in Modern Chinese History: Qing/Republican Transition
Continuities and discontinuities in society, economy, politics, culture, and thought during the transition from the Qing dynasty to the republic. May be repeated for credit.
4-5 units, not given this year

HISTORY 391A. Archaeology and Modernity in Asia: The Excavation of Ancient Civilizations in Modern Times
(Same as HISTORY 291A) The interplay in Asia between antiquity and modernity, civilization and nation state, and national versus colonial science. The recent excavation of artifacts and places associated with Asian civilization such as the terracotta warriors in China and Angkor Wat in Cambodia. How Asian states have grappled with modernity and colonialism as they simultaneously dug up their ancient pasts.
4-5 units, not given this year

HISTORY 391B. The City in Imperial China
(Same as HISTORY 291B) The evolution of cities in the early imperial, medieval, and early modern periods. Topics include physical structure, social order, cultural forms, economic roles, relations to rural hinterlands, and the contrast between imperial capitals and other cities. Comparative cases from European history. Readings include primary and secondary sources, and visual materials.
3-5 units, not given this year

HISTORY 391C. Early Imperial China
The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy,and literature. Also examines the nature of empire as a distinctive political form.
4-5 units, Spr (Lewis, M)

HISTORY 391D. Colonialism and Collaboration in East Asia
(Same as HISTORY 291D) The roles and problems of collaboration in the rise, sustenance, and fall of empires. Themes include conceptual definitions of collaboration and empire, collaboration of traditional elites, accommodation of religious communities, assimilation and collaboration, local intermediaries, and class and empire. Regional focus is East Asia; also cases from other colonial situations.
4-5 units, Aut (Moon, Y)

HISTORY 391E. Maps, Borders, and Conflict in East Asia
(Same as HISTORY 291E) The nature of borders and border conflicts in N.E. Asia from the 17th to the early 20th century. Focus is on contact zones between China, Russia, Korea, and Japan. The geopolitical imperatives that drove states to map their terrain in variable ways. Cultural, diplomatic, and imperial contexts. European pressures and contributions to E. Asian cartography; the uses of maps in surveillance, diplomacy, identity, and war. Student projects focus on a contested border zone.
4-5 units, not given this year

HISTORY 392. The Two Koreas
(Same as HISTORY 292) Major themes and scholarly works to understand the origins, outbreak, and consequences of the Korean War. The division of Korea into ROK and DPRK and their subsequent developments. Themes include: WW II in East Asia; Korean communist movements during Japanese colonial rule; the Cold War in East Asia; the roles of the U.S., China, and USSR in the Korean War; the ideas of key North and South Korean leaders, and the consolidation of the two Koreas after the Korean War.
4-5 units, Win (Moon, Y)

HISTORY 392B. Law and Society in Late Imperial China
Connections between legal and social history. Ideology and practice, center and periphery, and state-society tensions and interactions. Readings introduce the work of major historians on concepts and problems in Ming-Qing history.
4-5 units, Aut (Sommer, M)

HISTORY 392D. Japan in Asia, Asia in Japan
(Same as HISTORY 292D) How Japan and Asia mutually shaped each other in the late 19th and 20th centuries. Focus is on Japanese imperialism in Asia and its postwar legacies. Topics include: pan-Asianism and orientalism; colonial modernization in Korea and Taiwan; collaboration and resistance; popular imperialism in Manchuria; total war and empire; comfort women and the politics of apology; the issue of resident Koreans; and economic and cultural integration of postwar Asia.
4-5 units, Spr (Uchida, J)

HISTORY 392E. The Historical Roots of Modern East Asia
(Same as HISTORY 92A) Focus is on China and Japan before and during their transition to modernity. The populous, urbanized, economically advanced, and culturally sophisticated Ming empire and Muromachi shogunate in the 16th century when Europeans first arrived. How the status quo had turned on its head by the early 20th century when European and American steamships dominated the Pacific, China was in social and political upheaval, and Japan had begun its march to empire.
4-5 units, not given this year

HISTORY 392F. Traditional Korea: History and Culture
(Same as HISTORY 292F) Korea before 1800 and how iconic features of Korean tradition were created and reinvented. Themes include Korea's ancient kingdoms, the aristocracy and military in the Koryo dynasty, the print culture and Korean alphabet, ideologies and religions, the social status system and the life of women, the kingship and court culture of the Choson dynasty, and Korea's place in premodern East Asia. The modern and contemporary debates.
4-5 units, Spr (Moon, Y)

HISTORY 393. Frontier Expansion and Ethnic Statecraft in the Qing Empire
The legacy of the Qing dynasty in the territorial boundaries claimed by the People's Republic of China including the frontier zones that lie outside China proper. How the Qing acquired and ruled its frontier territories. Growth and migration of the Han Chinese population. How the dynasty's Manchu rulers managed ethnic difference. Consequences of Qing expansionism and ethnic statecraft for subject peoples and for the dynasty itself. At what point and by what processes did the Qing become China.
4-5 units, not given this year

HISTORY 393A. State, Society, and Economy in Qing Dynasty China
Historical scholarship on China during the Qing period, including the gentry, civil examinations, and the debate about social mobility; merchants, cities, and the debate about civil society/public sphere; taxation, local security, and famine relief; heterodoxy, collective violence, and rebellion; and rival approaches (neo-Malthusian, neo-conservative, and neo-Marxist) to understanding the high Qing economy.
4-5 units, not given this year

HISTORY 393B. Homosexuality in Historical and Comparative Perspective
(Same as HISTORY 293B) Comparative history of homoerotic desire, relations, and identity through scholarship on different historical periods and parts of the world: the classical Mediterranean, early modern European cities, late imperial and modern China, Tokugawa and modern Japan, and the U.S.
4-5 units, not given this year

HISTORY 393C. Late Imperial China
A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism.
4-5 units, Aut (Sommer, M)

HISTORY 393D. Empire and Cosmopolitanism: Traveling Ideas in Global Political Thought
(Same as HISTORY 293D)
4-5 units, not given this year

HISTORY 395B. Early Modern Japan
4-5 units, not given this year

HISTORY 395F. Race and Ethnicity in East Asia
(Same as HISTORY 295F) Historical, cultural, political and theoretical perspectives. Commonly misunderstood as an ethnically homogeneous country, the People's Republic of China is home to 55 officially recognized minority groups, many of whom inhabit the strategic border regions of the country. How similar assumptions of ethnic and racial homogeneity in Taiwan, Japan, and Korea are being reexamined by scholars in disciplines including anthropology, history, and political science.
4-5 units, not given this year

HISTORY 395J. Gender and Sexuality in Chinese History
4-5 units, not given this year

HISTORY 396D. Modern Japan
Introduces students to the major historical problems and historiographic trends in the study of modern Japan from the Meiji period to the present. Themes include approaches to late Meiji culture and politics, the formation of imperial subjects and citizens, agrarian society and politics, gender in modern Japan, empire and modernity, total war and transwar state and society, U.S. occupation, and postwar Japan.
4-5 units, Aut (Uchida, J)

HISTORY 399A. Design and Methodology for International Field Research
(Same as HISTORY 299X) Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys.
1 unit, Spr (Kollmann, N; Roberts, R)

HISTORY 399W. Graduate Directed Reading
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY 401A. Spatial History: Concepts, Methods, Problems
Technical training in GIS, with modules taught by Stanford Spatial History Lab staff; conceptual work in the use of these techniques in spatial historical analysis. Students develop their own spatial history projects and produce beta versions of dynamic visualizations.
4-5 units, Spr (Frank, Z)

HISTORY 401B. Spatial History, Part II
Prerequisite: 401A.
4-5 units, not given this year

HISTORY 406. Graduate Research Seminar on Colonial Law
Prerequisite: HISTORY 306G.
4-5 units, not given this year

HISTORY 414A. Medieval History
4-5 units, not given this year

HISTORY 414B. Medieval History
4-5 units, not given this year

HISTORY 421A. Early Modern Russia
4-5 units, not given this year

HISTORY 422A. Research Seminar on the History of the Russian Empire
4-5 units, not given this year

HISTORY 422B. Research Seminar in Imperial Russia
4-5 units, not given this year

HISTORY 424A. The Soviet Civilization
(Same as HISTORY 224A) Socialist visions and practices of the organization of society and messianic politics; the Soviet understanding of mass violence, political and ethnic; and living space. Primary and secondary sources. Research paper or historiographical essay.
4-5 units, Win (Weiner, A)

HISTORY 424B. The Soviet Civilization
Prerequisite: HISTORY 424A
4-5 units, Spr (Weiner, A)

HISTORY 424C. The End of Communism in Europe
Causes, course, and consequences.
4-5 units, not given this year

HISTORY 430A. Graduate Research Seminar: Early Modern Europe
Students will begin a research project on any aspect of early modern European history, 1400-1800, by taking HISTORY 430A in winter quarter as the first quarter of this two-quarter sequence. Enrollment by permission of instructor.
4-5 units, Win (Findlen, P)

HISTORY 430B. Graduate Research Seminar: Early Modern Europe
Prerequisite: HISTORY 430A. HISTORY 430B is the second quarter of a two-quarter sequence. Enrollment by permission of instructor.
4-5 units, not given this year

HISTORY 432A. Enlightenment Seminar
(Same as HISTORY 234, HISTORY 334, HUMNTIES 324) The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.
4-5 units, Win (Baker, K)

HISTORY 433A. European History
4-5 units, not given this year

HISTORY 438. European History Workshop
All European history graduate students in residence register for this weekly workshop, at which dissertation chapters and prospectuses, papers, and grant proposals by students and faculty are read and discussed.
1 unit, Spr (Robinson, P)

HISTORY 439A. Graduate Research Seminar: Modern Britain and the British Empire
4-5 units, not given this year

HISTORY 439B. Graduate Research Seminar: Modern Britain and the British Empire II
4-5 units, not given this year

HISTORY 443A. Human Origins: History, Evidence, and Controversy
(Same as HISTORY 243S) Research seminar. Debates and controversies include: theories of human origins; interpretations of fossils, early art, and the oldest tools; the origin and fate of the Neanderthals; evolutionary themes in literature and film; visual rhetoric and cliché in anthropological dioramas and phyletic diagrams; the significance of hunting, gathering, and grandmothering; climatological theories and neocatastrophic geologies; molecular anthropology; the impact of racial theories on human origins discourse. Background in human evolution not required.
4-5 units, not given this year

HISTORY 444C. The History of the Body in Science, Medicine, and Culture
(Same as HISTORY 244C) The human body as a natural and cultural object, historicized. The crosscultural history of the body from the 18th century to the present. Topics include: sciences of sex and race; medical discovery of particular body parts; human experimentation, foot binding, veiling, and other bodily coverings; thinness and obesity; notions of the body politic.
4-5 units, not given this year

HISTORY 445A. Research Seminar in African History
Primary sources such as government records and missionary archives. Students present work in progress. Prerequisite: consent of instructor.
4-5 units, not given this year

HISTORY 445B. Research Seminar in African History
Primary sources such as government records and missionary archives. Students present work in progress. Prerequisite: consent of instructor.
4-5 units, not given this year

HISTORY 446A. Research Seminar: African Nationalism and Beyond
(Same as HISTORY 246S) African intellectual, political, social and cultural institutions confronting issues of sovereignty, authority, heterarchy, and power during the 19th and 20th centuries.
4-5 units, not given this year

HISTORY 446B. Research Seminar: African Nationalism and Beyond
Prerequisite: 446A and consent of instructor.
4-5 units, not given this year

HISTORY 448A. African Societies and Colonial States
(Same as HISTORY 248S) The encounter between African societies and European colonialism in the colony or region of their choice. Approaches to the colonial state; tours of primary source collections in the Hoover Institution and Green Libraries. Students present original research findings and may continue research for a second quarter.
4-5 units, Win (Roberts, R)

HISTORY 448B. African Socieities and Colonial States
4-5 units, Spr (Roberts, R)

HISTORY 461A. Research Seminar on the Histories of Women, the Family, and Sexuality
Research design, research methods, and historical writing on topics in the histories of women, the family, or sexuality in the U.S. Prepares graduate students for dissertation work. Workshop model involves exchanging preliminary prospectus, outline, writing sample, and draft for peer responses. Article-length original paper based on primary sources, to be completed by the end of Spring Quarter.
4-5 units, Win (Freedman, E)

HISTORY 461B. Research Seminar on the Histories of Women, the Family, and Sexuality, Part II
Prerequisite: 461A.
4-5 units, Spr (Freedman, E)

HISTORY 470. Graduate Colloquium: Explorations in Latin American Social History
(Same as HISTORY 371) How to use primary sources such as government records, estate inventories, and parish records for social history.
4-5 units, Aut (Frank, Z)

HISTORY 470A. Graduate Research Seminar: Latin American Social History
Students will write a seminar paper. Prerequisite: HISTORY 371.
4-5 units, not given this year

HISTORY 481. Research Seminar in Middle East History
(Same as HISTORY 287S, JEWISHST 287S, JEWISHST 481) Student-selected research topics.
4-5 units, Spr (Beinin, J)

HISTORY 481A. Research Seminar in Middle East History
4-5 units, Sum (Staff)

HISTORY 486A. Graduate Research Seminar in Jewish History
(Same as JEWISHST 486A)
4-5 units, Spr (Staff)

HISTORY 486B. Graduate Research Seminar in Jewish History
4-5 units, not given this year

HISTORY 495A. Qing Legal Documents
How to use Qing legal documents for research. Winter: sample documents that introduce the main genres including: the Qing code and commentaries; magistrates' handbooks and published case collections; and case records from Chinese archives. Spring: class meets occasionally; students complete research papers. Prerequisite: advanced reading ability in Chinese.
4-5 units, Win (Sommer, M)

HISTORY 495B. Qing Legal Documents
How to use Qing legal documents for research. Winter: sample documents that introduce the main genres including: the Qing code and commentaries; magistrates' handbooks and published case collections; and case records from Chinese archives. Spring: class meets occasionally; students complete research papers. Prerequisite: advanced reading ability in Chinese.
4-5 units, Spr (Sommer, M)

HISTORY 497A. Maps and Gazetteers as Sources for East Asian History
For graduate students of early modern or modern East Asia. Includes weekend workshop on Chinese historical GIS with Harvard's Peter Bol. Students work with the Stanford Spatial History Lab to develop analytical techniques. Prerequisite: background in GIS.
4-5 units, not given this year

HISTORY 497B. Maps and Gazetters as Sources for East Asian History, Part 2
Prerequisite: HISTORY 497A.
4-5 units, not given this year

HISTORY 498C. Japanese Colonial Archives
First part of a two quarter sequence. Graduate seminar on conducting research in modern Japanese history. Focus is on Japanese imperialism and colonialism in Asia, especially Korea. Different types of archives, from national and research libraries to online databases, and methods of research including oral history. Primary sources include government publications, classified police records, and media sources.
4-5 units, not given this year

HISTORY 499X. Graduate Research
Units by arrangement. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY 802. TGR Dissertation
Units by arrangement.
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HISTORY AND PHILOSOPHY OF SCIENCE (HPS) COURSES

UNDERGRADUATE COURSES IN HISTORY AND PHILOSOPHY OF SCIENCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

HPS 60. Introduction to Philosophy of Science
(Same as PHIL 60) 20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerbend, and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions. GER:DB-Hum
5 units, Spr (Ryckman, T)

HPS 61. Science, Religion, and the Birth of Modern Philosophy
(Same as PHIL 61) Galileo's defense of the Copernican world-system that initiated the scientific revolution of the 17th century, led to conflict between science and religion, and influenced the development of modern philosophy. Readings focus on Galileo and Descartes. GER:DB-Hum
5 units, not given this year

HPS 154. The History of Scientific Methods, Pythagoras to Popper
(Same as PHIL 163H) History of scientific methods and associated science from ancient Greece to the 20th century. Case studies include Pythagoras, Plato, and Euclid; Aristotle; medieval science; scientific Renaissance of the 1540s; methodological clashes involving the Church, Galileo, Bacon, and Descartes; Newton; Faraday; Darwin; rise of statistical methods; beginnings of modern physics; Popper. The mutual influences of method and practice. What does and does not qualify as science. Recommended: background in history, philosophy, or a technical field such as mathematics, science, or engineering. GER:DB-Hum
4 units, Aut (McCaskey, J)

HPS 158. The Social History of Mental Illness
The variety of meanings of mental illness in the past, and the diagnostic, therapeutic, cultural, and policy challenges historically posed by mental illness. Focus is on the U.S. but not limited to it. How has mental illness been defined in history? How has the mind been medicalized and managed? Topics include the rise of institutions for the mentally ill, the growth of the psychiatric profession and the relationship between psychiatry, deviance and anti-psychiatry, and gender and psychiatric norms. GER:DB-SocSci
5 units, Win (Horn, M)

HPS 199. Directed Reading
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN HISTORY AND PHILOSOPHY OF SCIENCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HPS 299. Graduate Individual Work
May be repeated for credit. (Staff)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HUMAN BIOLOGY (HUMBIO) COURSES

UNDERGRADUATE COURSES IN HUMAN BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

HUMBIO 2A. Genetics, Evolution, and Ecology
Introduction to the principles of classical and modern genetics, evolutionary theory, and population biology. Topics: micro- and macro-evolution, population and molecular genetics, population dynamics, and community ecology, emphasizing the genetics of the evolutionary process and applications to human populations. GER:DB-NatSci
5 units, Aut (Boggs, C; Durham, W; Francke, U)

HUMBIO 2B. Culture, Evolution, and Society
Introduction to the evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences. GER:DB-SocSci
5 units, Aut (Klein, R; Wolf, A)

HUMBIO 3A. Cell and Developmental Biology
The principles of the biology of cells: principles of human developmental biology, biochemistry of energetics and metabolism, the nature of membranes and organelles, hormone action and signal transduction in normal and diseased states (diabetes, cancer, autoimmune diseases), drug discovery, immunology, and drug addiction. Prerequisite: college chemistry or completion of the HumBio chemistry lecture series during the fall quarter. GER:DB-NatSci
5 units, Win (Fuller, M; Kaiser, A; Nusse, R; Scott, M; Talbot, W)

HUMBIO 3B. Behavior, Health, and Development
Research and theory on human behavior, health, and life span development. How biological factors and cultural practices influence cognition, emotion, motivation, personality, and health in childhood, adolescence, and adulthood. GER:DB-SocSci
5 units, Win (Lyons, D; Fernald, A)

HUMBIO 3Y. Practicum in Child Development
Practical experience at Bing Nursery School for 3.5 hours per week. Pre- or corequisite: 3B. (AU)
1 unit, Win (Wise, B)

HUMBIO 4A. The Human Organism
Organ system physiology: the principles of neurobiology and endocrinology, and the functions of body organs. The mechanisms of control, regulation, and integration of organ systems function. GER:DB-NatSci
5 units, Spr (Fernald, R)

HUMBIO 4B. Environmental and Health Policy Analysis
Connections among the life sciences, social sciences, public health, and public policy. The economic, social, and institutional factors that underlie environmental degradation, the incidence of disease, and inequalities in health status and access to health care. Public policies to address these problems. Topics include pollution regulation, climate change policy, biodiversity protection, health care reform, health disparities, and women¿s health policy GER:DB-SocSci

5 units, Spr (Goulder, L; Baker, L)

HUMBIO 6. Human Origins
(Same as ANTHRO 6, ANTHRO 206) The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them. GER:DB-NatSci

5 units, not given this year

HUMBIO 21. Introduction to Brain and Behavior
(Same as BIO 20) Evolutionary principles to understand how the brain regulates behavior physiologically, and is also influenced by behavioral interactions. Topics include neuron structure and function, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states, the biological basis of learning and memory, and behavioral abnormalities. GER:DB-NatSci

3 units, Aut (Fernald, R), alternate years, not given next year

HUMBIO 27. Traditional Chinese Medicine
The philosophy and history behind traditional Chinese medicine. Concepts such as Qi, Yin/Yang, meridians, Chinese organs, and the 5 elements. How these concepts are applied through techniques such as acupuncture, herbal medicine, Qi gong, and massage. How traditional Chinese medicine is understood from a scientific standpoint. Political and socioeconomic implications. Observation of an acupuncturist. Readings on the integration of Eastern and Western medicine and on traditional Chinese medicine.

1 unit, Spr (Golianu, B)

HUMBIO 82A. Qualitative Research Methodology
Goal is to develop knowledge and skills for designing and conducting qualitative research studies including purposes, conceptual contexts, research questions, methods, validity issues, and interactions among these facets. Each student designs a qualitative research study.

3 units, Win (Wolf, J), Spr (Wolf, J)

HUMBIO 82B. Advanced Data Analysis in Qualitative Research
For students writing up their own qualitative research. Students prepare a complete draft presenting their own qualitative research study including results, with reports drafted section by section, week by week. Class provides feedback, guidance, support.

3 units, Aut (Wolf, J)

HUMBIO 82Q. The Omnivore's Dilemma, or Is It?
(Stanford Introductory Seminar) Preference to sophomores. The omnivore's dilemma: making the right food choices from the vast number possible. The health implications of our food choices. Why people make these choices; the positive and negative influences of the food industry; research in nutritional science; and public health policies and the resulting confusion about what people should eat. Readings include In Defense of Food by M. Pollan and primary reference materials. Introduction to the scientific literature in human nutrition.

3 units, Aut (Endemann, G)

HUMBIO 84Q. Social Justice, Responsibility, Health
(Stanford Introductory Seminar) Preference to sophomores. Reducing health disparities among segments of the US population is an over-arching goal of the Centers for Disease Control and Prevention (CDC). Evidence for and cause of existing health disparities; criteria for calling a health disparity unjust; and assignment of responsibility for maintaining or recovering good health. Service Learning Course (certified by Haas Center).

4 units, Aut (Heaney, C)

HUMBIO 86Q. Love as a Force for Social Change
(Stanford Introductory Seminar) Preference to sophomores. Biological, psychological, religious, social and cultural perspectives on the concept of love. How love is conceptualized across cultures; love as the basis of many religions; different kinds of love; the biology of love; love as sickness; love and sex; the languages of love including art, literature, music, and poetry. Emphasis is on writing. Oral presentation. A requirement of this class is participation in public blogs.

3 units, Win (Murray, A)

HUMBIO 90Q. Contemporary Issues in Human Experimentation
(Stanford Introductory Seminar) Preference to sophomores. The guiding principles currently used to protect human subjects in terms of informed consent and protection of privacy; ethical issues relating to compensatory mechanisms for inherent risks; historical perspective and the development of the current mechanisms to safeguard the privacy and integrity of the individual; examples of use/abuse of human experimentation during medieval, Nazi, and modern times. Guest speakers currently performing human experiments or involved in approving such experimentation.

3 units, Aut (Constantinou, C)

HUMBIO 91Q. Neuroethology: The Neural Control of Behavior
(Stanford Introductory Seminar) Preference to sophomores. Animal behavior offers insights about evolutionary adaptations. The origins of the study of animal behavior and its development to the present. Discussion of original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat. GER:DB-NatSci

3 units, Aut (Fernald, R)

HUMBIO 96Q. Injustice, Advocacy and Courage: The Path of Everyday Heroes
(Stanford Introductory Seminar) This course will study the paradigms of people of courage, action and energy who have fought against injustice by advocating for causes against great odds and at personal risk. The focus will be on everyday people who have taken action, often at great personal risk, not for ambition, but because of their convictions and steadfast commitment to their beliefs.

3 units, Win (Abrams, W)

HUMBIO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine
(Stanford Introductory Seminar) (Same as ORTHO 97Q) Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.

3 units, Aut (Matheson, G), Win (Matheson, G), Spr (Matheson)

HUMBIO 99Q. Becoming a Doctor: Readings from Medical School, Medical Training, Medical Practice
(Stanford Introductory Seminar) Preference to sophomores. For students considering medicine as a career. Goal is to acquaint students with medical school, training in medicine and surgery, and the practice of medicine and surgery. Topics include: how to pick a medical school and a residency; how medicine affects family life, especially children; the differences between surgical and medical specialties; the advantages and disadvantages among academic/teaching, pure research, group practice, HMO, hospital staff, or private practice; malpractice concerns; and financial considerations.

3 units, Aut (Zaroff, L)

HUMBIO 111. Human Dimensions of Global Environmental Change: Resilence, Vulnerability, and Environmental Justice
(Same as ANTHRO 173) The complexity of social and political issues surrounding global environmental change. Emphasis is on synergies precipitated by human-induced climatic change. Case studies and scenarios to explore the vulnerability and resilience in households, communities, regions, and nationmstates most affected by extreme weather conditions. Their concerns, livelihood changes, and diverse responses of rural smallholders, indigenous communities, the state, and local and regional migrants. Central theme is environmental justice.

3 units, Spr (Curran, L)

HUMBIO 112. Conservation Biology
(Same as BIO 144) Principles and application of the science of preserving biological diversity. Topics: sources of endangerment of diversity; the Endangered Species Act; conservation concepts and techniques at the population, community, and landscape levels; reserve design and management; conflict mediation. 4 units if taken with a service learning component. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101, or BIO 43 or HUMBIO 2A with consent of instructor. GER:DB-NatSci
3-4 units, Win (Boggs, C; Launer, A)

HUMBIO 113. The Biologies of Humans and Plants
The biological interdependence of humans and plants, particularly the ways in which people have imposed selection pressures and ecological change on one another. Topics include: evolution and basic plant structure; plant characteristics and genetic variants allowing domestication; effects of plant domestication on human biology; plants in traditional and contemporary diets; and human influences on plant biology through genetic manipulation and environmental change. Class meetings center on discussing journal articles.
3 units, Aut (Preston, K)

HUMBIO 114. Environmental Change and Emerging Infectious Diseases
(Same as ANTHRO 177, ANTHRO 277) The changing epidemiological environment. How human-induced environmental changes, such as global warming, deforestation and land-use conversion, urbanization, international commerce, and human migration, are altering the ecology of infectious disease transmission, and promoting their re-emergence as a global public health threat. Case studies of malaria, cholera, hantavirus, plague, and HIV. GER:DB-SocSci
3-5 units, Aut (Durham, W; Jones, J)

HUMBIO 115. Environmental Crises and State Collapse: Lessons from the Past
(Same as ANTHRO 115A) The effects and consequences of long-term human interaction with the environment. How and why past societies adapted, or failed to adapt, to changing environmental conditions and relevance to current environmental problems. Demographic, archaeological, and environmental data assessed using case studies from around the world since the late Pleistocene. Development of agriculture, societal collapse, sustainability, and policy response. Prerequisite: Human Biology core or equivalent or consent of instructor.
3 units, Aut (Truncer, J)

HUMBIO 116. Controlling Climate Change in the 21st Century
(Same as EARTHSYS 147, EARTHSYS 247) Global climate change science, impacts, and response strategies. Topics: scientific understanding of the climate system; modeling future climate change; global and regional climate impacts and vulnerability; mitigation and adaptation approaches; the international climate policy challenge; and decarbonization of energy and transportation systems. GER:DB-NatSci
3 units, not given this year

HUMBIO 117. Environment and Health: An Impact Assessment
(Same as ANTHRO 117A) The effects of environment upon human and animal health and vice versa, including impacts of climate change, local environment (urban/rural health issues), land-use change upon health issues such as asthma, cholera, and malaria. Emphasis is on interdisciplinary approaches including medicine, epidemiology, ecology, and environmental science. Health/environment topics from multiple levels, such as from the standpoint of the individual organism to the ecosystem. How such knowledge is applied to policy and public health. Students construct new conceptual models for health/environment case studies.
3 units, Spr (Salkeld, D)

HUMBIO 118. Theory of Ecological and Environmental Anthropology
(Same as ANTHRO 90C) Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America. GER:DB-SocSci
5 units, Win (Bird, D)

HUMBIO 119. Demography: Health, Development, Environment
(Same as BIO 102) Demographic methods and their application to understanding and projecting changes in human infant, child, and adult mortality and health, fertility, population, sex ratios, and demographic transitions. Progress in human development, capabilities, and freedoms. Relationships between population and environment. Prerequisites: numeracy and basic statistics; Biology or Human Biology core; or consent of instructor. GER:DB-SocSci
3 units, not given this year

HUMBIO 119C. Demography and Measurement of the Effects of Armed Conflict
This course presents the measurable demographic effects of conflicts, which go far beyond the counting of casualties of men involved in war-like events. The course provides the demographic and statistical tools that allow us to measure the indirect demographic effects (infant mortality, life expectancy, migration, marriage and fertility) of conflicts under the difficulties posed by those events, such as having lower data quality or no data at all, and the entanglements of causes of both conflict and demographic changes, such poverty.
4 units, Spr (Urdinola, B)

HUMBIO 120. Health Care in America: The Organizations and Institutions that Shape the Health Care System
Health policy and health care delivery. Options for health care reform. Prerequisite: Human Biology core or equivalent, or consent of instructor.
4 units, Aut (Barr, D)

HUMBIO 120A. Health Policy and Health Care System Design
The design of health care systems and their ability to improve the health of the population successfully. Concepts related to health care systems and components. Focus is on the health care systems of the U.S. and UK.
4 units, not given this year

HUMBIO 121. Critical Issues in Child Health
Integrated picture of the physical and psychosocial health factors that result in a healthy child building on principles taught in the Human Biology core. Students apply basic human physiology to the physiology of the child to develop perspective on global pediatric health challenges and how the cultural context influences and defines the child living within it.
4 units, Aut (Adam, M), Spr (Adam, M)

HUMBIO 121E. Ethnicity and Medicine
(Same as FAMMED 244) Weekly lecture series introduces information about ethnic and cultural factors that impact patient care. Culturally sensitive healthcare services and contemporary research issues involving minority and underserved populations. Topics include health care issues and indigenous medical practices of African Americans, Asians, Latinos, Native Americans, immigrants, and refugees in both urban and rural settings. 1 unit for attending weekly lectures only; 2 units for attending lectures followed by one-hour discussions facilitated by course director; 3 units (non-med students, grad or undergrad only) for preparing weekly response papers and a research paper, as well as attending lectures and discussions. Students taking the course for 3 units may earn a letter grade.
1-3 units, Spr (Garcia, R)

HUMBIO 122. Beyond Health Care: Seeking Health in Society
(Same as PEDS 222) Available evidence at the national and cross-country level linking social welfare interventions and health outcomes. If and how non-health programs and policies could have an impact on positive health outcomes. Evaluation of social programs and policies that buffer the negative health impact of economic instability and unemployment among adult workers and their children. Examination of safety nets, including public health insurance, income maintenance programs, and disability insurance. Prerequisites: HUMBIO 4B or equivalent, and background in research methods and statistics.
3 units, Aut (Rodriguez, E)

HUMBIO 122S. Social Class, Race, Ethnicity, Health
Socioeconomic, racial, and ethnic differences in health status. Access to care of racial and ethnic minorities and those from lower

social classes. Institutional factors such as government programs, and individual factors such as unconscious racial bias on the part of care providers or distrust of providers on the part of patients. The intersection of lower social class and ethnic minority status in health status and health care access. GER:DB-SocSci, EC-AmerCul

4 units, Win (Barr, D)

HUMBIO 124. Fat Nutrition and Current Health Concerns

Relationships between dietary fats and heart disease, cancer, obesity, diabetes, and fitness. Proposed benefits of omega-3 fats and antioxidants. Historical and economic influences on fat nutrition. Prerequisite: 3A; pre- or corequisite: 4A; preference to students who have completed 4A. Recommended: 130.

4 units, Spr (Endemann, G)

HUMBIO 125. Current Controversies in Women's Health

(Same as OBGYN 256) Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor. GER:EC-Gender

2-3 units, Spr (Jacobson, M; Stefanick, M)

HUMBIO 126. Promoting Health Over the Life Course: Multidisciplinary Perspectives

Disease prevention and health promotion topics pertinent to different stages of the life span emphasizing healthy lifestyle and reducing risk factors in both individuals and communities. Focus is on scientific investigation, the application of behavioral science to risk reduction strategies, and the importance of health promotion as a social and economic imperative. Topics include: epidemiology of chronic diseases; social determinants of health, behavior change; obesity, nutrition, and stress; young adult, mid-life and aging health issues; health care delivery and public health system; workplace wellness programs; and environmental and international issues. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, Aut (Stefanick, M; Alles, W)

HUMBIO 127A. Community Health: Assessment and Planning I

Major determinants of health in a community. Working with community partners to identify health issues and plan programs and policies to prevent disease and promote health. Service learning component involving students in community health assessment techniques. Final grade given upon completion of HUMBIO 127B. Service Learning Course (certified by Haas Center). Prerequisite: 4B or equivalent, or consent of instructor.

4 units, Win (Heaney, C)

HUMBIO 127B. Community Health: Assessment and Planning II

Continuation of 127A. Service learning course with emphasis on conducting community health assessment and planning projects in collaboration with community-based organizations. Service Learning Course (certified by Haas Center). Prerequisite: 4B or equivalent, 127A, or consent of instructor.

4 units, Spr (Heaney, C)

HUMBIO 128. Community Health Psychology

(Same as PSYCH 101) Social ecological perspective on health emphasizing how individual health behavior is shaped by social forces. Topics include: biobehavioral factors in health; health behavior change; community health promotion; and psychological aspects of illness, patient care, and chronic disease management. Prerequisites: HUMBIO 3B or PSYCH 1, or equivalent.

4 units, Win (Heaney, C)

HUMBIO 129. Critical Issues in International Women's Health

Women's lives, from childhood through adolescence, reproductive years, and aging. Economic, social, and human rights factors, and the importance of women's capacities to have good health and manage their lives in the face of societal pressures and obstacles. Emphasis is on life or death issues of women's health that depend on their capacity to negotiate or feel empowered, including maternal mortality, violence, HIV/AIDS, reproductive health, and sex trafficking. Organizations addressing these issues. A requirement of this class is participation in public blogs. Prerequisites: Human Biology core or equivalent or consent of instructor. GER:EC-Gender

4 units, Aut (Murray, A), Win (Murray, A)

HUMBIO 129P. International Health Policy: Comparative Health Care Systems

Key dimensions and issues involved in affluent health care systems in countries such as the U.K., Canada, Germany, Sweden, Japan, and France, including pharmaceutical policy and lessons for U.S. Key problems that health care systems face, principal characteristics of several systems, forces of change, and structural differences. How a given country approaches health care reveals its values, sense of justice, views on rationing, interest groups, and political power structure.

3 units, Aut (Light, D)

HUMBIO 129S. Global Public Health

The class is an introduction to the fields of international public health and global medicine. It focuses on resource poor areas of the world and explores major global health problems and their relation to policy, economic development and human rights. The course is intended for students interested in global health, development studies, or international relations, and provides opportunities for in-depth discussion and interaction with experts in the field. .

4 units, Win (Wise, P)

HUMBIO 130. Human Nutrition

The study of food, and the nutrients and substances therein. Their action, interaction, and balance in relation to health and disease. Emphasis is on the biological, chemical, and physiological processes by which humans ingest, digest, absorb, transport, utilize, and excrete food. Dietary composition and individual choices are discussed in relationship to the food supply, and to population and cultural, race, ethnic, religious, and social economic diversity. The relationships between nutrition and disease; eating disorders; ethnic diets; vegetarianism; nutritional deficiencies; nutritional supplementation; phytochemicals; and food safety. Prerequisite: Human Biology core or consent of instructor.

4 units, Spr (Gardner, C)

HUMBIO 132. Functional Anatomy of Exercise

Interdisciplinary: physiology, pathology, and biomechanics. Anatomy of the body's major joints in the context of exercise and movement emphasizing adaptations that occur with intensity and nature of exercise, age, and disease. Students work in cooperative groups with students at the Gothenburg School of Sports Science in Sweden to produce original research on an aspect of biomechanics and sport. Sources include the Stanford Human Performance Laboratory. Enrollment limited to 40. Prerequisites: 139 or consent of instructor.

4 units, Spr (Garza, D)

HUMBIO 133. Human Physiology

(Same as BIO 112, BIO 212) The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core. GER:DB-NatSci

4 units, Win (Garza, D)

HUMBIO 135. Exercise Physiology

How body systems respond to the stress of acute exercise and adapt to chronic exercise training. How the cardiovascular system adapts to optimize oxygen delivery and utilization, how muscles generate force and hypertrophy in response to training, how metabolic/biochemical pathways are regulated to support the increased energy demand of exercise. Theories on the causes of fatigue and muscle soreness, and on what limits human performance. Applied topics such as the effects of aging, gender, and environmental conditions (high altitude, heat, cold) on exercise capacity will also be discussed. Prerequisite: Human Biology core, Biology core, or equivalent, or consent of instructor.

4 units, Aut (Friedlander, A)

HUMBIO 135S. Applied Topics in Exercise Physiology and Metabolism

Focus on scientific research related to exercise physiology, sports performance, impacts of aging and environmental physiology. Exercise physiology lab and field work experience. Student pres-

entations. Summary paper. A requirement of this class is participation in public blogs. Enrollment limited to 12. If class is full, contact instructor for application. Prerequisites: HB135 or consent of instructor.

3 units, Spr (Friedlander, A)

HUMBIO 139. Sports Medicine

Sports, exercise, health, and medicine throughout the human performance continuum. Exercise as therapy; injuries and illnesses that result from sports and exercise; and the use of technology in modern sports science. Sources include physiology, nutrition, and biomechanics. Medical problems exacerbated or caused by exercise and sport; maximizing performance in elite athletes; and population-based issues such as exercise and its relationship to health, drugs in sport, and aging. Prerequisite: Biology or Human Biology core, or consent of instructor. GER:DB-NatSci

4 units, Aut (Garza, D)

HUMBIO 140. Sex Differences in Human Physiology and Disease

(Same as OBGYN 240, MED 240) Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Consequences of sex hormones and environmental factors that differ between men and women in systems including the musculoskeletal, neurological, cardiovascular, and immunological. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor. GER:EC-Gender

2-3 units, Win (Stefanick, M)

HUMBIO 142. Adolescent Development

Underlying changes and their consequences in everyday functioning. Physical, cognitive, social, and sexual development; how these changes influence the emerging sense of identity, autonomy, and intimacy. Contexts in which adolescents move such as family, friends and peers, school, and workplace. Focus is on normal development of boys and girls; attention to problem outcomes including eating disorders, depression, and teen pregnancy. Prerequisite: 3B or PSYCH 1, or consent of instructor.

4 units, Spr (Medoff, L)

HUMBIO 143. Adolescent Sexuality

Developmental perspective. Issues related to scientific, historical, and cultural perceptions; social influences on sexual development; sexual risk; and the limitations and future directions of research. Sexual identity and behavior, sexually transmitted diseases including HIV, pregnancy, abortion, gay and lesbian youth, sex education and condom availability in schools, mass media, exploitative sexual activity, and difficulties and limitations in studying adolescent sexuality. Legal and policy issues, gender differences, and international and historical trends. Prerequisite: Human Biology core or equivalent, or consent of instructor.

4 units, Win (Medoff, L)

HUMBIO 144. Boys' Psychosocial Development

(Same as EDUC 143) From early childhood through adolescence. Emphasis is on how boys' lives and experiences are embedded within their interpersonal relationships and social and cultural contexts. Interdisciplinary approach including perspectives from fields such as psychology, sociology, anthropology, family studies, and education. Prerequisite: Human Biology core, or Developmental Psychology , or consent of instructor. GER:EC-Gender

4 units, Spr (Chu, J)

HUMBIO 145L. The Biology and Evolution of Language

(Same as ANTHRO 171, ANTHRO 271) Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and the evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language centers in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory. GER:DB-NatSci

4-5 units, not given this year

HUMBIO 146. Culture and Madness: Anthropological Approaches to Psychiatric Illness

(Same as ANTHRO 181, ANTHRO 281) Interdisciplinary. Culture and social context on the identification, course, and outcome of psychiatric illness. What is known from psychiatry about the nature of illness as a biomedical process and from anthropology about the life course of illness within particular settings. Prerequisite: Human Biology core or equivalent or consent of instructor.

3-5 units, not given this year

HUMBIO 146D. Developmental Disabilities: From Biology to Policy

(Same as PEDS 246) Changes in science and societal attitudes have resulted in an increased prevalence of individuals with disabilities in our communities. This course focuses on Down syndrome, cerebral palsy, Fragile X, and autism. Topics include medical and social definitions of disability; the impact of attitudes, beliefs, and values; advances in biological sciences that may lead to novel therapies to improve functioning; and federal policies, laws, and regulations such as IDEA that increase opportunities for community participation. A field experience complements classroom discussion. Prerequisite: HUMBIO core or equivalent, or consent of instructor.

2-3 units, Win (Feldman, H)

HUMBIO 148. Kinship and Marriage

The courses compares selected societies in Africa, Asia, and South Asia with the aim of discovering the nature of human kinship systems. GER:DB-SocSci, EC-Gender

4 units, Win (Wolf, A)

HUMBIO 148W. Women, Fertility, and Work

(Same as ANTHRO 151, ANTHRO 251) How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places. GER:DB-SocSci, EC-Gender

5 units, not given this year

HUMBIO 149. Psychological and Educational Resilience Among Children and Youth

(Same as EDUC 256) Theoretical, methodological, and empirical issues pertaining to the psychological and educational resilience of children and adolescents. Overview of the resilience framework, including current terminology and conceptual and measurement issues. Adaptive systems that enable some children to achieve successful adaptation despite high levels of adversity exposure. How resilience can be studied across multiple levels of analysis, ranging from cell to society. Individual, family, school, and community risk and protective factors that influence children's development and adaptation. Intervention programs designed to foster resilient adaptation in disadvantaged children's populations.

4 units, Spr (Padilla, A)

HUMBIO 149L. Longevity

(Same as NENS 202, PSYCH 102) Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists. GER:DB-SocSci

4 units, given next year

HUMBIO 150A. Assisted Reproductive Technologies

(Same as DBIO 202, OBGYN 202) Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation.Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors.

1-3 units, Win (Porzig, E)

HUMBIO 151. Introduction to Epidemiology
Principles of epidemiology: the distribution and determinants of disease; the control of health problems; and the medical detective work required to understand disease outbreaks. Case studies from developed and developing countries to explore the use of epidemiological techniques in describing disease dynamics of human, emerging and zoonotic (animal to human) diseases such as SARS, plague, HIV, and influenza; the impacts of changes in policy, law, and behavior on disease control and eradication, such as hepatitis vaccination; and modern challenges in epidemiology such as global disease transmission, environmental change, and bioterrorism threats.

4 units, Aut (Salkeld, D)

HUMBIO 152. Viral Lifestyles
Contemporary topics related to microorganism. Relevance of microorganisms to disciplines beyond molecular biology and medicine. Public health implications of human/viral interactions, and the human behaviors that bring about such interactions. The ecological role played by viruses and their role in environmental health. Prerequisite: familiarity with biological systems, evolutionary biology, and microbiology.

3 units, Spr (Wolfe, N)

HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges
Parasitic and other pestilence of public health importance. Pathogenesis, clinical syndromes, complex life cycles, and the interplay among environment, vectors, hosts, and reservoirs in historical context. Public health policy initiatives aimed at halting disease transmission. World Health Organization tropical disease targets including river blindness, sleeping sickness, leishmaniasis, schistosomiasis, mycobacterial disease (tuberculosis and leprosy), malaria, toxoplasmosis, dracunculiais, and intestinal helminthes. Guest lecturers with expertise in disease control. Prerequisite: Human Biology core or equivalent, or consent of instructor.

4 units, Win (Smith, D)

HUMBIO 154. Cancer Epidemiology
Epidemiological methods relevant to human research in cancer. The concepts of risk; case control, cohort, and cross-sectional studies; clinical trials; bias; confounding; interaction; screening; and causal inference. Social, political, economic, and ethical controversies surrounding cancer screening, prevention, and research. Prerequisite: Human Biology core or equivalent, or consent of instructor.

4 units, Win (Fisher, P)

HUMBIO 155B. The Vaccine Revolution
(Same as MI 115B) Advanced seminar. Human aspects of viral disease, focusing on recent discoveries in vaccine development and emerging infections. Journal club format: students choose articles from primary scientific literature, write formal summaries, and synthesize them into a literature review. Emphasis is on analysis, experimental design, and interpretation of data. Oral presentations. Enrollment limited to 10. Prerequisites: HUMBIO 155H, MI 155V.

6 units, not given this year

HUMBIO 156. Global HIV/AIDS
(Same as MED 256) Public health, policy, and research issues. Resources at Stanford and institutions such as government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Student projects. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor. GER:DB-NatSci, EC-GlobalCom

3 units, Aut (Katzenstein, D)

HUMBIO 156A. Human Developmental Biology and Medicine
(Same as DBIO 156) The biological, medical, and social aspects of normal and abnormal human development. Topics: in vitro fertilization and embryo transfer; gene and cell therapy; gametogenesis; pattern formation in the nervous system and limb development; gene and grand multiple pregnancies; prematurity, in utero effects of teratogens; sex determination and differentiation; growth control; gigantism and dwarfism; neural tube defects; cardiac morphogenesis; progress in the developmental biology of humans. Limited enrollment. Prerequisites: Human Biology or Biology core, or consent of instructor.

3-4 units, Spr (Porzig, E)

HUMBIO 157. The Biology of Stem Cells
(Same as DBIO 257) The role of stem cells in human development and potential for treating disease. Guest lectures by biologists, ethicists, and legal scholars. Prerequisites: 2A,B, or consent of instructor.

3 units, Spr (Nusse, R; Fuller, M)

HUMBIO 158. The Human Genome and Disease
(Same as BIO 109A, BIO 209A) The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. GER:DB-NatSci

3 units, Win (Heller, R)

HUMBIO 159. Genes and Environment in Disease Causation: Implications for Medicine and Public Health
(Same as HRP 238) The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. Prerequisite: basic course in genetics; for undergraduates, Human Biology core or equivalent or consent of instructor.

2-3 units, not given this year

HUMBIO 160. Human Behavioral Biology
(Same as BIO 150, BIO 250) Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness. GER:DB-NatSci

5 units, alternate years, not given this year

HUMBIO 161. The Neurobiology of Sleep
(Same as BIO 149, BIO 249) (Graduate students register for 249.) Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16. GER:DB-NatSci

4 units, not given this year

HUMBIO 162. Clinical Neuroscience in Women's Health
Mental health from the perspectives of neuroscience, psychology, human physiology, and feminist studies. Major depression, bipolar, and obsessive compulsive disorders; how the female reproductive system affects the clinical presentation and course of these disorders. Eating disorders, substance abuse and dependence, and sexual trauma within a biopsychosocial model. Pharmacologic and therapeutic treatment of illnesses. Prerequisite: Human Biology core or equivalent, or consent of instructor. GER:EC-Gender

4 units, not given this year

HUMBIO 163. Neural Systems and Behavior
(Same as BIO 163, BIO 263) The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A. GER:DB-NatSci

4 units, alternate years, not given this year

HUMBIO 165. Promoting Behavior Change
(Same as EARTHSYS 165) How to apply principles of behavioral change to a real world public health problem: climate change and environmental sustainability. Sources include theory, research, and practice from perspectives such as social and cognitive psychology, media and communication, education, behavioral medicine, social marketing, and consumer behavior. Student groups create an intervention to help elementary school students reduce their environmental footprint. Research performed in local high schools to develop optimally feasible, acceptable, and effective interventions.

Prerequisite: Human Biology core or equivalent, or consent of instructor.

4 units, Spr (Robinson, T)

HUMBIO 166. Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context

The array of forces that affect the foods human beings eat, and when, where, and how we eat them, including economics, business, agriculture, law, politics, trade, ideology, culture, biology, and psychology. The impact of current policies, and actions that might be taken to improve human nutrition and health. Macroscale influences on food, nutrition, and eating behavior.

4 units, Win (Robinson, T; Gardner, C)

HUMBIO 167. The Art of Vision

This course concerns eyes: how they are built, how they process visual information, and how they are affected by diseases that are major problems in our society. These issues are analyzed largely through fine art and famous artists to show the implications of normal and abnormal vision. Other examples include animal eyes, and the role of vision in music, literature, and sports. GER:DB-NatSci

3 units, Win (Marmor, M)

HUMBIO 170. Justice, Policy, and Science

The role of science in civil rights, justice, policy, criminal justice, evidence, education, and disabled rights.

5 units, Spr (Abrams, W)

HUMBIO 171. The Death Penalty: Human Biology, Law, and Policy

Combines academic study with student participation in forensic research and case investigation, including DNA evidence, psychological and physiological development, mental and physical disabilities, and witness interviews. The philosophy, structure, and application of capital punishment in the U.S. Goal is to examine and challenge the issues involved in the death penalty from the perspective of involvement in a real case. Course not taught from a preconceived belief or political or philosophical agenda except to involve students in an intellectual challenge of policy and philosophy. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, given next year

HUMBIO 172B. Children, Youth, and the Law

How the legal rights of children and adolescents in America are defined, protected, and enforced through the legal process within the context of their developmental needs and competing societal interests. Topics: origins and definitions of children's rights; adoption; custody; the juvenile justice system; education; informed consent; health care; protection from harm and child welfare; due process; and privacy and freedom of expression. Interactive, using hypotheticals for discussion and analysis. A and B alternate annually; students may take one or both. Prerequisite: Human Biology core or equivalent, or consent of instructor.

5 units, alternate years, not given this year

HUMBIO 173. Science, Business, Law: How Scientific Discovery and Innovation are Protected and Brought to Market

The interaction of science, business and law: how scientific ideas are protected by law; the rights of those who invent, develop, and finance scientific discovery; and how ideas are commercialized and brought to market. What kinds of research, discovery, and innovation are protected; who has rights that can be protected; what kinds of rights can be protected, and the kinds of protections that apply; how inventions are commercialized; and the success and failure of businesses based on scientific discovery. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, Aut (Abrams, W)

HUMBIO 174. Foundations of Bioethics

Classic articles, legal cases, and foundational concepts. Theoretical approaches derived from philosophy. The ethics of medicine and research on human subjects, assisted reproductive technologies, genetics, cloning, and stem cell research. Ethical issues at the end of life. Prerequisite: Human Biology core or equivalent, or consent of instructor. GER:EC-EthicReas

3 units, Win (Magnus, D)

HUMBIO 175. Health Care as Seen Through Medical History, Literature, and the Arts

The differences between disease as pathology and as the patient's experience. Topics include: patient-doctor relationships; medical technology; the changing focus on illness; gender issues; love, sex, and illness; mental illness; sick children; and death and dying. Limited enrollment. Prerequisite: Human Biology core or equivalent or consent of instructor.

3 units, Aut (Zaroff, L)

HUMBIO 175S. Novels and Theater of Illness

Illness and disease through novels and plays by authors including Shakespeare, Miller, Sophocles, Hemingway, and Camus. How sickness involves the patient, family, community, and state. Limited enrollment. Prerequisite: Human Biology core or equivalent or consent of instructor.

3 units, Spr (Zaroff, L)

HUMBIO 176. Impact of Infectious Diseases on Human History

Impact of infectious diseases on human society. Some topics include: the plague of Justinian; impact on exploration, trade, and conquest; how slavery, malaria, and yellow fever combined to alter the New World; microbes and war; diseases of poverty such as tuberculosis; cholera and public health; pandemic influenza; diseases of human progress. Students keep a diary of current examples of interaction between infectious diseases and societal issues; students participate in public blogs.

3 units, Spr (Tompkins, L; Falkow, S)

HUMBIO 178. Ethics and Politics of Public Service

(Same as ETHICSOC 133, PHIL 175A, PHIL 275A, POLISCI 133, PUBLPOL 103D) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford. GER:DB-SocSci

5 units, not given this year

HUMBIO 183. Astrobiology and Space Exploration

Evolution in the context of space and time, focusing on the emergence of life in a planetary context on Earth and possibly elsewhere. The evolution of intelligence and the search for it elsewhere. The biological, psychological, sociological, and philosophical issues of human space exploration. Integrates information from astronautics, astrophysics, biochemistry, chemistry, evolutionary biology, geology, paleontology, physiology, psychology, and sociology. Guest lectures by scientists and astronauts from NASA, Stanford, SETI, and other universities. Prerequisite: two college-level science courses such as Human Biology core, or consent of instructor. GER:DB-NatSci

3-4 units, Win (Rothschild, L)

HUMBIO 185. Vertebrate Biology

(Same as BIOE 161) Study of structure, function, evolution and behavior of vertebrate animals. Consideration of vertebrate origins and examination of classes of vertebrates. Physiology, morphology, behaviors and evolutionary relationships are treated in each vertebrate group, as these relate to overall evolutionary trends within vertebrates. Topics: swimming behaviors in sharks and bony fishes, olfaction and vision in fishes, sex determination in amphibians, reptiles, birds and mammals, navigation in sea turtles and birds, evolution and biomechanics of flight in pterosaurs birds and bats, vocalization in whales and birds, temperature adaptation in reptiles, birds and mammals.

3 units, Win (Porzig, E)

HUMBIO 187. Human Diversity: A Linguistic Perspective

(Same as ANTHRO 123A) The diversity and distribution of human language and its implications for the origin and evolution of the human species. The origin of existing languages and the people who speak them. Where did current world languages come from and how can this diversity be used to study human prehistory? Evidence from related fields such as archaeology and human genetics. Topics: the origin of the Indo-European languages, the peopling of the Americas, and evidence that all human languages share a common origin. GER:DB-SocSci, EC-GlobalCom

3 units, Spr (Ruhlen, M)

HUMBIO 193. Research in Human Biology

Independent research conducted under faculty supervision, in junior or senior year, normally but not necessarily in pursuit of an

honors project. May be taken for a maximum 3 quarters of credit. Prerequisite: Faculty approval; application available in student services office.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMBIO 194. Honors

Completion of the honors project, normally taken in the student's final quarter. First component: the honors thesis, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style. Second component: participation in the honors symposium, including a 10-minute oral presentation followed by a brief question and answer session. Prerequisites: 193 or 199, and acceptance into the honors program.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMBIO 197. Human Biology Internship

Limited to and required of Human Biology majors. A supervised field, community, or lab experience of student's choosing, preapproved by Human Biology faculty and student advisers, and initiated at least three quarters prior to graduation. Participation in a poster session on the internship experience is required during the first quarter that the student is in residence at Stanford after completion of the internship. May be repeated for credit. Prerequisite: Human Biology core.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMBIO 198. Senior Tutorial in Human Biology

Reading for Human Biology majors in exceptional circumstances and under sponsorship of Human Biology associated faculty. Students must apply through Human Biology student services before registering. Reading list, paper, and evaluation required. May be repeated for credit.

1-5 units, Aut (Boggs, C), Win (Boggs, C), Spr (Staff)

HUMBIO 199. Directed Reading/Special Projects

Human Biology majors must obtain a sponsor from the Human Biology associated faculty or the Academic Council. Non-majors and students who have not declared must obtain a sponsor only from the Human Biology associated faculty. Students must complete application in student services office.

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMBIO 200. Teaching of Human Biology

For upper division undergraduates and graduate students. Practical experience in teaching Human Biology or serving as an assistant in a lecture course. May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMANITIES AND SCIENCES (HUMSCI) COURSES

UNDERGRADUATE COURSES IN HUMANITIES AND SCIENCES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

HUMSCI 190. Individually Designed Major Honor's Thesis

May be repeated for credit. (Staff)

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN HUMANITIES AND SCIENCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HUMSCI 201. Graduate Environment of Support

Psychosocial, financial, and career issues in adapting graduate students to Stanford; how these issues relate to diversity, resources, policies, and procedures. Discussions among faculty, advanced graduate students, campus resource people, and the dean's office. (Thomas)

1 unit, Aut (Thomas, A)

IBERIAN AND LATIN AMERICAN STUDIES (ILAC) COURSES

UNDERGRADUATE COURSES IN IBERIAN AND LATIN AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ILAC 112Q. Latin American Cities Through Literature and Film

A study of urban issues in Latin American cities, such as Buenos Aires, Montevideo, Lima, Medellin, Quito, Mexico City, Santiago, La Paz and Sao Paulo using literary works and films, using literary works and films. Books and films by Javier Vásconez, Mario Benedetti, Sebastián Cordero, Alicia Scherson, Antonio Serrano, Gisela Kozak, Francisco Lombardi, Veronica Chen, Fernando Vallejo, Barbet Schroeder, Walter Salles, and Roman Chalbaud, Santiago Roncagliolo among others.

3-5 units, not given this year

ILAC 114N. Lyric Poetry

(Stanford Introductory Seminar) Preference to freshmen. For students who have successfully completed two years of college Spanish. Elements and expressive devices of lyric poetry: multidimensional language, denotation, connotation, image, metaphor, symbol, allegory, paradox, irony, meaning, idea, rhythm, and meter. Poets of Spain and Latin America of the late 19th and early 20th century including G. A. Bécquer, Rosalía de Castro, Rubén Darío, Miguel de Unamuno, Antonio Machado, García Lorca, Pablo Neruda, and Gabriela Mistral. In English and Spanish.

3-5 units, Aut (Predmore, M)

ILAC 117N. Film, Nation, Latinidad

(Stanford Introductory Seminar) (Same as CHICANST 117N, CSRE 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

3-4 units, Spr (Yarbro-Bejarano, Y)

ILAC 119. Film Noir and the contemporary Iberian Novel

The influence of classic American film noir (Hitchcock, Lang, Huston, Welles etc.) on works by some of Iberia's most successful contemporary novelists including Antonio Muñoz Molina, Juan Marsé, Rosa Montero, José Cardoso Pires and Albert Sánchez Piñol. Supplementary works include reading from the Congreso de Novela y Cine Negro as well as works by Emmanuel Levinas, Dominique LaCapra, Carl Jung, Kenneth Burns and others. Readings in Spanish and English. Prerequisite: SPANLANG 3 or equivalent.

3-5 units, Win (Mack, T)

ILAC 120. Introduction to Literary and Scholarly Research

Strategies and tactics for research and writing in the humanities; focus is on the Spanish-speaking world. How to write a research proposal; how to conduct research online and in the library; annotated bibliographies; bibliographical essays; rhetorical strategies; and common logical fallacies. WIM

3-5 units, Spr (Kenna, C)

ILAC 126. Contemporary Literature and Cinema of the Spanish Civil War

An exploration of memory of the Spanish Civil War and its aftermath in contemporary Iberian literature and cinema. Focus is on the most important events of 20th-century Spain through analysis of novels, short stories, testimonial texts, documentaries, and feature films that attempt to recover the voices and memories of the victims: outcasts (guerrilla, refugees), women, and children.

3-5 units, Aut (Gonzalez Flores, F)

ILAC 130. Cultural Perspectives in Iberia

The historical dynamics, linguistic plurality, and social complexity of the Iberian world. Topics include: war and revolution; absolutism and liberalism; republicanism; the crisis at the end of the century: the year 98; the civil war; dictatorships, Franco, and Salazar; the revolution of cloves and the transition towards democracy; and

open society and El manifiesto por la lengua común. GER:DB-Hum

3-5 units, Spr (Predmore, M)

ILAC 131. Cultural Perspectives in the Luso-Hispanic Americas

Major theoretical debates about the construction of Latin American identities, from the 19th century to the present. Readings by writers, poets, philosophers, and historians, including Rodo, Retamar, O'Gorman, Vasconcelos, Henríquez-Ureña, Ramos, Paz, Carpentier, Lezama Lima, Borges, and Fuentes. GER:DB-Hum

3-5 units, Win (Hoyos, H)

ILAC 136. Modern Iberian Literatures

1800 to the present. Topics include: romanticism; realism and its variants; the turn of the century; modernism and the avant garde; the Civil War; and the second half of the 20th century. Authors may include Mariano José de Larra, Gustavo Adolfo Bécquer, Rosalía de Castro, Benito Pérez Galdós, Migues de Unamuno, Pío Baroja, Joan Maragall, Antonio Machado, Federico García Lorca, Salvador Espriu. GER:DB-Hum

3-5 units, Aut (Resina, J)

ILAC 137E. Viewing Modern Barcelona

An introduction to the salient aspects of Barcelona's history, its role in Spain's modernization and democratization as well as its tensions with the state. Emphasis on the modern period, from the tearing down of the ancient walls and the city's expansion in the mid-nineteenth century to the Olympic and post-Olympic definition of public space. Attention will be given to city planning, the architecture of Gaudí, the art work of Picasso and Dalí, popular music and literature about the city.

3-5 units, not given this year

ILAC 141. Culture, Politics and the Marvelous Real in Latin-American Narrative

The representation of cultural and political perspectives and changes from the twentieth to the present centuries through the artifact of short stories and a novel. Readings selections range from canonical to very recent authors from general demographic areas of Latin America. Selected works from Carpentier, Borges, Cortázar, Monterroso, Rulfo, Cabrera Infante, García Márquez, Castellanos, Benítez Rojo, Ferre, Rebeyro, Gorodischer, Valencia, Bolaño, Karla Suárez will be exmined.Youtube and other sources of interviews and criticism will complement classroom activities.

3-5 units, Aut (Kenna, C)

ILAC 142. Modernismo and the World Interior

At the turn of the 19th century, Rubén Darío gave the name reino interior to the private area of introspection and imagination favored by modernistas. A source and possibility for artistic production, this trope incarnates tensions between individual and social space, parochialism and cosmopolitanism. Sources include poetry, narrative, journals, and the visual arts. Authors may include: Delmira Agustini, Rubén Darío, Julián del Casal, Leopoldo Lugones, José Martí, Manuel Gutierrez Nájera, José Enrique Rodó, José Asunción Silva, Abraham Valdelomar. Spanish proficiency required.

3-5 units, Win (Briceno, X)

ILAC 157. Medieval and Early Modern Iberian Literatures

Topics may include: lyric and epic poetry; Jewish and Muslim literatures; the development of Castilian, Catalan, and Portuguese prose; the Valencian golden age; texts of the Renaissance and Baroque; the literature of imperial expansion into Africa, Asia, and the Americas. GER:DB-Hum

3-5 units, Aut (Barletta, V)

ILAC 158. New Latin American Short Stories and Films (1980-2009): A Survey

Focus is on Mexico, Cuba, Argentina, Colombia, and Brazil from the 80s to the present. Authors include: Bellatin, Portela, Vega Serova, Parra, Paz Soldán. Filmmakers include: Cuaron, Gruener, Furtado, Moya, Novaro.

3-5 units, not given this year

ILAC 159. Don Quijote

A close reading of the original Spanish text of Miguel de Cervantes's prose masterpiece. The rise of the novel, the problems of authorship and signification, modes of reading, the status of Muslim and Jewish converts in early modern Spain, the rise of capitalism, masochistic desire. In Spanish. WIM

3-5 units, Win (Barletta, V)

ILAC 161. Modern Latin American Literature

From independence to the present. Topics include romantic allegories of the nation; modernism and postmodernism; avant garde poetry; regionalism versus cosmopolitanism; indigenous and indigenist literature; magical realism and the literature of the boom; Afro-Hispanic literature; and testimonial narrative. Authors: Bolívar, Bello, Gómez de Avellaneda, Isaacs, Sarmiento, Machado de Assis, Darío, Martí, Mistral, Vallejo, Huidobro, Borges, Cortázar, Neruda, Guillén,Rulfo, Ramos, Arguedas, García Márquez, Lispector, Menchú, and Bolaño. GER:DB-Hum

3-5 units, Spr (Briceno, X)

ILAC 189A. Honors Research

Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.

5 units, Win (Staff)

ILAC 189B. Honors Research

Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.

2 units, Spr (Staff)

ILAC 193. The Cinema of Pedro Almodovar

The evolution of Spain's most recognizable director from marginal, transgressive amateur cinema to polished visual style. The deliberate blurring of frontiers between mass and high culture; his use of metafilmic allusions and attention to sexuality, extreme experiences, and marginal characters. From his early work to recent award-winning films. Prerequisite: spoken Spanish. GER:DB-Hum

3-5 units, Spr (Resina, J)

ILAC 193Q. Spaces and Voices of Brazil through Film

(Stanford Introductory Seminar) (Same as PORTLANG 193Q) How a country is perceived and defines itself is a result of complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed, but has conserved some defining traits. Introduction to the history, culture, politics, and artistic production of Brazil through feature films, documentaries, and readings. Movies include Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September. In English. GER:DB-Hum, EC-GlobalCom

3-4 units, Aut (Wiedemann, L)

ILAC 194E. Black Brazil

Afro-Brazilian culture through a media including fictional texts (short stories, poems, and novels), sociohistorical and anthropological essays, music, films, and sports dealing with racial issues in Brazilian society through a historical overview and a contemporary perspective. Authors (Machado de Assis, Joaquim Nabuco, Jorge de Lima, Jorge Amado, Carolina de Jesus, Gilberto Freyre, Roberto DaMatta, Antonio Risério, Luis Felipe D'Alencastro); music (samba, choro, mpb); sports (soccer, capoeira); religion (Candomblé, Umbanda); films (Orfeu Negro, Barravento, O Pai O).

3-5 units, Spr (Librandi Rocha, M)

ILAC 197. Brazilian Culture in a Comparative Latin American Perspective

Brazilian modernization and cultural dynamism in the second half of the 20th century. Concrete poetry and its relation to the construction of Brasilia, the bossa nova movement, and tropicalism. Comparative studies in the global art context. Authors include: Haroldo de Campos, Augusto de Campos, Decio Pignatari, Eugen Gomringer, Severo Sarduy, Octavio Paz, Ramón Xirau, Max Bense, and Charles Bernstein. Texts in English, Spanish, and Portuguese.

3-5 units, not given this year

ILAC 199. Individual Work

Open only to students in the department, or by consent of instructor.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ILAC 204. Spanish Nationalist Discourses from Franco to Zapatero: What Does Plural Spain Mean?

Spanish nationalism and patriotic affirmation discourses in contemporary Spain. Since the end of Francoism, Spanish nationalism has existed in a de-articulated and diffuse way, rather as a reaction

against the challenge of stateless nationalisms than as a substantive doctrine. However, since the mid-80s there has been a recovery of Spanish nationalist discourse, often labeled constitutional patriotism, whose main point is the insistence on history as the founding basis for the legitimation of the present Spanish polity, as well as the vindication of the 1978 Constitution as the end-point of decentralization.

3-5 units, Win (Staff)

ILAC 211. The Poetry of Pablo Neruda

The major works of Neruda, particularly Residencia en la Tierra I and II, Tercera Residencia, and Canto General. Neruda within a tradition of European lyric poetry from William Blake to García Lorca and Alberti; how this tradition was transformed in Neruda's poetry by the historical conditions of Chilean and Latin American societies and the Spanish Civil War.

3-5 units, Win (Predmore, M)

ILAC 214. Crypto-Muslim Culture in Early Modern Spain

(Same as RELIGST 220B) What is known about the secret religious practice and culture of the Moriscos, Spain's large minority community of Muslim converts to Christianity (1500-1609)? What role did their handwritten literature (largely Islamic texts written in Castilian but copied out in Arabic script) play in the formation and maintenance of their culture? What can these Crypto-Muslim communities teach us regarding the place of Muslim culture in Western Europe today? The course will be taught in English; knowledge of Spanish and/or Arabic script is useful but not necessary.

3-5 units, Win (Barletta, V)

ILAC 228. Secularism: The Boundaries of Religion in Early and Post-Modernity

an examination of how two analytical categories, secularism and religion, have shaped each other over time. We will trace the contemporary legacy of early modern forms of scholarship, government, and community by considering the history and divergent uses of concepts such as tolerance, natural law, multiculturalism, and the freedom of religion Texts by Asad, Augustine, Erasmus, Fallers Sullivan, Las Casas, Locke, Said, Spinoza, C. Taylor, Vitoria, and others.

3-5 units, Aut (Staff)

ILAC 229. The work of Luis Martín Santos in Mid-Twentieth Century Spain

(Same as COMPLIT 218) First published in 1962, ""Tiempo de Silencio"" is the only book that the young psychiatrist Luis Martin Santos finished during his lifetime, and, although largely overlooked (even in Spain) until the present day, one of the great European novels of the 20th century. It brings to a complex convergence the evocation of Spain's decadent and run-down post-Civil War society with high-modernist literary procedures and (an implicit parody of) phenomenological analysis.

3-5 units, Win (Gumbrecht, H)

ILAC 232. Culture and Power

An examination of the relationship between culture and power, relying mostly on how that relationship is reflected in the various forms of cultural creation: paintings, sculptures, photographs, graffiti, stories, theories. Focusing on artists from Catalonia (Picasso, Dalí, Miró, Tàpies, Barceló) and Spain (Velazquez, Goya) and will move on to contemporary artists and thinkers from different cultures.

3-5 units, Aut (Castineira Fernandez, A)

ILAC 240E. Borges and Philosophy

The Argentine author's literary renditions of philosophical ideas. Topics may include: time, free will, infinitude, authorship and self, nominalism versus realism, empiricism versus idealism, skepticism, peripheral modernities, postmodernism, and Eastern thought. Short stories, poems, and essays from Labyrinths paired with selections from authors such as Augustine, Berkeley, James, and Lao Tzu. In English; Spanish originals available. Satisfies the capstone seminar requirement for the major in Philosophy and Literature. GER:DB-Hum

3-5 units, not given this year

ILAC 241. Fiction Workshop in Spanish

Creative writing workshop in Spanish. Latin American and Iberian short stories approached through the theory and craft of this genre. Assignments are creative in nature and focus on the formal elements of fiction (characterization, plot, point of view, imagery, dialogue, theme, and diction). Students will develop an original short story over the course of the quarter. No previous experience with creative writing is required. Authors: Borges, Cortázar, García Márquez, Bolaño, Piglia, Ayala, Clarín, and others. This course is offered every other year.

3-5 units, Win (Santana, C)

ILAC 244. Andalusian Iberias

The relationship among the Spanish, Arabic, Latin, and Hebrew literatures and cultures of the Iberian Peninsula. Introduction to these debates about the development of literary genre, the transmission of philosophical knowledge, and the history of religious polemic in late medieval and early modern Iberia. The conventions structuring the different ecumenical, linguistic, and political communities as well as the multiplicity of Andalusian Iberias produced by their interaction.

3-5 units, Spr (Staff)

ILAC 247E. Magical Realism and Globalization

Is magical realism a genre, a style, a politics, or a label for elaborate fiction from the Third World? Seminal works and their role in the 20th century. Topics include: postcolonial discourse, myth and truth, tradition versus modernity, and realism versus fantasy. Novels, plays, and short stories by García Márquez, Rushdie, and Morrison; films by Schlondorff and Begnigni; essays by Roh and Carpentier. GER:DB-Hum

3-5 units, not given this year

ILAC 250. Latin America at the End of the Cold War

Systematic study of the cultural transformations in Latin America before and after the fall of the Berlin Wall. Comparisons between works that respond to the defining moments of the conflict (Neruda, Cardinal) and texts that reflect on its later, residual stage. Fiction: Sin remedio by Antonio Caballero, Literatura nazi en América by Roberto Bolaño, and Pasado Perfecto by Leonardo Padura. Film: Hijos de la guerra fría by Gonzalo Justiniano. Theoretical readings by Jorge Castañeda, Michael Reid, and Jean Franco.

3-5 units, not given this year

ILAC 256. Drug Wars: Narco Representations in Media and Literature

Representations of Latin American (and Chicano) Narcos and Druglords in film, telenovelas, corridos, essays and novels and how these representations affect governmental policies. Films: Tropical Snow by Ciro Durán; The Camarena Story by Brian Gibson; Escobar, The King of Cokaine by Steven Dupler; True Story of Killing Pablo by David Keane; Kingpin by David Mills; El rey by José Antonio Dorado; Sumas y restas by Víctor Gaviria; María llena eres de gracia by Joshua Marston. Books: La reina del sur by Pérez-Reverte; Killing Pablo by Bowden; Drugs, Thugs, and Divas: Telenovelas and Narco-Dramas in Latin America by O. Hugo Benavides.

3-5 units, Spr (Ruffinelli, J)

ILAC 259. Military, Intelligentsia, Las Madres of Plaza de Mayo and Tlatelolco: Film and Politics 1968-2009

How contemporary Latin American cinema in documentaries and feature films has focused on several historical pockets of the continent: the Dirty War, the Falkland Islands war, the Tlatelolco massacre, the Vladivideos and corruption in Peru, and the Disappeared, as part of the historical reconstruction of the recent past. Films: La deuda interna, Rojo Amanecer, La historia oficial, Por esos ojos, La noche de los lápices, Mariposa Negra, Cautiva, Hijos/Figli.

3-5 units, not given this year

ILAC 260. The Mexican Revolution of 1910 in Cinema

Our visual knowledge of the Mexican Revolution of 1910 originates in the Casasola photo archive, but most notably in the films that portrayed important leaders of the revolution such as Pancho Villa, and Emiliano Zapata. This course will study the political and social changing images of those ""heroes"" or ""bandits"" in the light of historical ideologies.

3-5 units, Spr (Ruffinelli, J)

ILAC 265. Museums and Novels in Argentina

The changing relationship between history, memory, collection, production, and consumption in narrative works from 20th- and 21st-century Argentina. The role of the museum in the novel's imaginary, comparing and contrasting the experiences of reading and museum going. Focusing on the museum in relation to the

literary form permits reflection on tensions between the market, the canon, and the avant gardes as they appear in a changing cultural economy. Authors include: Fernández, Borges, Mujica Láinez, Piglia, Pauls, and Kohan.

3-5 units, Spr (Briceno, X)

ILAC 271. Brazilian Presence: Landscape, Life and Literature
Brazil's literary representation of the it's diverse regional cultures and ecology through the works of Euclides da Cunha describing the Amazon in the early 1900s; the travels of anthropologist Claude Lévi-Strauss and his contact with Caduveo, Nhambiquara, Bororo and Tupi indigenous tribes; Mario de Andrade's novel, Macunaima and its ironical representation of Brazilian identity and miscegenation; Guimarães Rosa's short stories that show the imagery of the sertão and its people (the sertanejo culture); Milton Hatoum's novel, The Brothers, and its impressive portray of Manaus city in the 20th Century as an unstable world seen through the lens of Lebanese immigrants. GER:EC-GlobalCom

3-5 units, not given this year

ILAC 272E. Clarice Lispector: the Style of Ecstasy
An exploration of the presence, both in the mystic and in the erotic sense, of the feeling of ecstasy in Clarice Lispector's texts (novels, short stories, chronicles). Ecstasy favors a non-conceptual approach to writing and reading and an effect of delight that can be only communicated by words that mimitizes music and visual arts. Theoreticians of ecstasy, eroticism and epiphany: G. Bataille, H. Cixous, Jean-Luc Nancy; Gumbrecht, Lyotard. Course taught English with readings in English and Portuguese.

3-5 units, not given this year

ILAC 273. Brazilian Resonances: Poems, Lyrics, Songs
Brazilian culture through poems, lyrics and sounds from the 19th to the 20th century. Songs and lyrics by: Caetano Veloso, Gilberto Gil, Tom Jobim, Carlinhos Brown, Paulinho da Viola, Marisa Monte, Cartola. Authors may include: Gonçalves Dias, Mario de Andrade, Oswald de Andrade, Manuel Bandeira, Cecília Meireles, Murilo Mendes, Drummond, João Cabral de Melo Neto, Hilda Hilst, Antonio Cicero. In Portuguese.

3-5 units, Aut (Librandi Rocha, M)

ILAC 278. Senior Seminar: Early 20th-Century Iberian Poets
Major works of Antonio Machado, Juan Ramón Jiménez, and Federico García Lorca, with emphasis on the historical context of the first three dacades of the 20th century and their contribuitions to the development of 20th-century Spanish lyric poetry. GER:DB-Hum

3-5 units, Spr (Predmore, M)

ILAC 278A. Senior Seminar: Amazonia/Manhattan and Visions of El Dorado
The confrontation between two worlds: the forest and the city in the Americas, with a focus on the Amazon jungle and New York City, and the myth of El Dorado. Readings of 19th- and 20th-century Latin American writers such as Dario, Martí, Sousândrade, and Carpentier including their intertexts with the Chronicles of Discovery and Conquest.

3-5 units, Win (Librandi Rocha, M)

ILAC 280. Latina/o Literature
(Same as CHICANST 200, CSRE 200) Examination of a diverse set of literary texts by Latinas/os, bringing history, politics, and cultural theory to bear in order to apprehend the significant intracultural differences amongst Latinas/os (most notably concerning im/migration). Gender and sexuality as critical lenses that reflect and refract themes such as identity, language politics, transnationalism, political turmoil, socioeconomic status, and the notion of home/land and its loss, reinvention, and/or reclamation

3-5 units, Aut (Yarbro-Bejarano, Y)

ILAC 332. Race and Slavery in Nineteenth Century Spanish Empire
An analysis of the literature written in Spain during the nineteenth and twentieth centuries dealing with the empire post 1808. Authors discussed include Blanco White, Baroja, Avellaneda, and Rusiñol, among others

3-5 units, not given this year

GRADUATE COURSES IN IBERIAN AND LATIN AMERICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ILAC 213. Spanish Cinema in the Second Half of the 20th Century
Spanish Cinema in the Second Half of the 20th Century-Cinema's shaping of the national imaginary and its articulation of collective memories suppressed during the Franco dictatorship. Directors include Buñuel, Saura, Almodóvar, Amenábar, and Medem.

3-5 units, Aut (Resina, J)

ILAC 218. Anticlericalism in the Iberian Novel of the 19th Century
The rapid social and cultural changes in which 19th-century novelists wrote; the anti-clerical stance as marker of society's attempts to modernize. Why were monks and priests reviled by many Spanish novelists? How and why did they rewrite Spanish history around these figures? What was the role of the church and religious men in modern society? Questions of individualism, property, and labor in novels by major Iberian prose realists. In Spanish.

3-5 units, not given this year

ILAC 222. The Problem of Two Spains: Literature and Society in 19th-Century Spain
Representative literary figures including Larra, Espronceda, Zorrilla, Rosalía de Castro, Bécquer, and Galdós. Modern lyric poetry and the modern realist novel against the background of Napoleonic invasions, the loss of overseas colonies, two Carlist civil wars, and frustrated attempts to establish the First Spanish Republic.

3-5 units, not given this year

ILAC 225E. Theater, Society, and Politics in 20th-Century Spain
Ramón del Valle-Inclán and Federico García Lorca. The avant garde nature of their major plays and their engagement with social and political issues of the times including feudalism, the emerging liberal state, women's protest, class struggle, and civil war. Symbolism, expressionism, and realism.

3-5 units, not given this year

ILAC 299. Individual Work
Open to department advanced undergraduates or graduate students by consent of professor. May be repeated for credit.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ILAC 300. Contemporary Geopolitical Thinking: A Critical Look from Catalonia, Spain, and Europe
Contemporary geopolitical thought developed by Western experts on both sides of the Atlantic, such as Francis Fukuyama, Samuel Huntington, Benjamin Barber, Edward Lutwak, Zbigniew Brzezinski, Robert Kagan, Ignacio Ramonet, Anthony Giddens, Zaki Laidi, Emilio Lamo de Espinosa, Pere Vilanova, Antoni Segura, and Manuel Castells have detected key aspects of the new international order and have compared and contrasted the American and European approaches to its governance. Themes: hard vs. soft power; unilateralism vs. multilateralism, security vs. liberty, loyalty and legitimacy vs. effectiveness.

3-5 units, Aut (Staff)

ILAC 323. Renaissance/Early Modern Seminar
(Same as HUMNTIES 323) Focus is on how authors and readers from this period theorize various historical processes: the rise of European imperialism; religious conflicts and revolutions; new understandings of the self and the world; and the rise of the novel. Authors: Boccaccio, Machiavelli, Núñez Muley, Martorell, Rabelais, Camões, Cervantes, Montaigne, and Shakespeare.

3-5 units, not given this year

ILAC 328. Alexander the Great in Medieval Iberian
Greek hegemon, Asian emperor, student of Aristotle, Qur'anic hero, and Mediterranean legend. In this seminar, students explore the various manifestations of Alexander the Great in Iberian literature during the medieval period. What is Alexander's place in the development of theories of empire? In the formation of (always fuzzy and shifting) distinctions between East and West (and life and death)? Readingsinclude: Quintus Curtius Rufus, Pseudo-Callisthenes, Libro de Alexandre, the Aljamiado Rrekontamiento del rrey Alixandere, Secretum secretorum, and selected Qur'anic suras.
3-5 units, Spr (Barletta, V)

ILAC 330. Josep Pla: From Journalism to Literature
In the 20s and 30s journalism gave the tone to a normalized Catalan culture, whose distinctive traits were a cosmopolitan outlook and a high degree of professionalism. It is in this context that the works of journalist Josep Pla grow from an underbrush of quality journalism that, long neglected, throws light on the social and political situation of the time and constitutes an unsurpassed civilizational referent for today's culture wars. Journalists studied include Josep Pla, Eugeni d'Ors, Eugeni Xammar, and Gaziel. Readings in Catalan; available in Spanish.
3-5 units, not given this year

ILAC 331. Combat and Cultural Memory
Why do peoples go to war? What shapes the warrior's imaginary? What is the nature of collective violence? Western representations of violence, the myths of war and it cultural transmission, the war community, and the relation between violence and narration. Major theoretical texts on war and violence by Arendt, Schmitt, Weil, Baudrillard and others read in conjunction with literary texts by authors such as Jünger, Malraux, Rodoreda, Sales, Benet, and Cercas, and contrasted with representations in art, photography, and film.
3-5 units, Win (Resina, J)

ILAC 336. Early 20th-Century Peninsular Spanish Poetry
Poetry in restoration Spain, 1871-1930, against the background of the democratic tradition of Spanish liberalism. Emphasis is on stylistic analysis and concepts such as the generation of 1898, modernism, Krausism, pure poetry, and symbolic systems.
3-5 units, not given this year

ILAC 340. The Crowded Solitude of Juan Rulfo: his Writing, his Photography, his Children, his Legacy
A study of Mexican writer Juan Rulfo's literary work and photography as well as the film adaptations of his work, his portrayal in documentaries authored by his son Juan Carlos Rulfo and his literary legacy among young writers who have continue his work, like Élmer Mendoza´s Cóbraselo Caro and Susana Pagano´s Y si yo fuera Susana San Juan?
3-5 units, not given this year

ILAC 343. García Márquez
Extensive and detailed reading of the major works and a selection of the most significant critical texts about the author. Secondary readings by Vargas Llosa, Ludmer, Moretti, and Bloom. Topics include: macondismo, magical realism, canonicity, representations of violence, and autobiography.
3-5 units, Spr (Hoyos, H)

ILAC 344. Theorizing the Novel after 1989
Issues of literary historiography, canon formation, and cultural relevance through a detailed study of selected works, criticism, and theory from the last two decades. Topics may include: postnationalism, cultural synchronization, fiction as commodity, revisions of dictatorship, new media ecologies, anxiety of influence, meaning-making communities, and relations to visual culture. Readings by Latin American authors: Bolaño, Vallejo, Eltit, Bellatin and Fuguet. Critical texts by Richard, Sarlo, Rancière, and Casanova.
3-5 units, not given this year

ILAC 357. Juan Carlos Onetti: the Creation of Urban Narratives
Along with Arlt and Mallea, Juan Carlos Onetti initiates the urban novel in South America. Analysis of this turning point in the history of literature, and its relationship to urbanization and industrialization in Argentina and Uruguay.
3-5 units, Win (Ruffinelli, J)

ILAC 365. Anthropological Fictions in Latin America
The relationship between fiction and ethnography; literary theory and anthropology, discussing the notion of anthropological fiction. Authors: Viveiros de Castro, Roy Wagner, Alfred Gell, W.Iser, J.Clifford, Borges, Lispector, with a focus on Guimarães Rosa and Alejo Carpentier. In Portuguese, Spanish, and English.
3-5 units, Aut (Librandi Rocha, M)

ILAC 370E. Machado de Assis: Mimesis, Memory and money Machinations
Machado de Assis's paradoxes: the greatest author of the 19th Century and his oblique and peripheral perspective. The ruins and rebuilds of memory: Memórias Póstumas de Brás Cubas and Memorial de Aires; Jealously view and its mimesis in Dom Casmurro; his short stories and Rio de Janeiro's 19th century's sociability. The economy in his chronicles. Recent critical readings and editions. Course taught English with readings in English and Portuguese.
3-5 units, not given this year

ILAC 380E. Critical Concepts in Chicana/o Literature
(Same as CHICANST 201C, CSRE 201C) Interrogation of the critical discourses that have configured and reconfigured the canon of Chicana/o literature over the last thirty years. Close textual readings of primary texts, mainly narrative, within the development of Chicana/o literary and cultural criticism. Construction of narrative genealogies and foundational texts. Impact of the publication of late-nineteenth or pre-movement novels and Chicana feminist/lesbian/queer critiques. Consideration of alternative paradigms such as positioning Chicana/o literature within a U.S. Latina/o literary imaginary, and the shift of critical discourse in the field of visual art from a paradigm of resistance and affirmation to one of post-Chicano.
3-5 units, Aut (Yarbro-Bejarano, Y)

ILAC 389E. Race, Sex, Gender in Cultural Representations
(Same as CHICANST 199A, CSRE 199A) Critical theory and cultural representations in media that address issues surrounding the representation of race, gender, sexuality, and politics. How is desire racialized? How is racial difference produced through sex as a material practice and what is the function of sex in racial self formation ? How are questions of pleasure, desire, and the structures of power reconciled? How do these texts reinforce or contest stereotypes and the ideal bodies of national identity? Is it desirable to envision a bridging of queer communities of color, or a transnational or global network?
3-5 units, Spr (Yarbro-Bejarano, Y)

ILAC 399. Individual Work
For Spanish and Portuguese department graduate students only. Prerequisite: consent of instructor.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ILAC 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOLOGY (IMMUNOL) COURSES

UNDERGRADUATE COURSES IN IMMUNOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

IMMUNOL 185. Brain and the Immune System
(Same as IMMUNOL 285) For advanced undergraduates, coterminal students, and graduate students. Molecular and cellular interactions between the nervous and immune systems. Focus is on the role of immune molecules in neural development, the bi-directional mechanisms by which the brain and immune system communicate with each other, and the role of the immune system in the diseased and infected brain. Topics include: molecular basis of fever, stress and inflammation, gender differences in autoimmune diseases, inflammation in neurodegenerative diseases, central nervous system infections, and the immune system in psychiatric disorders. Expert guest lectures, weekly discussion sections, and student presentations. Prerequisite: Biological Sciences or Human Biology core.

3 units, Win (Steinman, L; Brownell, S; Price, J)

IMMUNOL 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN IMMUNOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

IMMUNOL 201. Advanced Immunology I
(Same as MI 211) For graduate and medical students and advanced undergraduates. Molecules and cells of the innate and adaptive immune systems; genetics, structure, and function of immune molecules; lymphocyte differentiation and activation; regulation of immune responses; autoimmunity and other problems in immune system dysfunction. Prerequisites: undergraduate course in Immunology and familiarity with experimental approaches in biochemistry, molecular biology, and cell biology.

3 units, Win (Chien, Y)

IMMUNOL 202. Advanced Immunology II
(Same as MCP 202) Readings of immunological literature. Classic problems and emerging areas based on primary literature. Student and faculty presentations. Prerequisite: IMMUNOL 201/MI 211.

3 units, Spr (Garcia, K)

IMMUNOL 203. Advanced Immunology III
Key experiments and papers in immunology. Student presentations and faculty participation; faculty describe their experimental process and scientific papers. Prerequisite: IMMUNOL 201/MI 211 or IMMUNOL 202/MCP 202.

3 units, Sum (Utz, P)

IMMUNOL 204. Innate Immunology
(Same as MI 104, MI 204) Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants.

3 units, Spr (Schneider, D)

IMMUNOL 205. Immunology in Health and Disease
Concepts and application of adaptive and innate immunology and the role of the immune system in human diseases. Case presentations of diseases including autoimmune diseases, infectious disease and vaccination, hematopoietic and solid organ transplantation, genetic and acquired immunodeficiencies, hypersensitivity reactions, and allergic diseases. Problem sets based on lectures and current clinical literature. Laboratory in acute and chronic inflammation.

2-4 units, Win (Lewis, D)

IMMUNOL 209. Translational Immunology
(Open to medical students in the Immunology concentration, graduate students, undergraduates by consent of instructor) Journal style format focusing on current basic immunology research and how it is translated into immunotherapies and clinical trials. Topics include hematopoiesis, transplantation, tolerance, immune monitoring, vaccination, autoimmunity and antibodies, rheumatoid arthritis, chronic pulmonary disease, and asthma. May be repeated for credit.

1 unit, Aut (Miklos, D), Win (Miklos, D), Spr (Miklos, D)

IMMUNOL 210. Immunology Research Seminars for Medical Students
Required for medical students selecting the Immunology Concentration. Attendance at a minimum of ten seminars related to immunology outside of required medical school classes. A one-page essay on each seminar, what was presented and how it relates to a clinical immunologic problem, is required.

2 units, Aut (Miklos, D), Win (Miklos, D), Spr (Miklos, D)

IMMUNOL 211. Clinical Research Design and Development Using Immunomodulatory Agents
For advanced undergraduates, coterminal students, medical students, and graduate students. Immunomodulatory agents have improved outcomes in human disease such as autoimmunity, cancer, allergies, asthma, and transplantation. The agents that immunomodulate have been developed from discovery of targets in basic immunology. Objectives: 1) how to design phase I (safety and proof of concept studies) based on animal models of new targets for immunomodulatory agents, including concepts such as endpoints, translational biomarker studies, immunological monitoring, power size calculations, and basic statistics applied to clinical trial design; 2) to understand regulatory (FDA) pathways and institutional policies to obtain approval of clinical studies; 3) to become familiar with patent law for applying for composition of matter and methods of use for discovery of targets for immunomodulatory agents. Prerequisite: Biology or Human Biology core for undergraduates.

2 units, Aut (Nadeau, K)

IMMUNOL 212. Granulocyte Biology in Human Disease
For advanced undergraduates, coterminal students, medical students, and graduate students. Objectives: 1) to learn the basic functions and activation pathways of major granulocytes in humans (neutrophils, eosinophils, basophils and mast cells; 2) to understand the pathology in humans diseases primarily associated with disorders in neutrophils, eosinophils, basophils, or mast cells; 3) to compare and contrast each granulocyte type and its response to therapies used in clinical medicine. Expert guest lectures, weekly discussion sections, and an emphasis on science communication and science writing. Prerequisite: Biology or Human Biology core for undergraduates.

2 units, Win (Nadeau, K)

IMMUNOL 215. Principles of Biological Technologies
(Same as MI 215) The principles underlying commonly utilized technical procedures in biological research. Lectures and primary literature critiques on gel electrophoresis, protein purification and stabilization, immunofluorescence microscopy, FACS. Prerequisites: biochemistry. Required of first-year graduate students in Microbiology and Immunology, and the Immunology program.

3 units, Spr (Kirkegaard, K)

IMMUNOL 231. Medicine for Innovators and Entrepreneurs
(Same as PEDS 231) Interdisciplinary, project-based course in which bioscience, bioinformatics, biodesign, bioengineering students learn concepts and principles to understand human disease and work together to propose solutions to medical problems. Diabetes mellitus is used as a paradigm for understanding human disease. Guest medical school and outside faculty. Field trips to Stanford clinics and biotechnology companies. Prequisite: college level biology.

3-4 units, not given this year

IMMUNOL 275. Tumor Immunology
(Same as CBIO 275) Focuses on the ability of innate and adaptive immune responses to recognize and control tumor growth. Topics include: tumor antigens, tumor immunosurveillance and immunoediting, tumor immunotherapy, cancer vaccines and dendritic cell therapy. Tracks the historical developments of our understanding of modulating tumor immune response and discusses their relative

significance in the light of current research findings. Prerequisite: for undergraduates, human biology or biology core.

3 units, not given this year

IMMUNOL 280. Early Clinical Experience in Immunology
Clinical observation experience for medical students in the Immunology Scholarly Concentration. At the end of the observation period, which may span over one to two quarters, the student submits a case observation paper to his/her faculty sponsor. Prerequisite: IMMUNOL 205.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOL 285. Brain and the Immune System
(Same as IMMUNOL 185) For advanced undergraduates, coterminal students, and graduate students. Molecular and cellular interactions between the nervous and immune systems. Focus is on the role of immune molecules in neural development, the bidirectional mechanisms by which the brain and immune system communicate with each other, and the role of the immune system in the diseased and infected brain. Topics include: molecular basis of fever, stress and inflammation, gender differences in autoimmune diseases, inflammation in neurodegenerative diseases, central nervous system infections, and the immune system in psychiatric disorders. Expert guest lectures, weekly discussion sections, and student presentations. Prerequisite: Biological Sciences or Human Biology core.

3 units, Win (Steinman, L; Brownell, S; Price, J)

IMMUNOL 290. Teaching in Immunology
Practical experience in teaching by serving as a teaching assistant in an immunology course. Unit values are allotted individually to reflect the level of teaching responsibility assigned to the student. May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOL 299. Directed Reading in Immunology
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOL 305. Immunology Journal Club
Required of first- to fourth-year graduate students. Graduate students present and discuss recent papers in the literature. May be repeated for credit.

1 unit, Aut (Steinman, L; Martinez, O), Win (Steinman, L; Martinez, O), Spr (Steinman, L; Martinez, O)

IMMUNOL 311. Seminar in Immunology
Enrollment limited to Ph.D., M.D./Ph.D., and medical students whose scholarly concentrations are in Immunology. Current research topics.

1 unit, Aut (Steinman, L; Fathman, C), Win (Steinman, L; Fathman, C), Spr (Steinman, L; Fathman, C)

IMMUNOL 311A. Discussions in Immunology
Students discuss papers of speakers in 311, and meet with the speakers. Corequisite: 311.

1 unit, Aut (Steinman, L; Fathman, C), Win (Steinman, L; Fathman, C), Spr (Steinman, L; Fathman, C)

IMMUNOL 399. Graduate Research
For Ph.D., M.D./Ph.D. students, and medical students whose scholarly concentrations are in Immunology.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOL 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IMMUNOL 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INSTITUTE FOR INTERNATIONAL STUDIES (FREEMAN SPOGLI) (IIS) COURSES

UNDERGRADUATE COURSES IN INSTITUTE FOR INTERNATIONAL STUDIES (FREEMAN SPOGLI)

Primarily for undergraduates; graduate students may enroll with consent of adviser.

IIS 195. Interschool Honors Program in Environmental Science, Technology, and Policy
Students from the schools of Humanities and Sciences, Engineering, and Earth Sciences analyze important problems in a year-long small group seminar. Combines research methods, oral presentations, preparation of an honors thesis by each student, and where relevant, field study. May be repeated for credit.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff)

IIS 199. Interschool Honors Program in International Security Studies
Students from different schools meet in a year-long seminar to discuss, analyze, and conduct research on international security. Combines research methods, policy evaluation, oral presentation, and preparation of an honors thesis by each student. May be repeated for credit.

1-5 units, Aut (Stedman, S; Fingar, T), Win (Stedman, S; Fingar, T), Spr (Stedman, S; Fingar, T)

INTERDISCIPLINARY STUDIES IN HUMANITIES (HUMNTIES) COURSES

UNDERGRADUATE COURSES IN INTERDISCIPLINARY STUDIES IN HUMANITIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

GRADUATE COURSES IN INTERDISCIPLINARY STUDIES IN HUMANITIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HUMNTIES 322. Medieval Seminar: Classics and Key Works
(Same as HISTORY 317) Colloquium focused on key primary sources that allow entry into Medieval European culture. Readings include: Augustine, On Christian Doctrine; Gregory the Great, Moralia on the Book of Job; Beowulf; the Song of Roland; and Aquinas, Summa Theologica.

3-5 units, not given this year

HUMNTIES 323. Renaissance/Early Modern Seminar
(Same as ILAC 323) Focus is on how authors and readers from this period theorize various historical processes: the rise of European imperialism; religious conflicts and revolutions; new understandings of the self and the world; and the rise of the novel. Authors: Boccaccio, Machiavelli, Núñez Muley, Martorell, Rabelais, Camões, Cervantes, Montaigne, and Shakespeare.

3-5 units, not given this year

HUMNTIES 324. Enlightenment Seminar
(Same as HISTORY 234, HISTORY 334, HISTORY 432A) The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors

include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

4-5 units, Win (Baker, K)

INTERNATIONAL POLICY STUDIES (IPS) COURSES

GRADUATE COURSES IN INTERNATIONAL POLICY STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

IPS 201. Managing Global Complexity
(Same as POLISCI 312S) The value of major theories and concepts in international relations for understanding and addressing global policy issues. Country case study with policy challenges such as development, democracy promotion, proliferation, and terrorism; the challenge of creating coherent policies that do not run at cross purposes. Case study of a policy challenge that cuts across academic disciplines and policy specializations to provide the opportunity to bring together skills and policy perspectives.

3 units, Spr (Krasner, S; Stoner-Weiss, K)

IPS 202. Topics in International Macroeconomics
Topics: standard theories of open economy macroeconomics, exchange rate regimes, causes and consequences of current account imbalances, the economics of monetary unification and the European Monetary Union, recent financial and currency crises, the International Monetary Fund and the reform of the international financial architecture.

5 units, Aut (Aturupane, C)

IPS 203. Issues in International Economics
Topics in international trade and international trade policy: trade, growth and poverty, regionalism versus multilateralism, the political economy of trade policy, trade and labor, trade and the environment, and trade policies for developing economies. Prerequisite: ECON 165, ECON 166.

5 units, Win (Aturupane, C)

IPS 204A. Microeconomics
(Same as PUBLPOL 301A) Microeconomic concepts relevant to decision making. Topics include: competitive market clearing, price discrimination; general equilibrium; risk aversion and sharing, capital market theory, Nash equilibrium; welfare analysis; public choice; externalities and public goods; hidden information and market signaling; moral hazard and incentives; auction theory; game theory; oligopoly; reputation and credibility. Prerequisites: ECON 50 and MATH 51 or equiv.

4 units, Aut (Bulow, J)

IPS 204B. Cost-Benefit Analysis and Evaluation
(Same as PUBLPOL 301B) Relationship between microeconomic analysis and public policy making. Economic rationales for policy interventions. Economic models of politics and application to policy making. Relationship of income distribution to policy choice. Welfare evaluation of public and private decisions. Education policy, social security, and health care. Prerequisite: PUBLPOL 301A or ECON 51.

4 units, Spr (Lim, C)

IPS 205A. Foundations Of Statistical Inference
(Same as PUBLPOL 303A) (Same as LAW 362.) Statistical background and introduction to regression. Topics include hypothesis testing, linear regression, nearest-neighbors regression, and other statistical concepts. Hands-on empirical analysis using popular statistical packages. Goal is to analyze empirical studies, conduct empirical research, and to crossexamine or work with statistical experts.

4 units, Aut (Strnad, J)

IPS 205B. Econometrics
(Same as PUBLPOL 303B) (Same as LAW 366.) Descriptive statistics. Regression analysis. Hypothesis testing. Analysis of variance. Heteroskedasticity, serial correlation, errors in variables, simultaneous equations. The construction and use of models for analyzing economic and social phenomena. Bayesian analysis. Univariate and bivariate analysis. Simple regression model. Multiple regression model. Inference and heteroskedasticity. Linear probability model. Instrumental variables. Maximum likelihood methods. Measurement of social and political attitudes and ideologies. Statistical analysis of large data sets.

4 units, Win (Strnad, J)

IPS 206A. Politics and Collective Action
(Same as POLISCI 331S, PUBLPOL 304A) Classic theories for why collective action problems occur and how they can be solved. Politics of aggregating individual decisions into collective action, including voting, social protest, and competing goals and tactics of officials, bureaucrats, interest groups, and other stakeholders. Economic, distributive, and moral frameworks for evaluating collective action processes and outcomes. Applications to real-world policy problems involving collective action.

4 units, Spr (Hanson, W)

IPS 207. Governance, Corruption, and Development
The role of governance in the growth and development experience across countries emphasizing the economies of corruption. The concept and measurement of governance. Theory and evidence on the impact of corruption on growth and development outcomes, including investment, international trade and financial flows, human capital accumulation, poverty and income inequality. The cultural, economic, and political determinants of corruption and policy implications for improving governance. Prerequisite: ECON 50.

3-5 units, Spr (Aturupane, C)

IPS 207A. Judgment and Decision Making
(Same as PUBLPOL 305A) (Same as LAW 333.) Theories and research on heuristics and biases in human inference, judgment, and decision making. Experimental and theoretical work in prospect theory emphasizing loss and risk aversion. Challenges that psychology offers to the rationalist expected utility model; attempts to meet this challenge through integration with modern behavioral economics. Decision making biases and phenomena of special relevance to public policy such as group polarization, group think, and collective action.

4 units, Win (Brest, P)

IPS 207B. Public Policy and Social Psychology: Implications and Applications
(Same as PSYCH 216, PUBLPOL 305B) Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior.

4 units, Spr (Ross, L)

IPS 208. Justice
(Same as ETHICSOC 171, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality.

4-5 units, Aut (Cohen, J)

IPS 209. Practicum
(Same as PUBLPOL 309) Applied policy exercises in various fields. Multidisciplinary student teams apply skills to a contemporary problem in a major policy exercise with a public sector client such as a government agency. Problem analysis, interaction with the client and experts, and presentations. Emphasis is on effective written and oral communication to lay audiences of recommendations based on policy analysis.

1-10 units, Aut (Nation, J; Hensler, D), Win (Nation, J)

IPS 210. The Politics of International Humanitarian Action
The relationship between humanitarianism and politics in international responses to civil conflicts and forced displacement. Focus is on policy dilemmas and choices, and the consequences of action

or inaction. Case studies include northern Iraq (Kurdistan), Bosnia, Rwanda, Kosovo, and Darfur.

3-5 units, Aut (Morris, E)

IPS 211. The Transition from War to Peace: Peacebuilding Strategies

How to find sustainable solutions to intractable internal conflicts that lead to peace settlements. How institutions such as the UN, regional organizations, and international financial agencies attempt to support a peace process. Case studies include Bosnia, East Timor, Kosovo, Burundi, Liberia, and Afghanistan.

3-5 units, Spr (Staff)

IPS 213. International Mediation and Civil Wars

3-5 units, Win (Morris, E)

IPS 219. Intelligence and National Security

How intelligence supports U.S. national security and foreign policies. How it has been used by U.S. presidents to become what it is today; organizational strengths and weaknesses; how it is monitored and held accountable to the goals of a democratic society; and successes and failures. Current intelligence analyses and national intelligence estimates are produced in support of simulated policy deliberations.

3-4 units, Aut (Fingar, T)

IPS 221. International Organizations and Institutions

How do international organizations and institutions (IOs and IIs) influence state practices, if at all? Do states have a firm grasp in controlling international organizations or have these IOs spun out of control? IOs and IIs raise exciting questions for both scholars and practitioners alike. This course will briefly review the central theoretical perspectives on IOs and also the history of the major international organizations. Emphasis will be placed on specific conceptual or policy-motivated puzzles posed by international organizations, generally focusing on one IO or II (including the UN, WTO, IMF, World Bank, ECJ and others) per puzzle.

3-5 units, Win (Gould, E)

IPS 221A. Globalization and Its Discontents: An Introduction to International Political Economy

What is globalization? Its impacts on different countries and population including those that multilateral organizations such as the World Bank, International Monetary Fund, and World Trade Organization have on the economic policies of member states and the functioning of the global economy. Topics include: political economy of trade; exchange rate policy; the liberalization of trade and finance; the global move to openness; development, debt and aid; and the role of international organizations.

3-5 units, Spr (Gould, E)

IPS 221B. Citizenship and Immigration

How people define and delineate nations. How states define their citizens. Different models of citizenship. Historical and political review of immigration in the U. S., W. Europe, Asia, and Australia. Political and economic effects of immigration. The economic impact of immigration, refugees and asylum seekers, public opinion, nationalist parties, and immigrant rights.

5 units, not given this year

IPS 222. Economic Development

General theories of economic development with focus on development policies. Topics include: agriculture, industrialization, role of financial development, income distribution, human resource development, international relations, and economic aid.

5 units, not given this year

IPS 230. Democracy, Development, and the Rule of Law

(Same as INTNLREL 114D, POLISCI 114D, POLISCI 314D) Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts.

5 units, Aut (Diamond, L; Stoner-Weiss, K)

IPS 233. Public Policy and South Asian Development

Trends in socioeconomic conditions in South Asia from independence to present and the policies that influenced them. Topics: theoretical framework of the relationship between forms of governance and development; governance choices in South Asia, particularly democracy and federalism; and influence of political governance, national identity, and socioeconomic institutions on development. Review of case studies, including the Kerala development experience, India's IT industry, Bangladesh's microfinance initiative, and Sri Lanka's education system.

3-5 units, not given this year

IPS 241. International Security in a Changing World

(Same as POLISCI 114S) The major international and regional security problems in the modern world. Interdisciplinary faculty lecture on the political and technical issues involved in nuclear proliferation, terrorism and homeland security, civil wars and insurgencies, and future great power rivalries.

5 units, Win (Sagan, S; Cuellar, M)

IPS 243. Refugees, Security, and Cooperation

3-5 units, Win (Staff)

IPS 244. U.S. Policy toward Northeast Asia

Case study approach to the study of contemporary U.S. policy towards Japan, Korea, and China. Historical evolution of U.S. foreign policy and the impact of issues such as democratization, human rights, trade, security relations, military modernization, and rising nationalism on U.S. policy. Case studies include U.S.-Japan trade tensions, anti-Americanism in Korea, and cross-straits relations between China and Taiwan.

5 units, not given this year

IPS 250. International Conflict: Management and Resolution

(Same as POLISCI 210R, POLISCI 310R, PSYCH 383) (Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.

3 units, Win (Ross, L; Holloway, D; Weiner, A)

IPS 262. Contemporary Issues in Nuclear Energy Policy

Current nuclear energy trends related to economic growth and carbon-free energy production to reduce global warming. Topics include: trends, promise, and perils; environment; proliferation; and international security. Policy considerations for nuclear safety and safeguards, environmentally responsible management from raw uranium to spent fuel, international security and nonproliferation, economic competition with other energy sources, domestic and foreign politics, and international law and treaties. International guest expert lecturers.

5 units, not given this year

IPS 263. Energy and Climate Cooperation in the Western Hemisphere

(Same as EARTHSYS 132, EARTHSYS 232, INTNLREL 146A) Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

4 units, not given this year

IPS 264. Behind the Headlines: An Introduction to Contemporary South Asia

Introduction to South Asia. Historical forces that shaped the region: diverse religions and ethnicities, geography, and colonialism. Recent history and current state of the region: rise of the Taliban and Al Quaeda in Afghanistan; Pakistan's government, military, and mullahs; U.S. intervention in Afghanistan, its relationship with Pakistan, and its policy shift toward India; regional problems and opportunities amongst neighboring countries; and the economic and political rise of India.

3-5 units, Aut (Manuel, A)

IPS 271. Selena Diana Jenkins International Human Rights Colloquium
(Same as INTNLREL 110, POLISCI 204, POLISCI 304) This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, women and children¿s rights, environmental rights and indigenous rights. It is open to all Stanford undergraduate and graduate students. Students in the seminar will be encouraged to present their ongoing research and to develop new research projects (individually and collaboratively). Students wishing to do significant research and reading in the context of the seminar may, in consultation with one of the instructors, sign up for independent study. Law students are first required to be enrolled in an International Human Rights in the law school in order to participate.
1 unit, Win (Stacy, H)

IPS 280. Transitional Justice, International Criminal Tribunals, and the International Criminal Court
Historical backdrop of the Nuremberg and Tokyo Tribunals. The creation and operation of the Yugoslav and Rwanda Tribunals (ICTY and ICTR). The development of hybrid tribunals in East Timor, Sierra Leone, and Cambodia, including evaluation of their success in addressing perceived shortcomings of the ICTY and ICTR. Examination of the role of the International Criminal Court and the extent to which it will succeed in supplanting all other ad hoc international justice mechanisms and fulfill its goals. Analysis focuses on the politics of creating such courts, their interaction with the states in which the conflicts took place, the process of establishing prosecutorial priorities, the body of law they have produced, and their effectiveness in addressing the needs of victims in post-conflict societies.
3-5 units, Spr (Staff)

IPS 298. Practical Training
Students obtain internship in a relevant research or industrial activity to enhance their professional experience consistent with their degree program and area of concentration. Prior to enrolling students must get internship approved by associate director. At the end of the quarter, a three page final report must be supplied documenting work done and relevance to degree program. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own internship. May be repeated for credit.
1-5 units, Sum (Staff)

IPS 299. Directed Reading
IPS students only. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPS 300. Issues in International Policy Studies
Presentations of techniques and applications of international policy analysis by students, faculty, and guests, including policy analysis practitioners.
1 unit, Aut (Stoner-Weiss, K)

IPS 314S. Decision Making in U.S. Foreign Policy
(Same as POLISCI 314S) Priority to IPS students. Formal and informal processes involved in U.S. foreign policy decision making. The formation, conduct, and implementation of policy, emphasizing the role of the President and executive branch agencies. Theoretical and analytical perspectives; case studies.
5 units, Spr (Blacker, C)

IPS 388. Palestine and the Arab-Israeli Conflict
(Same as HISTORY 288, HISTORY 388, JEWISHST 288, JEWISHST 388) 1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)
4-5 units, Win (Beinin, J)

IPS 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INTERNATIONAL RELATIONS (INTNLREL) COURSES

For information on undergraduate programs in International Relations, see page 000 of this bulletin.

UNDERGRADUATE COURSES IN INTERNATIONAL RELATIONS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

INTNLREL 110. Selena Diana Jenkins International Human Rights Colloquium
(Same as IPS 271, POLISCI 204, POLISCI 304) 10 international and domestic human rights scholars, judges, and activists who have made significant contributions to international justice, women's and children's rights, environmental rights, and indigenous rights. Students encouraged to present their ongoing research and develop new research projects (individually and collaboratively). Students wishing to do significant research and reading in the context of the seminar may, in consultation with one of the instructors, sign up for independent study. Law students are first required to be enrolled in an International Human Rights in the law school in order to participate.
1 unit, Win (Stacy, H)

INTNLREL 114D. Democracy, Development, and the Rule of Law
(Same as IPS 230, POLISCI 114D, POLISCI 314D) Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts. GER:DB-SocSci
5 units, Aut (Diamond, L; Stoner-Weiss, K)

INTNLREL 115. Development Issues in South Asia
Development problems and solutions from theoretical and practical perspectives, including village economies and global networks, during the present period of S. Asian growth.
5 units, Spr (Dossani, R)

INTNLREL 122A. The Political Economy of the European Union
EU institutions, the legislative process, policies, relations with the U.S., and enlargement and the future of the EU. History and theories of EU integration. Democratic accountability of the institutions, and the emerging party system. Principal policies in agriculture, regional development, the internal market, single currency, and competition. Emphasis is on policies that affect the relations with the U.S. including trade and security. Results of the EU's constitutional convention.
5 units, Win (Crombez, C)

INTNLREL 130. Science, Technology, and Development
Global and sociological perspectives on science and technology expansion, comparing nations and regions. Social features such as gender equity; and social impact economic development strategies such as tech incubators, the triple helix model, and UN initiatives. Democratization, human rights, welfare of local populations, and national security. Policy issues, the digital divide, development debates, commodification of the public good, and notions of social change.
5 units, Aut (Drori, G)

INTNLREL 136R. Introduction to Global Justice
(Same as ETHICSOC 136R, PHIL 76, POLISCI 136R, POLISCI 336) Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

5 units, Spr (Oberman, K)

INTNLREL 140A. International Law and International Relations
What is the character of international legal rules? Do they matter in international politics, and if so, to what degree? The foundational theories, principles, and sources of public international law. Prominent theories of international relations and how they address the role of law in international politics. Practical problems such as human rights, humanitarian intervention, and enforcement of criminal law. International law as a dynamic set of rules, at times influenced by power, at other times constraining it, but always essential to studying international relations. WIM

5 units, Aut (Lutomski, P)

INTNLREL 140C. The U.S., UN Peacekeeping, and Humanitarian War
The involvement of U.S. and the UN in major wars and international interventions since the 1991 Gulf War. The UN Charter's provisions on the use of force, the origins and evolution of peacekeeping, the reasons for the breakthrough to peacemaking and peace enforcement in the 90s, and the ongoing debates over the legality and wisdom of humanitarian intervention. Case studies include Croatia and Bosnia, Somalia, Rwanda, Kosovo, East Timor, and Afghanistan.

5 units, Spr (Patenaude, B)

INTNLREL 141A. Camera as Witness: International Human Rights Documentaries
Rarely screened documentary films, focusing on global problems, human rights issues, and aesthetic challenges in making documentaries on international topics. Meetings with filmmakers. GER:DB-Hum

5 units, Aut (Bojic, J)

INTNLREL 147. The Political Economy of the Southern Cone of South America
Argentina, Brazil, Paraguay, Uruguay, Bolivia, and Chile. Post-WW II political economy developments and political relations. Impacts of military rule from the 60s into the 80s. Regional and international political developments that led to MERCOSUR in 1991, and subsequent expansion.

5 units, Aut (O'Keefe, T)

INTNLREL 148. Economic Integration of the Americas
Current attempts at economic integration throughout the Western Hemisphere, including the Andean Community, the Caribbean Common Market (CARICOM), the Latin American Integration Association (ALADI), MERCOSUR, the North American Free Trade Area (NAFTA), and the Central American Integration System (SICA). Emphasis is on practical applications of integration efforts and nuts-and-bolts issues of how integration efforts function.

5 units, Win (O'Keefe, T)

INTNLREL 149. The Economics and Political Economy of the Multilateral Trade System
The historical development of the multilateral trade system, the current agenda of the World Trade Organization, and prospects for trade liberalization. Emphasis is on the economic rationale for multilateral trade rules, the political problems facing countries in supporting further liberalization, and the challenges to the legitimacy of WTO procedures and practices. Issues include the greater participation of developing countries, the impact of new members, and the relationship between the WTO and other multilateral bodies. Guest speakers; student research paper presentations.

5 units, Win (Josling, T)

INTNLREL 165A. Globalization, Governance, and Human Rights
Economic, political, and cultural aspects of globalization drawing on theories from sociology, political science, cultural anthropology, and law. The tensions within globalization and their paradoxical effects on human rights. Globalization is associated with a downward spiral of human rights. Yet, paradoxically, more countries now subscribe to human rights treaties than ever before. Global governance mechanisms aimed at improving human rights, including governmental treaties, international NGOs advocacy work, and corporate codes of conduct and their effects on human rights. The effects of the UN International Labour Organization on labor related human rights, such as child labor and discrimination,. Integrating social sciences theories with empirical research.

5 units, Spr (Abu Sharkh, M)

INTNLREL 166. Russia and Islam
Seminar. Focus is on 1985 to the present. The policies of Gorbachev toward the Muslim populace of the Soviet Union; how post-communist Russia under Yeltsin and Putin has dealt with its Muslim minorities; and the relationship of Russia to the newly independent states of Central Asia and the South Caucasus after the breakup of the USSR in 1991. The two major wars which Russia has fought with the secessionist Russian autonomous republic of Chechnya. GER:EC-GlobalCom

5 units, not given this year

INTNLREL 170. Energy and Climate
Interdisciplinary introduction to the technology, economics, and international politics of energy and climate. Energy technologies and their impact on geopolitics, the environment, and mitigating the effects of climate change. What is the role of energy in national security? What does climate change mean for the energy mix? How do developing countries view energy and climate change? What is the proper balance between regulation and free market operation in energy markets?

5 units, Aut (Rosencranz, A)

INTNLREL 191. IR Journal

1 unit, Aut (Schultz, K), Win (Schultz, K), Spr (Schultz, K)

INTNLREL 197. Directed Reading in International Relations
Open only to declared International Relations majors. (Staff)

3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INTNLREL 198. Senior Thesis
Open only to declared International Relations majors with approved senior thesis proposals.

2-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INTNLREL 199. Honors Research: Democracy, Development, and the Rule of Law in Developing Countries
(Same as POLISCI 299Q) Restricted to students in the CDDRL option of the International Relations honors program. Goal is to prepare students to do research and/or fieldwork to complete their thesis research. Main currents in democracy and development literature concerning how economic growth and democratization are related; how the rule of law supports these processes in countries undergoing change. Student presentations of thesis questions; student groups develop research problems and designs. May be repeated for credit.

3-5 units, Spr (Stoner-Weiss, K)

INTNLREL 200A. International Relations Honors Field Research
For juniors planning to write an honors thesis during senior year. Initial steps to prepare for independent research. Professional tools for conceptualizing a research agenda and developing a research strategy. Preparation for field research through skills such as data management and statistics, references and library searches, and fellowship and grant writing. Creating a work schedule for the summer break and first steps in writing. Prerequisite: acceptance to IR honors program.

3 units, Spr (Drori, G)

INTNLREL 200B. International Relations Honors Seminar
Second of two-part sequence. For seniors working on their honors theses. Professional tools, analysis of research findings, and initial steps in writing of thesis. How to write a literature review, formulate a chapter structure, and set a timeline and work schedule for the senior year. Skills such as data analysis and presentation, and writing strategies. Prerequisites: acceptance to IR honors program, and 199 or 200A.

3 units, Aut (Drori, G)

INTNLREL 206. Palestinian Nationalism, Past and Present
The Palestinian national movement and its role in the Arab-Israeli conflict. The roots of the movement in the Ottoman Empire, its growth through the British Mandate, the 1948 and1967 wars, the

Intifada, and the Israeli-Palestinian peace process. Emphasis is on components which contributed to or delayed the growth of a distinct Palestinian identity, including Zionism.

5 units, not given this year

INTNLREL 207. Tribe, State, and Society in the Modern Middle East

The staying power of tribal identities and values in the Middle East. Examples include the Iraqi Sunni tribal insurgency against the U.S. The role of tribes in the formation of Middle Eastern states and how tribal values continue to impact social, political, and economic issues today.

5 units, not given this year

INTRODUCTION TO THE HUMANITIES (IHUM) COURSES

UNDERGRADUATE COURSES IN INTRODUCTION TO THE HUMANITIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

IHUM 2. Epic Journeys, Modern Quests

First of a two quarter sequence. Through the metaphor of the journey, epic poems externalize the human quest for identity and self-definition: as the epic hero crosses the physical world and descends into the underworld, to visit the dead and seek counsel from them, he gradually comes closer to himself. The different goals of such journeys and the evolution of the epic hero as he struggles to reach his destination, with attention to how exile and alienation, the encounter with ancestors, the female voice, and divine guidance define the trajectories traced by the various epics in question.The diminished importance of the dead and the increased emphasis on the power of the living in various literary genres. How concepts of humanity and society are defined by the sense of rupture with the past, including a heightened importance given to innovation, the present, the living, and the everyday that contrasts with the formative power of the afterlife, tradition, and the dead. GER:IHUM-2

4 units, Win (Harrison, R)

IHUM 3. Epic Journeys, Modern Quests

Second of a two quarter sequence. Through the metaphor of the journey, epic poems externalize the human quest for identity and self-definition: as the epic hero crosses the physical world and descends into the underworld, to visit the dead and seek counsel from them, he gradually comes closer to himself. The different goals of such journeys and the evolution of the epic hero as he struggles to reach his destination, with attention to how exile and alienation, the encounter with ancestors, the female voice, and divine guidance define the trajectories traced by the various epics in question.The diminished importance of the dead and the increased emphasis on the power of the living in various literary genres. How concepts of humanity and society are defined by the sense of rupture with the past, including a heightened importance given to innovation, the present, the living, and the everyday that contrasts with the formative power of the afterlife, tradition, and the dead. GER:IHUM-3

4 units, Spr (Edelstein, D; Harrison, R)

IHUM 11A. Making of the Modern World: Europe and Latin America

First in a two quarter sequence. How did the modern world come to be? The emergence of modernity from 1300 to the present. Demographic and religious transformations in Europe; the development of ideologies, social formations, and political institutions as they eventually crossed the Atlantic and were modified in the Americas; 20th-century social revolution and authoritarianism throughout Latin America. Students build an understanding of the modern world and engage with the creative/destructive tensions inherent in this long transformation. Readings include classics of imaginative literature, political thought, and historical criticism. Theorists who have confronted and analyzed the problem of the origins of capitalist modernity, such as Adam Smith, Karl Marx, Max Weber. Records of ordinary life, such as parish registers, wills and diaries illustrate changes in social and economic existence. Sources include materials drawn from literature, philosophy, economic and social theory, and pri GER:IHUM-2

4 units, Win (Como, D)

IHUM 11B. Making of the Modern World: Europe and Latin America

Second in a two quarter sequence. How did the modern world come to be? The emergence of modernity from 1300 to the present. Demographic and religious transformations in Europe; the development of ideologies, social formations, and political institutions as they eventually crossed the Atlantic and were modified in the Americas; 20th-century social revolution and authoritarianism throughout Latin America. Students build an understanding of the modern world and engage with the creative/destructive tensions inherent in this long transformation. Readings include classics of imaginative literature, political thought, and historical criticism. Theorists who have confronted and analyzed the problem of the origins of capitalist modernity, such as Adam Smith, Karl Marx, Max Weber. Records of ordinary life, such as parish registers, wills and diaries illustrate changes in social and economic existence. Sources include materials drawn from literature, philosophy, economic and social theory, and pr GER:IHUM-3

4 units, Spr (Frank, Z)

IHUM 13. Beyond Survival

How do men and women survive, physically, intellectually, creatively, spiritually in the world? Focus is on texts that imaginatively model strategies to overcome physical deprivation (such as enslavement, prison camp confinement, and sexual violence) and social oppression (such as religious persecution and gender discrimination). How does a legacy of psychic and social trauma manifest itself in the contemporary moment? How do people reach beyond survival and rise above the historical circumstances into which they are born? Sources include works from the 17th century to the present that look back to critical moments in the past. The texts confront events of political and psychological rupture: slavery, the Holocaust, Latin American dictators. History and memory, ritual and reality collide as characters confront the past and negotiate its meanings and its presence. Innovative strategies of survival represented in these works appear in forms such as physical resistance. GER:IHUM-1

4 units, Aut (Elam, H; Elam, M)

IHUM 25A. Art and Ideas

First in a two quarter sequence. A broad sampling of cultural practices, primarily dance and theater, that use the human body as an art medium. From the critical perspectives of dance and drama history and theory, course examines both established and emerging works. The focus is on developing perceptual and interpretive skills for understanding how the performing arts have functioned historically and critically as key indices to and challenging templates of cultural understanding. How can the body be read as an art medium? What kinds of knowledge can a highly disciplined moving body reveal? What does it mean to re-present life through performance historically? How does a live performance work to construct the spectator who views it? How do people come to know themselves through watching and participating in performance? From romantic ballet and realist drama to the present, including examples such as the Harlem Renaissance. GER:IHUM-2

4 units, Win (Ross, J; Rayner, A)

IHUM 25B. Art and Ideas

Second in a two quarter sequence. A broad sampling of cultural practices, primarily dance and theater, that use the human body as an art medium. From the critical perspectives of dance and drama history and theory, course examines both established and emerging works. The focus is on developing perceptual and interpretive skills for understanding how the performing arts have functioned historically and critically as key indices to and challenging templates of cultural understanding. How can the body be read as an art medium? What kinds of knowledge can a highly disciplined moving body reveal? What does it mean to re-present life through performance historically? How does a live performance work to construct the spectator who views it? How do people come to know themselves through watching and participating in performance? From romantic ballet and realist drama to the present, including examples such as the Harlem Renaissance. GER:IHUM-3

4 units, Spr (Rayner, A; Ross, J)

IHUM 34A. A Life of Contemplation or Action? Debates in Western Literature and Philosophy
First in a two quarter sequence. Which is preferable: a life of thought or a life of action? Are the two necessarily in conflict, or is it possible to reconcile them? Focus is on literary treatments of the ongoing debate over the active life versus the contemplative life as it is carried out in texts from the classical to the modern eras. While the debate itself is perennial, it takes on different forms and implications as it moves across changing literary, historical, and philosophical contexts. 34A considers the debate as it is defined by classical authors, early Christian thinkers, and medieval mystical and literary texts, and is redefined in the Renaissance by humanist and posthumanist treatments of it. 34B considers the role of contemplation in an increasingly market-driven and secular world. GER:IHUM-2
4 units, Win (Summit, J)

IHUM 34B. A Life of Contemplation or Action? Debates in Western Literature and Philosophy
Second in a two quarter sequence. Which is preferable: a life of thought or a life of action? Are the two necessarily in conflict, or is it possible to reconcile them? Focus is on literary treatments of the ongoing debate over the active life versus the contemplative life as it is carried out in texts from the classical to the modern eras. While the debate itself is perennial, it takes on different forms and implications as it moves across changing literary, historical, and philosophical contexts. 34A considers the debate as it is defined by classical authors, early Christian thinkers, and medieval mystical and literary texts, and is redefined in the Renaissance by humanist and posthumanist treatments of it. 34B considers the role of contemplation in an increasingly market-driven and secular world. GER:IHUM-3
4 units, Spr (Vermeule, B)

IHUM 39A. Inventing Classics: Greek and Roman Literature in Its Mediterranean Context
First in a two quarter sequence. Are you concerned with fundamental questions about the human condition? Do you ask yourself whether your life is controlled more by your own free choices or by your genetic code? Do you wonder whether the universe is just or unjust? Do you worry whether a superpower can function without hubristic arrogance? If these sorts of issues seem central to your intellectual and personal explorations, this IHUM sequence is designed to reveal that the ancient Mediterranean world was equally consumed with identical questions about the nature of human society and human existence. Sources include a wide and deep selection of influential literary texts from Greece and Rome, amplified by a smaller selection of texts from other cultures in the Mediterranean and the Near East. GER:IHUM-2
4 units, Win (McCall, M)

IHUM 39B. Inventing Classics: Greek and Roman Literature in Its Mediterranean Context
Second in a two quarter sequence. Are you concerned with fundamental questions about the human condition? Do you ask yourself whether your life is controlled more by your own free choices or by your genetic code? Do you wonder whether the universe is just or unjust? Do you worry whether a superpower can function without hubristic arrogance? If these sorts of issues seem central to your intellectual and personal explorations, this IHUM sequence is designed to reveal that the ancient Mediterranean world was equally consumed with identical questions about the nature of human society and human existence. Sources include a wide and deep selection of influential literary texts from Greece and Rome, amplified by a smaller selection of texts from other cultures in the Mediterranean and the Near East. GER:IHUM-3
4 units, Spr (Kaesser, C)

IHUM 40A. World Archaeology and Global Heritage
First in a two quarter sequence. In a world marked by rapid globalization and forward-looking technology, heritage presents a particular paradox. Increasingly, heritage sites are flashpoints in cultural and religious conflicts around the globe. Simultaneously heritage is viewed as a unifying force in nation building and in forging international alliances. Clearly, history matters but how do certain histories come to matter in particular ways, and to whom? How is research on the past shaped through present-day concerns about identity, community, nation, alongside transnational flows of people, money, and goods? The main topics are the impact of the past on the present, and the impact of the present on the past. How the past plays a role in contemporary society, and at contemporary archaeological research, management and conservation. Close study of important archaeological sites. GER:IHUM-2
4 units, Win (Hodder, I)

IHUM 40B. World Archaeology and Global Heritage
Second in a two quarter sequence. In a world marked by rapid globalization and forward-looking technology, heritage presents a particular paradox. Increasingly, heritage sites are flashpoints in cultural and religious conflicts around the globe. Simultaneously heritage is viewed as a unifying force in nation building and in forging international alliances. Clearly, history matters but how do certain histories come to matter in particular ways, and to whom? How is research on the past shaped through present-day concerns about identity, community, nation, alongside transnational flows of people, money, and goods? The main topics are the impact of the past on the present, and the impact of the present on the past. How the past plays a role in contemporary society, and at contemporary archaeological research, management and conservation. Close study of important archaeological sites. GER:IHUM-3
4 units, Spr (Voss, B; Kojan, D)

IHUM 48. The Art of Living
Everyone is forced to make a fundamental choice: by deciding what is most valuable, people decide how they are going to live their lives. They may opt for a life of reason and knowledge; one of faith and discipline; one of nature and freedom; one of community and altruism; or one of originality and style. People may choose to live lives as though they were works of art. In every case, hard work is required: lives are not just given, but need to be made. To live well is, in fact, to practice an art of living. Where, however, do such ideals come from? How do people adopt and defend them? What is required to put them into practice? What do people do when they come into conflict with one another? And what role do great works of art play in all this? The various ways in which it is possible to live well and beautifully, what it takes to implement them, and what happens when they come under pressure from inside and out. GER:IHUM-1
4 units, Aut (Anderson, L; Landy, J; Taylor, K)

IHUM 57. Humans and Machines
How is a living, thinking human being like, or not like, a machine? This might seem like a new question for the Information Age, yet it has been a preoccupation of our civilization for centuries. From the culmination of the Scientific Revolution in the 17th century, philosophers, physiologists, engineers, authors, political actors, and artists of every kind have taken humanity's measure by comparing humans with machines. This course follows that tradition by asking a number of questions about what it means to think of the human mind, body, and society as types of machines. How has the machine served as a metaphor for the cosmos and culture? How do people interact with machines, and how have machines influenced literature, performance, and the arts? What separates people from machines, and are they really all that? The shifting boundary lines between the mechanical and the human by considering how humanity has created or imagined machines. GER:IHUM-1
4 units, Aut (Lowood, H; Bukatman, S)

IHUM 64. Journeys
The journey is the most fundamental narrative: from the moment of birth, everyone is embarked on a constant passage through space and time toward an end. Death itself is in dispute: is it final, or only the beginning of another journey? The mysteries of destination infuse lives, giving rise to the most basic questions of purpose and meaning and faith, one's proper relation to others and the physical world. The works examined in this course were written across a span of some 2,300 years, from very different cultural and historical situations and in very different forms and genres. But each of them presents some essential aspect of that journey and of the multiplicity of passages within that one great journey: moral, spiritual, and emotional passages that challenge and transform people even as they advance toward what the poet Thomas Gray called the inevitable hour. GER:IHUM-1
4 units, Aut (Wolff, T; Yearley, L)

IHUM 69A. Human History: A Global Approach
First of a two quarter sequence. 75,000 years ago there were barely 20,000 people on earth and each of them consumed about 4,000 calories of energy each day, half of it for food and half for every-

thing else combined. Today, by contrast, there are 6,000,000,000 people on earth and in the U.S. each, on average, burn through 230,000 calories per day, for everything from driving Hummers to eating much more than needed. People take for granted things that would have seemed like magic a hundred years ago; they have penetrated every niche on the planet and have even moved beyond planet. Yet at the same time, other species are going extinct at the rate of one every 20 minutes and human beings have poisoned the atmosphere and seas. People are the greatest success story or the greatest disaster of the last million years. Humans may be on the verge of an astonishing transformation, transcending biology and making death obsolete; or they may be on the verge of destroying themselves.

4 units, Win (Morris, I)

IHUM 69B. Human History: A Global Approach

Second of a two quarter sequence. 75,000 years ago there were barely 20,000 people on earth and each of them consumed about 4,000 calories of energy each day, half of it for food and half for everything else combined. Today, by contrast, there are 6,000,000,000 people on earth and in the U.S. each, on average, burn through 230,000 calories per day, for everything from driving Hummers to eating much more than needed. People take for granted things that would have seemed like magic a hundred years ago; they have penetrated every niche on the planet and have even moved beyond planet. Yet at the same time, other species are going extinct at the rate of one every 20 minutes and human beings have poisoned the atmosphere and seas. People are the greatest success story or the greatest disaster of the last million years. Humans may be on the verge of an astonishing transformation, transcending biology and making death obsolete; or they may be on the verge of destroying themselves.

4 units, Spr (Morris, I)

IHUM 70. Word and Image

Is a picture really worth a thousand words? This familiar phrase, which began to appear frequently in the U.S. press around 1920, is particularly worth pondering in our image-saturated era, when an image shown for a few seconds can sell a product, seal an election, result in death threats, or shift public opinion. What roles do pictures and words play in our perception and understanding of the world, in how people learn, enjoy, remember, and experience emotions? What is the relationship of an image or a word to that which it represents? These and similar questions are raised today in many different places: in journalism as much as in cognitive science, in science as much as in literature, on the Internet and in the criminal justice system. How images argue, prove, convince, and how they argue, prove, and convince differently from the written or spoken word, are central questions asked in this course.

4 units, Aut (Bobonich, C)

IHUM 71. Sustainability and Collapse

Contemporary environmental crises such as climate illustrate how all human societies depend in intricate ways on their interactions with natural resources, habitats, and other species. Some human societies survive for thousands of years, whereas others collapse after a few decades or centuries. Exploring such cases of survival and collapse requires drawing on the resources of the sciences as well as the humanities, since they usually involve complex interactions of natural resources and limits with social organization and cultural ideas and values. Course explores these interactions and the complex issues 21st-century societies face. Where current concepts of environmental sustainability, crisis, and disaster come from, how they are used in particular social, cultural, and political contexts, how they affect human behavior, and in what ways they shape social choices and policies in dealing with the many problems that confront the global community.

4 units, Aut (Heise, U)

IHUM 72. The Poet Re-making the World

Can poetry change the world? How poetry has proved itself to be a resilient aesthetic form at the intersection of the personal and the political. Course follows the poem as it is written by men and women facing wars, imprisonment, journeys, social upheavals, and the fragmentation of their worlds. Through reading works from different historical, cultural, and poetic traditions, course explore the question of whether something as individual as subjective artistic experience can help people cope with social and political events that threaten suffering and destruction. The adventures of the individual poet: a young man caught in the trenches of the WW I; a Japanese haiku master and inspired wanderer of the 17th century; an American beat, Jack Kerouac; a poet from St. Louis who went to England and changed the course of 20th-century poetry; an English woman trapped in the conventions of her time; a contemporary US soldier in Iraq.

4 units, Aut (Horky, P)

IHUM 73A. Ultimate Meanings: Decoding Religious Stories from around the World

First of a two quarter sequence. Is there more to life than survival, or does it have some higher purpose? Why is there suffering, death, and evil in the world, and is there some way to overcome them? Religious communities often answer such questions through the art of story-telling, through history, myth, biography and other forms of distilling human experience into narrative. These stories have shaped the world, helping people to cope with difficult aspects of experience, influencing the way people love, suffer, and die, inspiring the imagination, and helping to ignite conflict and violence. Some of the great stories of the world's religions: the sacred narratives of Buddhism, Judaism, Christianity, and Islam, to learn something about the religious cultures that produced them, and how they have shaped human experience.

4 units, Win (Staff)

IHUM 73B. Ultimate Meanings: Decoding Religious Stories from around the World

Second of a two quarter sequence. Is there more to life than survival, or does it have some higher purpose? Why is there suffering, death, and evil in the world, and is there some way to overcome them? Religious communities often answer such questions through the art of story-telling, through history, myth, biography and other forms of distilling human experience into narrative. These stories have shaped the world, helping people to cope with difficult aspects of experience, influencing the way people love, suffer, and die, inspiring the imagination, and helping to ignite conflict and violence. Some of the great stories of the world's religions: the sacred narratives of Buddhism, Judaism, Christianity, and Islam, to learn something about the religious cultures that produced them, and how they have shaped human experience.

4 units, Spr (Staff)

ITALIAN GENERAL (ITALGEN) COURSES

UNDERGRADUATE COURSES IN ITALIAN GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ITALGEN 149. New Frontiers in Italian Cinema

A new generation of Italian filmmakers who examine the contradictory encounters between Italians and the migrant others in contemporary Italy. Critical texts from film studies, gender studies, ethnic and cultural studies, psychoanalysis, and history. I English; films, in Italian with English subtitles, by Amelio, Ozpetek, Munzi, Garrone, Melliti, Tornatore, and Giordana. GER:DB-Hum

3-5 units, not given this year

ITALGEN 155. The Mafia in Society, Film, and Literature

We will compare both Italian and American fantasies of the Mafia to its historical origins and impact on Italian culture. Central topics: do the media inevitably idealize corruption or can they criticize it? how do Mafia stories reflect tensions between North and South in Italy, and between Italians and Italian-Americans? how do we triangulate the myths of the Mafia, popular culture, and the anti-institutional bias of much modern Italian fiction? In English. GER:DB-Hum

3-5 units, Aut (Wittman, L)

ITALGEN 172. Dream Visions: The Roman de la Rose

(Same as FRENGEN 172, FRENGEN 272, ITALGEN 272) What truths are in dreams? How does the quest for a symbolic object embody a moral struggle? What motivates a personal search for divine love? Study of arguably the most influential work of the European Middle Ages, the Roman de la Rose of Guillaume de Lorris and Jean de Meun. Focus on the work as erotic, allegorical

quest for the mystical Rose, and scholastic encyclopedia through close analysis, secondary readings, and study of manuscript illumination. Use of medieval and modern French edition.

3-5 units, Spr (Galvez, M)

ITALGEN 181. Philosophy and Literature
(Same as CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum

4-5 units, Win (Anderson, L; Landy, J)

GRADUATE COURSES IN ITALIAN GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ITALGEN 230. Italian Renaissance Epic: Ariosto
For graduate students and advanced undergraduates. Ariosto's epic poem Orlando furioso in the context of the social and political world of Renaissance Italy. Topics include: its relationship to precursor texts and traditions (classical, Arthurian, Carolingian); Ferrarese court culture and the politics of dynastic epic; its relationship to early modern ideologies of gender. Taught in English but requires advanced reading knowledge of Italian.

4-5 units, Spr (Springer, C)

ITALGEN 235E. Inferno
The first canticle of Dante's masterpiece.

3-5 units, Win (Harrison, R)

ITALGEN 242. Women Mystics from the Middle Ages to the Present
(Same as FRENGEN 242) The predominantly female mystical experience or direct-embodied encounter with a spiritual reality that is difficult, perhaps impossible, to reduce to words, or to explain rationally. Sources include European texts from the Middle Ages to the present by women and men who attempt to convey the experience metaphorically, to interpret it theologically and philosophically, and to transmit it actively to others.

3-5 units, not given this year

ITALGEN 261. Rebels, Outlaws, and Iconoclasts: Italian Cinema from 1943 to 1975
Introduction to major Italian directors from neorealism through the turbulent decades of the 60s and 70s in Italy. Emphasis on figures such as outcasts or social deviants. Analysis of revolutionary cinematic style in the works of Visconti, De Santis, Rossellini, Antonioni, Bertolucci, Bellocchio, and Pasolini. Critical texts from film and cultural studies. English; films in Italian with English subtitles; readings in English. Mandatory evening film screenings.

3-5 units, Aut (Carey, S)

ITALGEN 264E. Petrarch and Petrarchism
(Same as COMPLIT 216) The works of Petrarch (1304-1374), acknowledged as the founder of Renaissance humanism, and a bibliophile, collector of manuscripts, and devotee of erudition. How he dedicated his life to harmonizing the Christian faith with classical learning. Sources include his Latin moral works, epistles, epics, and treatises on illustrious men, and the Triumphs and Canzoniere .

5 units, not given this year

ITALGEN 272. Dream Visions: The Roman de la Rose
(Same as FRENGEN 172, FRENGEN 272, ITALGEN 172) What truths are in dreams? How does the quest for a symbolic object embody a moral struggle? What motivates a personal search for divine love? Study of arguably the most influential work of the European Middle Ages, the Roman de la Rose of Guillaume de Lorris and Jean de Meun. Focus on the work as erotic, allegorical quest for the mystical Rose, and scholastic encyclopedia through close analysis, secondary readings, and study of manuscript illumination. Use of medieval and modern French edition.

3-5 units, Spr (Galvez, M)

ITALGEN 281. Novels into Film
20th-century Italian novels and their film adaptations. Texts include The Leopard (Tomasi di Lampedusa/De Sica), The Garden of the Finzi-Continis (Bassani, De Sica), The Conformist (Moravia/Bertolucci), Christ Stopped at Eboli (Levi/Rosi), Padre/Padrone (Ledda/Taviani).

4 units, Win (Springer, C)

ITALGEN 284. Philosophy and Poetry in 20th-Century French and Italian Theory
(Same as FRENGEN 284) To what extent is poetry the other of modern philosophy? How does modern aesthetic theory understand the distinction and blur the boundaries between philosophical and poetic thinking? Authors include Croce, Gentile, Sartre, Bataille, Agamben, Ricoeur, Cacciari, Derrida, and Vattimo.

3-5 units, Aut (Wittman, L)

ITALGEN 289. French and Italian Women Writers
(Same as FRENGEN 289) How does women's writing evolve from the very early 20th century, when women's liberation movements first began and WW I brought major social changes, to the flowering of feminine writing in the 70s and beyond? What is the relationship between women writers and filmmakers, and feminism? Is it legitimate to consider women writers in a separate category? To what extent does a reevaluation of women writers mean reconsidering modern literary history? Authors and filmmakers include Aleramo, Yourcenar, de Beauvoir, Banti, Duras, Cavani.

3-5 units, not given this year

ITALGEN 301E. New Methods and Sources in French and Italian Studies
(Same as FRENGEN 301E) Based on student interest. Changes in research methods: the use of digitized texts, resources, and databases available through Stanford Libraries¿ gateways. Emphasis is on strategies for exploration of broad and specialized topics through new and traditional methods. Using a flexible schedule based on enrollment and the level of students¿ knowledge, may be offered in forms including a shortened version on the basics, independent study, or a syllabus split over two quarters. Unit levels adjusted accordingly.

1-4 units, alternate years, not given this year

ITALGEN 369. Introduction to Graduate Studies: Criticism as Profession
(Same as COMPLIT 369, FRENGEN 369, GERLIT 369) Major texts of modern literary criticism in the context of professional scholarship today. Readings of critics such as Lukács, Auerbach, Frye, Ong, Benjamin, Adorno, Szondi, de Man, Abrams, Bourdieu, Vendler, and Said. Contemporary professional issues including scholarly associations, journals, national and comparative literatures, university structures, and career paths.

5 units, Aut (Berman, R)

ITALGEN 395. Philosophical Reading Group
(Same as COMPLIT 359A, FRENGEN 395) Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit.

1 unit, Aut (Gumbrecht, H), Win (Gumbrecht, H)

ITALIAN LANGUAGE (ITALLANG) COURSES

UNDERGRADUATE COURSES IN ITALIAN LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ITALLANG 1. First-Year Italian, First Quarter
All-in-Italian communicative and interactive approach. Emphasis is on the development of a ppropriate discourse in contemporary cultural contexts. Interpretation of authentic materials, written and

oral presentations, and plenty of conversational practice. Language lab, multimedia, and online activities. quirement.

5 units, Aut (Staff), Win (Tempesta, G), Spr (McCarty, A)

ITALLANG 1A. Accelerated First-Year Italian, Part 1
Accelerated sequence that completes first-year Italian in two rather than three quarters. For students with previous knowledge of Italian or with a strong background in another Romance language. 2A fulfills the University language requirement. Prerequisite: advanced-level proficiency in another Romance language.

5 units, Aut (McCarty, A), Win (McCarty, A)

ITALLANG 2. First-Year Italian, Second Quarter
Continuation of 1. Prerequisite: 2 or equivalent.

5 units, Aut (McCarty, A), Win (Alberti, G), Spr (Tempesta, G)

ITALLANG 2A. Accelerated First-Year Italian, Part 2
Continuation of 1A. Prerequisite: 1A or equivalent.Fulfills the University language requirement.

5 units, Win (Baldocchi, M), Spr (McCarty, A)

ITALLANG 3. First-Year Italian, Third Quarter
Continuation of 2. Prerequisite: 2 or equivalent. Fulfills the University language requirement.

5 units, Aut (Tempesta, G), Win (McCarty, A), Spr (Alberti, G)

ITALLANG 5A. Intensive First-Year Italian, Part A
Same as ITALLANG 1.

5 units, Sum (Ferrando, S)

ITALLANG 5B. Intensive First-Year Italian, Part B
Same as ITALLANG 2. Prerequisite: 1 or 5A.

5 units, Sum (Coggeshall, E)

ITALLANG 5C. Intensive First-Year Italian, Part C
Same as ITALLANG 3. Prerequisite: 2 or 5B. Fulfills the University language requirement.

5 units, Sum (Tennen, D)

ITALLANG 15S. Intermediate Italian Oral Conversation
May be repeated once for credit.

3 units, Sum (Gelmetti, S; Tempesta, G)

ITALLANG 20. Intermediate Oral Communication: Italy Today
Second-year conversational and presentational skills developed through exposure to based on movie clips, slide shows, and other authentic multimedia materials. Guest lectures on Italian culture including opera, pop music, wine, and food culture. Preview of the Florentine experience with Florence returnees sharing their experiences in Italy. Prerequisite: completion of first-year Italian or equivalent.

3 units, Aut (Tempesta, G), Win (Tempesta, G), Spr (Tempesta, G), Sum (Staff)

ITALLANG 21. Second Year Italian, First Quarter
Sequence integrating culture and language in the development of socioculturally appropriate discourse. Authentic materials include news and film clips, video and audio files, and short stories. Reading, writing, listening, and speaking competence based on cross-cultural understanding. Prerequisite: first-year Italian or equivalent.

4 units, Aut (Baldocchi, M)

ITALLANG 21A. Accelerated Second-Year Italian, Part 1
For students going to Florence. Completes second-year sequence in two rather than three quarters. Prerequisite: first-year Italian or equivalent.

4-5 units, Aut (McCarty, A), Win (McCarty, A), Spr (Baldocchi, M)

ITALLANG 22. Second-Year Italian, Second Quarter
Continuation of 21. Prerequisite: 21 or equivalent.

4-5 units, Win (Pansa, K)

ITALLANG 22A. Accelerated Second-Year Italian, Part 2
Continuation of 21A or 21F (for Florence returnees). Satisfies the foreign language requirement for International Relations majors. Prerequisite: 21A or 21F.

4-5 units, Aut (Baldocchi, M), Win (McCarty, A), Spr (McCarty, A)

ITALLANG 23. Second-Year Italian, Third Quarter
Continuation of 22. Prerequisite: 22 or equivalent. Satisfies the foreign language requirement for International Relations majors.

4-5 units, Spr (Ferrando, S)

ITALLANG 99. Language Specials
Prerequisite: consent of instructor.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ITALLANG 101. Advanced Oral Communication: Italian Opera
For Florence returnees or those who have completed second-year Italian. Use of opera excerpts by Leoncavallo, Puccini, Rossini, and Verdi to improve communication skills and review language functions. Emphasis is on presentation, conversation, and debate. Prerequisites: second-year Italian or equivalent.dinator.

3 units, Aut (Cellinese, A)

ITALLANG 102. Advanced Oral Communication: Modern Cinema
For Florence returnees or those who have completed second-year Italian. Use of movie sequences by Italian film directors such as Benigni, Moretti, Salvatores, Soldini, and Tornatore to improve communication skills and review language functions. Emphasis is on presentation, conversation, and debate. Prerequisite: second-year Italianor equivalent.

3 units, not given this year

ITALLANG 103. Advanced Oral Communication: Italian Classic Cinema
For Florence returnees or those who have completed second-year Italian. Use of classical movie sequences by Italian film directors such as Antonioni, De Sica, Fellini, Rossellini, and Visconti to improve communication skills and review language functions. Emphasis is on presentation, conversation, and debate. Prerequisites: second-year Italian or equivalent.

3 units, Spr (Cellinese, A)

ITALLANG 113. Italian Cultural Studies
Literary texts, news reports, comic books, film reviews, music lyrics, and sociological surveys used to examine Italy's language, culture, and society today. Advanced grammatical analysis and reading comprehension. Prerequisite: second-year Italian or equivalent.

3-4 units, not given this year

ITALLANG 114. Advanced Stylistics and Composition
Goal is advanced proficiency in written Italian. Textual and grammatical analysis of literary and non-literary texts, oral reports, translations, and writing assignments. Prerequisite: second-year Italian or equivalent.

3-4 units, Win (Baldocchi, M)

ITALLANG 115. Academic and Creative Writing
Continuation of 114. Academic prose: formal structures and academic terminology. Creative prose: short stories, expressive language, and when and how to break the rules for effect. Prerequisite: second-year Italian or equivalent. WIM

3-4 units, Spr (Baldocchi, M)

ITALLANG 126. Italy and Italians Today
May be repeated for credit.

2 units, Aut (Staff), Spr (Coggeshall, E)

GRADUATE COURSES IN ITALIAN LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ITALLANG 50. Reading Italian
For seniors or graduate students seeking to meet the University reading requirement for advanced degrees. Reading sstrategies for comprehension of secondary literature for acaemic research. Fulfills the University foreign language requirement for advanced degrees if student earns a grade of 'B.' Prerequisite: one year of Italian or reading proficiency in another Romance language.

3 units, not given this year

ITALLANG 205A. Intensive First-Year Italian
For Stanford graduate students restricted to 9 units. Accelerated. Covers 1-3 quarters of Italian. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials.

3-5 units, Sum (Staff)

ITALLANG 205B. Intensive First-Year Italian
For Stanford graduate students restricted to 9 units. Accelerated. Covers 1-3 quarters of Italian. Emphasis is on the development of

authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials
3-5 units, Sum (Staff)

ITALLANG 205C. Intensive First-Year Italian
For Stanford graduate students restricted to 9 units. Accelerated. Covers 1-3 quarters of Italian. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials.
3-5 units, Sum (Staff)

ITALLANG 394. Graduate Studies in Italian Conversation
Prerequisite: consent of instructor. (Staff)
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

ITALLANG 395. Graduate Studies in Italian
Prerequisite: consent of instructor. (Staff)
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES COURSES IN ITALIAN LANGUAGE

Courses approved for the French or Italian major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

FLORENCE ITALIAN LANGUAGE COURSES

OSPFLOR 21F. Accelerated Second-Year Italian, Part A
5 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 22F. Accelerated Second-Year Italian Part B,
5 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Staff, 1)

ITALIAN LITERATURE (ITALLIT) COURSES

UNDERGRADUATE COURSES IN ITALIAN LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ITALLIT 127. Inventing Italian Literature: Dante, Boccaccio, Petrarca
The origins of Italian literature. Poetry such as 13th-century love lyrics, Dante's Vita Nuova, and Petrarca's Canzoniere; prose such as stories from Boccaccio's Decameron. Prerequisite: ITALLANG 22A or equivalent. GER:DB-Hum, WIM
4 units, Aut (Springer, C)

ITALLIT 128. The Italian Renaissance and the Path to Modernity
The literature, art, and history of the Renaissance and beyond. Readings from the 15th through 18th centuries include Moderata Fonte, Machiavelli, Ariosto, Tasso, Galileo, and Goldoni. Prerequisite: ITALLANG 22A or equivalent. GER:DB-Hum, WIM
4 units, Win (Springer, C)

ITALLIT 129. Modern Italian History and Literature
The history of the Italian nation and national literary identity in the 19th and 20th centuries. The relationship between literary texts and their historical context from the Risorgimento to the Resistance. Focus is on the romantic lyric, futurism, fascism, and the changing status of women. Authors include Foscolo, Leopardi, D'Annunzio, Aleramo, Marinetti, Pirandello, Ungaretti, and Montale. Prerequisite: ITALLANG 22A or equivalent. GER:DB-Hum, WIM
4 units, Spr (Carey, S)

ITALLIT 142. Literature and the City
How has the relationship between man and the city changed since the advent of industrialization? How did men and women in the 20th century relate to the Modern City? The recent rise of ecocriticism suggests a growing interest in the urban environment and its relationship to literature. From Futurism to Neorealism, from Magic Realism to Postmodernism, sources range from fiction to poetry to the graphic novel and span over the course of the 20th century to century to the present day (D'Annunzio, Marinetti, Merini, Buzzati, Calvino).
3-5 units, Spr (Ferrando, S)

ITALLIT 189A. Honors Research
Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.
5 units, Win (Staff)

ITALLIT 189B. Honors Research
Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.
2 units, Spr (Staff)

ITALLIT 199. Individual Work
1-12 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN ITALIAN LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ITALLIT 266. Pasolini: Cinema and Subversion
The connections made by controversial writer and director Pier Paolo Pasolini between poetry, politics, film, and sexuality. Pasolini's much-contested public role, which caused him to be persecuted by political and artistic opponents, and theories concerning his mysterious murder in 1975. Comparing him to contemporaries, such as Fellini and Antonioni. Why did Pasolini become an icon of rebellion, and what connects his communist commitment, his archaic Catholicism, and his homosexuality?
3-5 units, Win (Wittman, L)

ITALLIT 282. Solid or Liquid Modernity
This course takes as its starting point Zygmund Bauman's distinction between a solid and a liquid modernity. Examples from Italian literature include Pirandello, Calvino, Tabucchi, Tommaso Pincio, and Paolo Zanotti.
3-5 units, Spr (Ceserani, R)

ITALLIT 292. Machiavelli
The course will examine the political thought, literary style, and historical importance of Niccolò Machiavelli. Readings will include selections from Machiavelli's Discorsi, The Prince, and his play La Mandragola.
2 units, Aut (Staff)

ITALLIT 299. Individual Work
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ITALLIT 399. Individual Work
For graduate students working on a special project or predissertation research. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ITALLIT 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANESE GENERAL (JAPANGEN) COURSES

UNDERGRADUATE COURSES IN JAPANESE GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

JAPANGEN 51. Japanese Business Culture
(Same as JAPANGEN 251) Japanese group dynamics in industrial and corporate structures, negotiating styles, decision making, and crisis management. Strategies for managing intercultural differences.
3-5 units, Win (Dasher, R)

JAPANGEN 60. Asian Art and Culture
(Same as ARTHIST 2) The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in architecture, painting, woodblock prints, sculpture, and

in such forms as garden design and urban planning. GER:DB-Hum, EC-GlobalCom

5 units, alternate years, not given this year

JAPANGEN 84. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting

Changes marking the transition from medieval to early modern Japanese society that generated a revolution in visual culture, as exemplified in subjects deemed fit for representation; how commoners joined elites in pictorializing their world, catalyzed by interactions with the Dutch. GER:DB-Hum

4 units, not given this year

JAPANGEN 92. Traditional East Asian Culture: Japan

Required for Chinese and Japanese majors. Introduction to Japanese culture in historical context. Previous topics include:shifting paradigms of gender relations and performance, ancient mythology, court poetry and romance, medieval war tales, and the theaters of Noh, Bunraku, and Kabuki. GER:DB-Hum, EC-GlobalCom

5 units, Win (Takeuchi, M)

JAPANGEN 121. Translating Japan, Translating the West

(Same as JAPANGEN 221) Translation lies at the heart of all intercultural exchange. This course introduces students to the specific ways in which translation has shaped the image of Japan in the West, the image of the West in Japan, and Japan's self-image in the modern period. What texts and concepts were translated by each side, how, and to what effect? No prior knowledge of Japanese language necessary. GER:DB-Hum

3-5 units, Aut (Levy, I)

JAPANGEN 137. Classical Japanese Literature in Translation

(Same as JAPANGEN 237) Prose, poetry, and drama from the 10th-19th centuries. Historical, intellectual, and cultural context. Works vary each year. May be repeated for credit with consent of instructor. GER:DB-Hum, DB-Hum

4 units, Win (Carter, S)

JAPANGEN 138. Survey of Modern Japanese Literature in Translation

(Same as JAPANGEN 238) Required for Japanese majors. Japanese literature since 1868. Authors include Futabatei Shimei, Higuchi Ichiyo, Natsume Soseki, and Yoshimoto Banana. GER:DB-Hum, EC-GlobalCom

3-4 units, Win (Reichert, J)

JAPANGEN 141. Japanese Performance Traditions

(Same as JAPANGEN 241) Major paradigms of gender in Japanese performance traditions from ancient to modern times, covering Noh, Kabuki, Bunraku, and Takarazuka.

3-4 units, Spr (Levy, I)

JAPANGEN 148. Modern Japanese Narratives: Literature and Film

(Same as JAPANGEN 248) Central issues in modern Japanese visual and written narrative. Focus is on competing views of modernity, war, and crises of individual and collective identity and responsibility. Directors and authors include Kurosawa, Mizoguchi, Ozu, Ogai, Akutagawa, Tanizaki, Abe, and Oe. GER:DB-Hum, EC-GlobalCom

3-5 units, not given this year

JAPANGEN 149. Screening Japan: Issues in Crosscultural Interpretation

(Same as JAPANGEN 249) Is the cinematic language of moving images universal? How have cultural differences, political interests, and genre expectations affected the ways in which Japanese cinema makes meaning across national borders? Sources include the works of major Japanese directors and seminal works of Japanese film criticism, theory, and scholarship in English. No Japanese language skills required. GER:DB-Hum

3-4 units, not given this year

JAPANGEN 160. Early Modern Japan: The Floating World of Chikamatsu

(Same as JAPANGEN 260) Early modern Japan as dramatized in the puppet theater of Chikamatsu Monzaemon (1653-1725), Japan's leading dramatist, who depicted militarization, commercialization, and urbanization in the Tokugawa period (1603-1868). Emperors, shogun, daimyo, samurai, merchants, monks, geisha, and masterless ronin in his bunraku plays as denizens of a floating world. Themes of loyalty, love, heroism, suicide, and renunciation in the early modern world. In English.

4 units, not given this year

JAPANGEN 185. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868

(Same as ARTHIST 187, ARTHIST 387) Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan. GER:DB-Hum, EC-GlobalCom

4 units, Aut (Takeuchi, M)

JAPANGEN 186. Theme and Style in Japanese Art

(Same as ARTHIST 186, ARTHIST 386, JAPANGEN 286) Monuments in traditional Japanese architecture, sculpture, garden design, painting, prints, and pots, through the 19th century. Chronological framework emphasizes the role of these objects play in visualizing the ideals of the society they represent. GER:DB-Hum

4 units, not given this year

JAPANGEN 187. Romance, Desire, and Sexuality in Modern Japanese Literature

(Same as JAPANGEN 287) Constructions of romance, desire, and sexuality such as sexual connoisseurship, love suicide, and nanshoku in Edo Japan. How these paradigms are reconfigured by modern writers. Readings: Saikaku, Chikamatsu, Ichiyo, Soseki, Tanizaki, and Mishima. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

JAPANGEN 198. Senior Colloquium in Japanese Studies

(Same as KORGEN 198) Research, write, and present capstone essay or honors thesis.

1 unit, Win (Takeuchi, M)

GRADUATE COURSES IN JAPANESE GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

JAPANGEN 200. Directed Reading in Asian Languages

For Japanese literature. Prerequisite: consent of instructor. (Staff)

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANGEN 201. Teaching Japanese Humanities

Prepares graduate students to teach humanities at the undergraduate level. Topics include syllabus development and course design, techniques for generating discussion, effective grading practices, and issues particular to the subject matter.

1 unit, Aut (Reichert, J)

JAPANGEN 220. The Situation of the Artist in Traditional Japan

(Same as ARTHIST 485) Topics may include: workshop production such as that of the Kano and Tosa families; the meaning of the signature on objects including ceramics and tea wares; the folk arts movement; craft guilds; ghost painters in China; individualism versus product standardization; and the role of lineage. How works of art were commissioned; institutions supporting artists; how makers purveyed their goods; how artists were recognized by society; the relationship between patrons' desires and artists' modes of production.

5 units, not given this year

JAPANGEN 221. Translating Japan, Translating the West

(Same as JAPANGEN 121) Translation lies at the heart of all intercultural exchange. This course introduces students to the specific ways in which translation has shaped the image of Japan in the West, the image of the West in Japan, and Japan's self-image in the modern period. What texts and concepts were translated by

the modern period. What texts and concepts were translated by each side, how, and to what effect? No prior knowledge of Japanese language necessary.

3-5 units, Aut (Levy, I)

JAPANGEN 237. Classical Japanese Literature in Translation
(Same as JAPANGEN 137) Prose, poetry, and drama from the 10th-19th centuries. Historical, intellectual, and cultural context. Works vary each year. May be repeated for credit with consent of instructor.

4 units, Win (Carter, S)

JAPANGEN 238. Survey of Modern Japanese Literature in Translation
(Same as JAPANGEN 138) Required for Japanese majors. Japanese literature since 1868. Authors include Futabatei Shimei, Higuchi Ichiyo, Natsume Soseki, and Yoshimoto Banana.

3-4 units, Win (Reichert, J)

JAPANGEN 241. Japanese Performance Traditions
(Same as JAPANGEN 141) Major paradigms of gender in Japanese performance traditions from ancient to modern times, covering Noh, Kabuki, Bunraku, and Takarazuka.

3-4 units, Spr (Levy, I)

JAPANGEN 248. Modern Japanese Narratives: Literature and Film
(Same as JAPANGEN 148) Central issues in modern Japanese visual and written narrative. Focus is on competing views of modernity, war, and crises of individual and collective identity and responsibility. Directors and authors include Kurosawa, Mizoguchi, Ozu, Ogai, Akutagawa, Tanizaki, Abe, and Oe.

3-5 units, not given this year

JAPANGEN 249. Screening Japan: Issues in Crosscultural Interpretation
(Same as JAPANGEN 149) Is the cinematic language of moving images universal? How have cultural differences, political interests, and genre expectations affected the ways in which Japanese cinema makes meaning across national borders? Sources include the works of major Japanese directors and seminal works of Japanese film criticism, theory, and scholarship in English. No Japanese language skills required.

3-4 units, not given this year

JAPANGEN 251. Japanese Business Culture
(Same as JAPANGEN 51) Japanese group dynamics in industrial and corporate structures, negotiating styles, decision making, and crisis management. Strategies for managing intercultural differences.

3-5 units, Win (Dasher, R)

JAPANGEN 260. Early Modern Japan: The Floating World of Chikamatsu
(Same as JAPANGEN 160) Early modern Japan as dramatized in the puppet theater of Chikamatsu Monzaemon (1653-1725), Japan's leading dramatist, who depicted militarization, commercialization, and urbanization in the Tokugawa period (1603-1868). Emperors, shogun, daimyo, samurai, merchants, monks, geisha, and masterless ronin in his bunraku plays as denizens of a floating world. Themes of loyalty, love, heroism, suicide, and renunciation in the early modern world. In English.

4 units, not given this year

JAPANGEN 286. Theme and Style in Japanese Art
(Same as ARTHIST 186, ARTHIST 386, JAPANGEN 186) Monuments in traditional Japanese architecture, sculpture, garden design, painting, prints, and pots, through the 19th century. Chronological framework emphasizes the role of these objects play in visualizing the ideals of the society they represent.

4 units, not given this year

JAPANGEN 287. Romance, Desire, and Sexuality in Modern Japanese Literature
(Same as JAPANGEN 187) Constructions of romance, desire, and sexuality such as sexual connoisseurship, love suicide, and nanshoku in Edo Japan. How these paradigms are reconfigured by modern writers. Readings: Saikaku, Chikamatsu, Ichiyo, Soseki, Tanizaki, and Mishima.

4 units, not given this year

JAPANGEN 287A. The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime
(Same as ARTHIST 287A) The tea ceremony, a premodern multimedia phenomenon, integrates architecture, garden design, ceramics, painting, calligraphy, and treasured objects into a choreographed ritual wherein host, objects, and guests perform roles on a tiny stage. Aesthetic, philosophical, and political dimensions. The evolution of tea taste including its inception in Zen monasteries, use for social control during the 16th century, the development of a class of tea connoisseurs, and 20th-century manipulation by the emerging industrialist class.

5 units, not given this year

JAPANESE LANGUAGE (JAPANLNG) COURSES

UNDERGRADUATE COURSES IN JAPANESE LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

JAPANLNG 1. First-Year Modern Japanese, First Quarter
Foundation in grammar, reading, conversation and basic composition to articulate experiences and ideas. 150 Kanji characters introduced.

5 units, Aut (Busbin, K)

JAPANLNG 2. First-Year Modern Japanese, Second Quarter
Continuation of 1. Foundation in grammar, reading, conversation and basic composition to articulate experiences and ideas. 150 Kanji characters introduced. Prerequisiste 1.

5 units, Win (Busbin, K)

JAPANLNG 3. First-Year Modern Japanese, Third Quarter
Continuation of 2. Foundation in grammar, reading, conversation and basic composition to articulate experiences and ideas. 150 Kanji characters introduced. Prerequisiste 2.

5 units, Spr (Busbin, K)

JAPANLNG 4A. First -Year Japanese Language Essentials, First Quarter
(Formerly JAPANLNG 7A.) For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://japanese.stanford.edu/?page_id=73.

3 units, Aut (Fu, M)

JAPANLNG 4B. First-Year Japanese Language Essentials, Second Quarter
(Formerly JAPANLNG 8A.) Continuation of 4A. For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://japanese.stanford.edu/?page_id=73.

3 units, Win (Fu, M)

JAPANLNG 4C. First-Year Japanese Language Essentials, Third Quarter
(Formerly JAPANLNG 9A.) Continuation of 4B. For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://japanese.stanford.edu/?page_id=73.

3 units, Spr (Fu, M)

JAPANLNG 5. Intensive First-Year Japanese Language
Equivalent to 7, 8, and 9 combined. See http://www.stanford.edu/group/japanese/summer. Same as JAPANLNG 305

12-15 units, Sum (Miyachi, M)

JAPANLNG 7. First-Year Japanese Language, Culture, and Communication, First Quarter
(Formerly JAPANLNG 7B.) First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. 300 kanji characters. See http://japanese.stanford.edu/?page_id=5

5 units, Aut (Lipton, H)

JAPANLNG 8. First-Year Japanese Language, Culture, and Communication, Second Quarter
(Formerly JAPANLNG 8B.) Continuation of 7. .) First-year sequence enables students to converse, write, and read essays on topics such as personal his-tory, experiences, familiar people. 300 kanji characters. http://japanese.stanford.edu/?page_id=5
5 units, Win (Lipton, H)

JAPANLNG 9. First-Year Japanese Language, Culture, and Communication, Third Quarter
(Formerly JAPANLNG 9B.) Continuation of 8. .) First-year sequence enables students to converse, write, and read essays on topics such as personal his-tory, experiences, familiar people. 300 kanji charactersSee http://japanese.stanford.edu/?page_id=5
5 units, Spr (Lipton, H)

JAPANLNG 11A. Intermediate Japanese Conversation, First Quarter
(Formerly JAPANLNG 27.) Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite: 3, 9, or consent of instructor.
2 units, Aut (Busbin, K)

JAPANLNG 11B. Intermediate Japanese Conversation, Second Quarter
(Formerly JAPANLNG 28.) Continuation of 11A. Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite 11A or consent of the instructor.
2 units, Win (Busbin, K)

JAPANLNG 11C. Intermediate Japanese Conversation, Third Quarter
(Formerly JAPANLNG 29.) Continuation of 11B. Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite 11B or consent of instructor.
2 units, Spr (Busbin, K)

JAPANLNG 14A. Second-Year Japanese Language Essentials, First Quarter
(Formerly JAPANLNG 17A.) Continuation of 4C. For students who want to build communication skills in limited time. Prerequisite: 4C or equivalent. http://japanese.stanford.edu/?page_id=89.
3 units, Aut (Yasumoto Magnani, E)

JAPANLNG 14B. Second-Year Japanese Language Essentials, Second Quarter
(Formerly JAPANLNG 18A.) Continuation of 14A. http://www.stanford.edu/group/japanese/3unit.htm. Prerequisite: 14A or equivalent.
3 units, Win (Yasumoto Magnani, E)

JAPANLNG 14C. Second-Year Japanese Language Essentials, Third Quarter
(Formerly JAPANLNG 19A.) Continuation of 14C. See http://www.stanford.edu/group/japanese/3unit.htm.. Prerequisite: 14C or equivalent.
3 units, Spr (Yasumoto Magnani, E)

JAPANLNG 17. Second-Year Japanese Language, Culture, and Communication, First Quarter
(Formerly JAPANLNG 17B.) Our goal is to express further develop and enhance spoken and written Japanese in order to handle advanced concepts such as the comparison and contrasts of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: 9 or equivalent. See https://www.stanford.edu/dept/lc/language/courses/japanese/japanese.html.
5 units, Aut (Lowdermilk, M)

JAPANLNG 18. Second-Year Japanese Language, Culture, and Communication, Second Quarter
(Formerly JAPANLNG 18B.) Prerequisite: 17 or equivalent. See https://www.stanford.edu/dept/lc/language/courses/japanese/japanese.html.
5 units, Win (Lowdermilk, M)

JAPANLNG 19. Second-Year Japanese Language, Culture, and Communication, Third Quarter
(Formerly JAPANLNG 19B.) Prerequisite 18 or equivalent. https://www.stanford.edu/dept/lc/language/courses/japanese/japanese.html.
5 units, Spr (Lowdermilk, M)

JAPANLNG 20. Intensive Second-Year Japanese
Equivalent to 17,18,19 combined. Prerequisite 9 or equivalent. See http://www.stanford.edu/group/japanese/summer.
12-15 units, Sum (Lipton, H)

JAPANLNG 31A. Intermediate to Advanced Japanese Conversation, First Quarter
(Formerly JAPANLNG 51.) Oral proficiency through role play, oral presentations, and discussion. Recommended for those who have participated in Kyoto SCTI program May be able to take concurrently with 17, 18, and 19. Prerequisite: 9K, or consent of instructor.
2 units, Aut (Lowdermilk, M)

JAPANLNG 31B. Intermediate to Advanced Japanese Conversation, Second Quarter
(Formerly JAPANLNG 52.) Continuation of 31A. Prerequisite: 31A or consent of instructor.
2 units, Win (Lowdermilk, M)

JAPANLNG 31C. Intermediate to Advanced Japanese Conversation, Thrid Quarter
(Formerly JAPANLNG 53.) Continuation of 31B. Prerequisite: 31B or consent of instructor.
2 units, Spr (Lowdermilk, M)

JAPANLNG 99. Language Specials
Prerequisite: consent of instructor. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLNG 111. Business Japanese, First Quarter
Topics include cultural attitudes and approaches, work ethic, the stock market, import-export trade. Business letters, job interviews, and resume writing. May be repeated for credit. In Japanese. Prerequisite: 23, 29, or 19B, or consent of instructor.
3 units, not given this year

JAPANLNG 111A. Advanced Japanese Conversation, First Quarter
(Formerly JAPANLNG 121.) Focus is on improving speaking skills to narrate and describe things in detail. Audiovisual material and oral presentations. Prerequisite: 19K, 31C, or consent of instructor.
2 units, Aut (Lipton, H)

JAPANLNG 111B. Advanced Japanese Conversation, Second Quarter
(Formerly JAPANLNG 122.) Continuation of 111A. Prerequisite: 111A or consent of instructor.
2 units, Win (Lipton, H)

JAPANLNG 111C. Advanced Japanese Conversation, Third Quarter
(Formerly JAPANLNG 123.) Continuation of 111B. Prerequisite: 111B, or consent of instructor
2 units, Spr (Lipton, H)

JAPANLNG 115. Japanese for Bilingual Students
For students with advanced-level comprehension and speaking skills who in need of supplemental study. Emphasis is on reading, writing Chinese (kanji) characters, and formal Japanese.
3 units, not given this year

JAPANLNG 116. Japanese for Bilingual Students
For students with advanced-level comprehension and speaking skills who in need of supplemental study. Emphasis is on reading, writing Chinese (kanji) characters, and formal Japanese.
3 units, not given this year

JAPANLNG 117. Third-Year Japanese Language, Culture, and Communication, First Quarter
(Formerly JAPANLNG 127B.) Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. See https://www.stanford.edu/dept/lc/language/courses/japanese/japanese.html.
5 units, Aut (Nakamura, K)

JAPANLNG 118. Third-Year Japanese Language, Culture, and Communication, Second Quarter
(Formerly JAPANLNG 128B.). Continuation of 117. Prerequisite 117. See https://www.stanford.edu/dept/lc/language/courses/ japanese/japanese.html.
5 units, Win (Nakamura, K)

JAPANLNG 119. Third-Year Japanese Language, Culture, and Communication, Third Quarter
(Formerly JAPANLNG 129B.) continuation of 118 http://www.stanford.edu/group/japanese/3rdjlcc. Prerequisite: 118.
5 units, Spr (Nakamura, K)

GRADUATE COURSES IN JAPANESE LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

JAPANLNG 32G. Accelerated Beginning Business Japanese II
For GSB students only. Limited enrollment.
4 units, not given this year

JAPANLNG 33G. Accelerated Beginning Business Japanese III
For GSB students only. Limited enrollment.
4 units, not given this year

JAPANLNG 200. Directed Reading
Prerequisite: 213 and consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

JAPANLNG 211. Advanced Japanese, First Quarter
Structure of Japanese, writings in different genres and styles, using such knowledge in writing, and expressing opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: 119 or equivalent.
3-5 units, Aut (Nakamura, K)

JAPANLNG 212. Advanced Japanese, Second Quarter
Continuation of 211 Prerequisite: 211 or equivalent.
3-5 units, Win (Nakamura, K)

JAPANLNG 213. Advanced Japanese, Third Quarter
Prerequisite: 212 or equivalent.
3-5 units, Spr (Nakamura, K)

JAPANLNG 305. Intensive First-Year Japanese for Graduate Students
Equivalent to 3 quarters of JAPANLNG 395 combined. Grads only. See http://www.stanford.edu/group/japanese/summer.
6-15 units, Sum (Staff)

JAPANLNG 320. Intensive Second-Year Japanese for Graduate Students
Equivalent to 3 quarters of JAPANLNG 395 combined. Grads only. See http://www.stanford.edu/group/japanese/summer.
6-15 units, Sum (Staff)

JAPANLNG 394. Graduate Studies in Japanese Conversation
Prerequisite: consent of instructor. (Staff)
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

JAPANLNG 395. Graduate Studies in Japanese
Prerequisite: consent of instructor. (Staff)
2-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS STUDIES COURSES IN JAPANESE LANGUAGE

Courses approved for the French or Italian major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

KYOTO JAPANESE LANGUAGE COURSES

OSPKYOTO 9K. First-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff, 1)

OSPKYOTO 17K. Second-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff)

OSPKYOTO 19K. Second-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff, 1)

OSPKYOTO 119K. Third-Year Japanese Language, Culture, and Communication
5 units, Spr (Staff, 1)

JAPANESE LITERATURE (JAPANLIT) COURSES

UNDERGRADUATE COURSES IN JAPANESE LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

JAPANLIT 146. Introduction to Premodern Japanese
(Same as JAPANLIT 246) Readings from Heian, Kamakura, Muromachi, and early Edo periods with focus on grammar and reading comprehension. Prerequisite: JAPANLNG 129B or 103, or equivalent.
3-5 units, given next year

JAPANLIT 157. Points in Japanese Grammar
(Same as JAPANLIT 257) Meaning and grammatical differences of similar expressions, and distinctions that may not be salient in English. Prerequisite: JAPANLNG 18B or 22, or equivalent. GER:DB-SocSci
4 units, Aut (Matsumoto, Y)

JAPANLIT 170. The Tale of Genji and Its Historical Reception
(Same as JAPANLIT 270) Approaches to the tale including 12th-century allegorical and modern feminist readings. Influence upon other works including poetry, Noh plays, short stories, modern novels, and comic book (manga) retellings. Prerequisite for graduate students: JAPANLNG 129B or 103, or equivalent. GER:DB-Hum
4 units, not given this year

JAPANLIT 189A. Honors Research
2-5 units, Aut (Staff), Spr (Staff)

JAPANLIT 189B. Honors Research
Open to senior honors students to write thesis.
5 units, Win (Staff)

JAPANLIT 199. Individual Reading in Japanese
Asian Languages majors only. May be repeated for credit. Prerequisites: JAPANLNG 129B or 103, and consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN JAPANESE LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

JAPANLIT 200. Directed Reading in Japanese
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLIT 201. Proseminar: Introduction to Graduate Study in Japanese
Bibliographical and research methods; major trends in literary and cultural theory and critical practice. May be repeated once for credit. Prerequisite: JAPANLNG 103 or 129B, or consent of instructor.
2-5 units, not given this year

JAPANLIT 202. Bibliographic and Research Methods in Japanese
The use of library and online resources for the study of Japanese literature, language, and culture. Prerequisite: JAPANLNG 103 or 129B, or consent of instructor.
1-3 units, not given this year

JAPANLIT 235. Academic Readings in Japanese I
Strategies for reading academic writings in Japanese. Readings of scholarly papers and advanced materials in Japanese in students' research areas in the humanities and social sciences. Prerequisites: JAPANLNG 103, 129B, or equivalent; and consent of instructor.
2-4 units, Win (Matsumoto, Y)

JAPANLIT 246. Introduction to Premodern Japanese
(Same as JAPANLIT 146) Readings from Heian, Kamakura, Muromachi, and early Edo periods with focus on grammar and reading comprehension. Prerequisite: JAPANLNG 129B or 103, or equivalent.
3-5 units, given next year

JAPANLIT 247. Readings in Premodern Japanese
Edo and Meiji periods with focus on grammar and reading comprehension. May be repeated for credit. Prerequisite: 246 or equivalent.
2-5 units, given next year

JAPANLIT 257. Points in Japanese Grammar
(Same as JAPANLIT 157) Meaning and grammatical differences of similar expressions, and distinctions that may not be salient in English. Prerequisite: JAPANLNG 18B or 22, or equivalent.
4 units, Aut (Matsumoto, Y)

JAPANLIT 260. Japanese Poetry and Poetics
Heian through Meiji periods with emphasis on relationships between the social and aesthetic. Works vary each year. Prerequisites: 246, 247, or equivalent.
2-4 units, Aut (Carter, S)

JAPANLIT 266. Introduction to Sino-Japanese
Readings in Sino-Japanese (kambun) texts of the Heian, Kamakura, and Muromachi periods, with focus on grammar and reading comprehension. Prerequisite: 246 or equivalent.
3-5 units, Spr (Carter, S)

JAPANLIT 270. The Tale of Genji and Its Historical Reception
(Same as JAPANLIT 170) Approaches to the tale including 12th-century allegorical and modern feminist readings. Influence upon other works including poetry, Noh plays, short stories, modern novels, and comic book (manga) retellings. Prerequisite for graduate students: JAPANLNG 129B or 103, or equivalent.
4 units, not given this year

JAPANLIT 279. Research in Japanese Linguistics
Introduction to graduate research in Japanese linguistics. Fields of research, methods and bibliographical background. Conduct a pilot research project in a chosen area. May be repeated for credit. Prerequisite: JAPANLNG 119 or consent of instructor.
2-4 units, Spr (Matsumoto, Y)

JAPANLIT 281. Japanese Pragmatics
Sociocultural and discourse factors reflected in the choice of linguistic forms, and their theoretical implications. Prerequisites: one year of Japanese and a course in linguistics, or two years of Japanese, or consent of instructor.
4 units, not given this year

JAPANLIT 287. Pictures of the Floating World: Images from Japanese Popular Culture
(Same as ARTHIST 287) Printed objects produced during the Edo period (1600-1868), including the Ukiyo-e (pictures of the floating world) and lesser-studied genres such as printed books (ehon) and popular broadsheets (kawaraban). How a society constructs itself through images. The borders of the acceptable and censorship; theatricality, spectacle, and slippage; the construction of play, set in conflict against the dominant neo-Confucian ideology of fixed social roles. Prerequisites: 2, 186, 187, 188.
5 units, Spr (Takeuchi, M)

JAPANLIT 296. Readings in Modern Japanese Literature-20th Century Comic Fiction
(Same as JAPANLIT 396) Works and topics vary each year. May be repeated for credit. Prerequisite: fourth-year Japanese or consent of instructor.
2-4 units, Win (Levy, I)

JAPANLIT 298. The Theory and Practice of Japanese Literary Translation
Theory and cultural status of translation in modern Japanese and English. Comparative analysis of practical translation strategies. Final project is a literary translation of publishable quality. Prerequisite: fourth-year Japanese or consent of instructor.
2-5 units, Spr (Levy, I)

JAPANLIT 299. Master's Thesis or Translation
A total of 5 units, taken in one or more quarters. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLIT 350. Japanese Historical Fiction
Authors include Mori Ogai, Akutagawa Ryunosuke, Tanizaki Jun'ichiro, Enchi Fumiko, Shiba Ryotaro, Fujisawa Shuhei, and Hiraiwa Yumie. Genre theory, and historical and cultural context. Works vary each year. May be repeated for credit.
3-5 units, not given this year

JAPANLIT 377. Seminar: Structure of Japanese
Linguistic constructions in Japanese. Topics vary annually. Prerequisites: courses in Japanese linguistics, consent of instructor.
2-4 units, Win (Matsumoto, Y)

JAPANLIT 381. Topics in Pragmatics and Discourse Analysis
Naturally occurring discourse (conversational, narrative, or written) and theoretical implications. Discourse of different age groups, expressions of identity and persona, and individual styles. May be repeated for credit.
2-4 units, not given this year

JAPANLIT 395. Early Modern Japanese Literature
May be repeated for credit. Prerequisite: 247.
2-4 units, not given this year

JAPANLIT 396. Readings in Modern Japanese Literature-20th Century Comic Fiction
(Same as JAPANLIT 296) Works and topics vary each year. May be repeated for credit. Prerequisite: fourth-year Japanese or consent of instructor.
2-4 units, Win (Levy, I)

JAPANLIT 396. Modern Japanese Literature
May be repeated for credit. Prerequisite: JAPANLNG 213.
3-5 units, Aut (Reichert, J)

JAPANLIT 399. Dissertation Research
For doctoral students in Japanese working on dissertations.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLIT 400. Advanced Language Training
For students at the Yokohama Center. For more information, see the Inter-University Center for Japanese Studies in Yokohama at http://stanford.edu/dept/IUC/.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

JAPANLIT 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLIT 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JEWISH STUDIES (JEWISHST) COURSES

UNDERGRADUATE COURSES IN JEWISH STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

JEWISHST 15N. Travels through the Afterlife
(Stanford Introductory Seminar) (Same as RELIGST 15N) Since the beginning of civilization, humans have refused to believe that physical death is the end of life and have sought in various ways to travel into the afterlife. One cannot know what lies beyond death, but there are other kinds of insights to be learned from these otherworldly journeys. The origins and history of the afterlife, going back in time to ancient Egypt, Mesopotamia, Israel, Greece, and medieval Europe to survey these cultures' view of death and what lies beyond it. What has happened to belief in the afterlife in modern American culture. Goal is to confront one of the most difficult aspects of life, the fear of death and oblivion, and to explore the power of thought and imagination to move beyond the confines of mortality. GER:DB-Hum
4 units, Aut (Weitzman, S)

JEWISHST 16SI. Religion and Spirituality: LGBTQ Perspectives
(Same as RELIGST 16SI) Many lesbian, gay, bisexual, transgender, and queer (LGBTQ) people today are finding that mainstream religious institutions do not meet their unique spiritual needs, and they are looking elsewhere to create meaningful spiritual lives. How LGBTQ people are creating and practicing religion and spirituality in the U.S. The diversity of American LGBTQ religious and spiritual traditions, both within and beyond the boundaries of traditional religions. Religious and spiritual practices created by and for LGBTQ people and communities, rather than the responses of religious institutions towards the reality of LGBTQ people in their midst. Students attend an LGBTQ worship service in a tradition of their choice. Goal is a better understanding of, and appreciation for, the diversity of religious and spiritual traditions within LGBTQ communities.
1 unit, Aut (Fonrobert, C)

JEWISHST 50A. Reading Hebrew, First Quarter
(Same as AMELANG 50A) Introduction to Hebrew literature through short stories and poetry by notable Israeli writers. In Hebrew. Prerequisite: one year of Hebrew or equivalent.
2-4 units, not given this year

JEWISHST 95. How to Read the Bible
(Same as RELIGST 95) What does the Bible mean? How the Bible has been read over the ages. Focus is on the book of Genesis, but the real subject is the history of biblical interpretation: how Genesis has been understood by theologians, writers, artists, scholars and others. Goal is to engage the Bible itself and to gain a better appreciation of the act of reading, why people read differently, and the consequences of that difference for religious history. GER:DB-Hum
4 units, Aut (Weitzman, S), Sum (Weitzman, S)

JEWISHST 101A. Beginning Hebrew, First Quarter
(Same as AMELANG 128A)
5 units, Aut (Shemtov, V; Greif, E)

JEWISHST 101B. Beginning Hebrew, Second Quarter
(Same as AMELANG 128B)
5 units, Win (Greif, E)

JEWISHST 101C. Beginning Hebrew, Third Quarter
(Same as AMELANG 128C)
5 units, Spr (Porat, G; Greif, E)

JEWISHST 102. Land and Literature
(Same as AMELANG 127) Israel has captured the imagination of writers throughout the generations. It has been portrayed as promised land, holy land, homeland, empty land, occupied land, and land of dreams. Ideological views and political events have shaped writers' conception of Israel. Readings include poems, prose, and theoretical texts about place and literature. No knowledge of Hebrew required. GER:DB-Hum, EC-GlobalCom
4 units, Spr (Staff)

JEWISHST 102A. Intermediate Hebrew, First Quarter
(Same as AMELANG 129A)
4 units, Aut (Porat, G)

JEWISHST 102B. Intermediate Hebrew, Second Quarter
(Same as AMELANG 129B)
4 units, Win (Porat, G)

JEWISHST 102C. Intermediate Hebrew, Third Quarter
(Same as AMELANG 129C)
4 units, Spr (Shemtov, V)

JEWISHST 103A. Advanced Hebrew, First Quarter
(Same as AMELANG 130A)
1-4 units, Aut (Porat, G)

JEWISHST 104A. Beginning Yiddish, First Quarter
(Same as AMELANG 140A) Reading, writing, and speaking.
4 units, Aut (Levitow, J)

JEWISHST 104B. Beginning Yiddish, Second Quarter
(Same as AMELANG 140B) Reading, writing, and speaking.
4 units, Win (Levitow, J)

JEWISHST 104C. Beginning Yiddish, Third Quarter
(Same as AMELANG 140C) Reading, writing, and speaking.
4 units, Spr (Levitow, J)

JEWISHST 107A. Biblical Hebrew, First Quarter
(Same as AMELANG 170A) The basic lexicon and grammar of Hebrew of the Tanakh or Old Testament.
2-4 units, Aut (Porat, G), Win (Staff)

JEWISHST 107B. Biblical Hebrew, Second Quarter
(Same as AMELANG 170B) Continuation of 170A
2-4 units, Spr (Staff)

JEWISHST 107C. Biblical Hebrew, Third Quarter
(Same as AMELANG 170C) Continuation of 170B.
2-4 units, Spr (Porat, G)

JEWISHST 120. Genesis and Gender: Male and Female in Judaism, Christianity, and Islam
(Same as RELIGST 130) What does it mean to be a man or a woman? And what role have classical and religious traditions played in shaping understandings of gender differences? Investigation of the construction of gender identities, roles, and differences in Greek and Roman sources and three monotheistic faiths. Interpretation and retellings of the story of Adam and Eve in the Bible and the Qu¿ran, commentaries, lives and practices of religious communities, religious iconography down to the present. GER:DB-Hum, EC-Gender
4 units, Aut (Fonrobert, C; Pitkin, B)

JEWISHST 140. Introduction to Hebrew Literature
(Same as COMPLIT 140) The influence of biblical poetry, piyut, and medieval Hebrew poetry on the development of Modern Hebrew poetry. With focus on voice, space, lyrical Subjectivity, Intertextuality, and Poetic Forms. Guest Speakers include Tamar Zwei, Susan Einbinder, Berry Saharoff, and Raymond Scheindlin.
3-5 units, Win (Staff)

JEWISHST 150A. Creative Resistance and the Holocaust
(Same as ENGLISH 140A) Creative resistance, a little-known phenomenon and a new term, emerges during times of devastation. Under the Nazis, it took form in graffiti, diaries, chronicles, poems, paintings, photos, and music. How did a human spirit of creativity arise from such duress, and to what end? Why would acts of imagination, incapable of stopping destruction, count as resistance? Guests include a string quartet playing music by a prisoner; and a guest speaker who was a survivor of seven camps. Works include Goya's counter-Napoleon etchings, poems from WW I and Iraq, and contemporary examples. GER:DB-Hum
5 units, Win (Felstiner, J; Felstiner, M)

JEWISHST 153C. Feminism and American Literature
(Same as AMSTUD 183C, ENGLISH 183C) How writers have endeavored to enlarge the canvas on which women can paint their lives. Fiction, journalism, and poetry engaging how women come to understand who they might become; women's role in the home and outside the home; motherhood, marriage, work. Writing by Euro American, African American, Asian American, and Latino writers. Focus on feminists' use of humor to undercut demeaning assumptions, stereotypes, and texts. Readings include feminist parodies of advice manuals, cookbooks, literary criticism and fairy tales.
GER:DB-Hum, EC-Gender
5 units, Spr (Fishkin, S)

JEWISHST 182C. Heretics to Headscarves
(Same as HISTORY 202C, POLISCI 224H) Religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.
5 units, Aut (Rakove, J)

JEWISHST 183. The Holocaust
(Same as HISTORY 137, HISTORY 337, JEWISHST 383) The emergence of modern racism and radical anti-Semitism. The Nazi rise to power and the Jews. Anti-Semitic legislation in the 30s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry. GER:DB-Hum
4-5 units, Spr (Zipperstein, S)

JEWISHST 185B. Jews in the Modern World
(Same as HISTORY 185B) Possible themes: the restructuring of Jewish existence during the Enlightenment and legal emancipation

at the end of the 18th century in W. Europe, the transformation of Jewish life in E. Europe under the authoritarian Russian regime, colonialism in the Sephardic world, new ideologies (Reform Judaism and Jewish nationalisms), the persistence and renewal of antisemitism, the destruction of European Jewry under the Nazis, new Jewish centers in the U.S., and the State of Israel. GER:DB-Hum, EC-GlobalCom

5 units, Win (Zipperstein, S)

JEWISHST 186D. Jews, Citizenship, and Europe's Others

(Same as HISTORY 186D) The paths of assimilation of Jews in Europe, and their integration as citizens is examined alongside other cases of Europe's Others, those who introduced diversity and challenged modes of assimilation. Looks at the development of Jews as citizens and compares the debates on the Jewish Question to other debates in Europe on the integration of other Others, such as former colonial subjects, immigrants, Gypsies, ans Muslims in the nineteenth and twentieth centuries.

5 units, Aut (Roberts, S)

JEWISHST 187D. Zionism and Its Critics

(Same as HISTORY 187D) Zionism from its genesis in the 1880s up until the establishment of the state of Israel in May, 1948, exploring the historical, ideological and political dimensions of Zionism. Topics include: the emergence of Zionist ideology in connection to and as a response to challenges of modernity; emancipation; Haskalah (Jewish enlightenment); other national and ideological movements of the period; the ideological crystallization of the movement; and the immigration waves to Palestine.

4-5 units, Aut (Dubnov, A)

JEWISHST 199B. Directed Reading in Yiddish, Second Quarter

For intermediate or advanced students. May be repeated for credit.

1-5 units, Win (Staff)

JEWISHST 221C. Aramaic Jewish Texts

(Same as JEWISHST 321C, RELIGST 221C, RELIGST 321C) Reading of Aramaic Jewish texts with focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud, and Geonic materials and attempt to follow the development of the language though time. Prerequisite: substantial knowledge of Hebrew. GER:DB-Hum

2-5 units, Aut (Balberg, M; Fonrobert, C)

JEWISHST 225. Research Methods and Resources in Jewish Studies

(Same as JEWISHST 325, RELIGST 265, RELIGST 365) Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: reference sources in Jewish Studies, history and bibliography of the Hebrew book, Hebrew Bible, Talmud, religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions include special workshops on Hebrew/Yiddish/Ladino romanization, transliteration, transcription.

1-3 units, Win (Baker, Z)

JEWISHST 226B. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict

(Same as CLASSGEN 126, CLASSGEN 226, JEWISHST 326B, RELIGST 226B, RELIGST 326B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world. GER:DB-Hum

5 units, Aut (Fonrobert, C)

JEWISHST 226C. Mystics and Merrymakers: Innovations in Modern Judaism

(Same as JEWISHST 326C, RELIGST 226C, RELIGST 326C) How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival. GER:DB-Hum

3 units, Win (Rosenberg, J; Fonrobert, C)

JEWISHST 228. King Solomon and the Search for Wisdom

(Same as JEWISHST 328, RELIGST 282, RELIGST 382) What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.

4 units, Win (Weitzman, S)

JEWISHST 250G. Century's End: Race, Gender, and Ethnicity at the Turn of the Century

(Same as AMSTUD 260G, ENGLISH 260G) How race, gender and ethnicity were constructed and construed in American culture from 1890 to 1914. Readings include stories, poetry, drama, and journalism by Euro-American, African-American, Asian-American, Jewish-American and Native American writers that illuminate how race, gender and ethnicity inflected such issues as the performance of identity, the purpose of education, the uses of dialect, and the dynamics of violence during this period. GER:EC-AmerCul

5 units, Win (Fishkin, S)

JEWISHST 285F. Mediators of Tradition & Modernity: Comparative Jewish Women's History from 17th Century to Present

(Same as HISTORY 285F, HISTORY 385F) Focuses on the single role of women as mediators between tradition and modernity in the Jewish home. While simultaneously the preservationists of certain traditions such as kashrut, Shabbat observance, or prayer, Jewish women also served as the medium of Jewish families' paths to assimilation. Looks at women in the West and East comparing their experiences in the face of modernity, caught between tradition and modernity, while simultaneously encouraging the assimilation and cultural improvement of their children.

5 units, Spr (Roberts, S)

JEWISHST 286E. Jews in France from the Dreyfus Affair to World War II

(Same as HISTORY 286E, HISTORY 386E, JEWISHST 386E) Examines the experience of Jews in France and their confrontations with antisemitism, discrimination, violence, assimilation, and integration from the Dreyfus Affair through Vichy and World War II. Popular and institutionalized antisemitism in France placed significant limits on the Jews' path to assimilation and shaped the ways in which they related to France and to Judaism.

4-5 units, Win (Roberts, S)

JEWISHST 287D. Tel Aviv: Site, Symbol, City

(Same as HISTORY 287D, HISTORY 387D, JEWISHST 387D) Tel Aviv, the first Israeli city, from a cultural history perspective combining high and low cultural texts. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's early years; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; as the site of the Israeli Zionist and post-Zionist intellectuals. Sources include art, cinema, and literature. GER:DB-Hum

4-5 units, Win (Dubnov, A)

JEWISHST 287E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism

(Same as HISTORY 287E, HISTORY 387E, JEWISHST 387E) Intellectual responses of Jewish thinkers to the age of extremes. Readings include a wide assemblage of twentieth-century thinkers, such as Theodor Adorno, Leo Strauss, Hannah Arendt, Isaiah Berlin, and Herbert Marcuse. Analyses of enlightenment, nationalism,

socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in post-war years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945.

4-5 units, Win (Dubnov, A)

JEWISHST 287G. Jews in Colonial North Africa

(Same as HISTORY 287G, HISTORY 387G, JEWISHST 387G) Under European imperialism, the relations between Jews ans Muslims in North Africa changed dramatically. Examines the complicated process of remaking Jewish identity under colonialism and the way in which citizenship, education, and assimilation separated Jews ans Muslims. Also looks at the spheres in which Jews and Muslims continued to coexist. Studies the impact of the rise of nationalism, anti-colonialism, Zionism, pan-Arabism, and antisemitism in the context of colonial North Africa.

4-5 units, Spr (Roberts, S)

JEWISHST 287K. Gentlemen and Jews: History of the Jews of England

(Same as HISTORY 287K, HISTORY 387K, JEWISHST 387K) Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?

4-5 units, Spr (Dubnov, A)

JEWISHST 287S. Research Seminar in Middle East History

(Same as HISTORY 287S, HISTORY 481, JEWISHST 481) Student-selected research topics. GER:DB-SocSci

4-5 units, Spr (Beinin, J)

JEWISHST 288. Palestine and the Arab-Israeli Conflict

(Same as HISTORY 288, HISTORY 388, IPS 388, JEWISHST 388) 1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin) GER:DB-Hum

4-5 units, Win (Beinin, J)

GRADUATE COURSES IN JEWISH STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

JEWISHST 299A. Directed Reading in Yiddish, First Quarter

Directed Reading in Yiddish, First Quarter

1-5 units, Aut (Staff)

JEWISHST 321C. Aramaic Jewish texts

(Same as JEWISHST 221C, RELIGST 221C, RELIGST 321C) Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language though time. The course is intended for students with substantial knowledge of Hebrew.

2-5 units, Aut (Balberg, M; Fonrobert, C)

JEWISHST 325. Research Methods and Resources in Jewish Studies

(Same as JEWISHST 225, RELIGST 265, RELIGST 365) Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription).

1-3 units, Win (Baker, Z)

JEWISHST 326B. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict

(Same as CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, RELIGST 226B, RELIGST 326B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

5 units, Aut (Fonrobert, C)

JEWISHST 326C. Mystics and Merrymakers: Innovations in Modern Judaism

(Same as JEWISHST 226C, RELIGST 226C, RELIGST 326C) How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.

3 units, Win (Rosenberg, J; Fonrobert, C)

JEWISHST 328. King Solomon and the Search for Wisdom

(Same as JEWISHST 228, RELIGST 282, RELIGST 382) What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.

4 units, Win (Weitzman, S)

JEWISHST 383. The Holocaust

(Same as HISTORY 137, HISTORY 337, JEWISHST 183) The emergence of modern racism and radical anti-Semitism. The Nazi rise to power and the Jews. Anti-Semitic legislation in the 30s. WW II and the beginning of mass killings in the East. Deportations and ghettos. The mass extermination of European Jewry.

4-5 units, Spr (Zipperstein, S)

JEWISHST 386E. Jews in France from the Dreyfus Affair to World War II

(Same as HISTORY 286E, HISTORY 386E, JEWISHST 286E) Examines the experience of Jews in France and their confrontations with antisemitism, discrimination, violence, assimilation, and integration from the Dreyfus Affair through Vichy and World War II. Popular and institutionalized antisemitism in France placed significant limits on the Jews' path to assimilation and shaped the ways in which they related to France and to Judaism.

4-5 units, Win (Roberts, S)

JEWISHST 387D. Tel Aviv: Site, Symbol, City

(Same as HISTORY 287D, HISTORY 387D, JEWISHST 287D) Tel Aviv, the first Israeli city, from a cultural history perspective combining high and low cultural texts. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's early years; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; as the site of the Israeli Zionist and post-Zionist intellectuals. Sources include art, cinema, and literature.

4-5 units, Win (Dubnov, A)

JEWISHST 387E. Understanding the Age of Extremes: Intellectual Responses to the Holocaust and Totalitarianism

(Same as HISTORY 287E, HISTORY 387E, JEWISHST 287E) Intellectual responses of Jewish thinkers to the age of extremes. Readings include a wide assemblage of twentieth-century thinkers, such as Theodor Adorno, Leo Strauss, Hannah Arendt, Isaiah Berlin, and Herbert Marcuse. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in post-

war years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945.
4-5 units, Win (Dubnov, A)

JEWISHST 387G. Jews in Colonial North Africa
(Same as HISTORY 287G, HISTORY 387G, JEWISHST 287G) Under European imperialism, the relations between Jews ans Muslims in North Africa changed dramatically. Examines the complicated process of remaking Jewish identity under colonialism and the way in which citizenship, education, and assimilation separated Jews ans Muslims. Also looks at the spheres in which Jews and Muslims continued to coexist. Studies the impact of the rise of nationalism, anti-colonialism, Zionism, pan-Arabism, and antisemitism in the context of colonial North Africa.
4-5 units, Spr (Roberts, S)

JEWISHST 387K. Gentlemen and Jews: History of the Jews of England
(Same as HISTORY 287K, HISTORY 387K, JEWISHST 287K) Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?
4-5 units, Spr (Dubnov, A)

JEWISHST 388. Palestine and the Arab-Israeli Conflict
(Same as HISTORY 288, HISTORY 388, IPS 388, JEWISHST 288) 1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)
4-5 units, Win (Beinin, J)

JEWISHST 481. Research Seminar in Middle East History
(Same as HISTORY 287S, HISTORY 481, JEWISHST 287S) Student-selected research topics.
4-5 units, Spr (Beinin, J)

JEWISHST 486A. Graduate Research Seminar in Jewish History
(Same as HISTORY 486A)
4-5 units, Spr (Staff)

KOREAN GENERAL (KORGEN) COURSES

UNDERGRADUATE COURSES IN KOREAN GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

KORGEN 170. Art and Archaeology of Korea
(Same as ARCHLGY 201, KORGEN 270) Introduction to art and archaeology of Korean peninsula and adjacent continental northeast Asia from Bronze Age to early twentieth century. Topics include archaeology of the proto-Three Kingdoms period, state formation and Sinicization, introduction of Buddhism and its development to the Unified Silla period, the sophisticated tastes of the Koryo aristocrats, and the literati culture of Choson.
3-5 units, Win (Staff)

KORGEN 198. Senior Colloquium in Japanese Studies
(Same as JAPANGEN 198) Research, write, and present capstone essay or honors thesis.
1 unit, Win (Takeuchi, M)

GRADUATE COURSES IN KOREAN GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

KORGEN 270. Art and Archaeology of Korea
(Same as ARCHLGY 201, KORGEN 170) Introduction to art and archaeology of Korean peninsula and adjacent continental northeast Asia from Bronze Age to early twentieth century. Topics include archaeology of the proto-Three Kingdoms period, state formation and Sinicization, introduction of Buddhism and its development to the Unified Silla period, the sophisticated tastes of the Koryo aristocrats, and the literati culture of Choson.
3-5 units, Win (Staff)

KOREAN LANGUAGE (KORLANG) COURSES

UNDERGRADUATE COURSES IN KOREAN LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

KORLANG 1. First-Year Korean, First Quarter
Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language.
4-5 units, Aut (Kim, H)

KORLANG 1H. Beginning Korean for Heritage Learners, First Quarter
For Korean background students. Focus is on reading, writing, and spelling rather than speaking and listening. Meetings and individual study. Sources include textbook, workbook, and digitized listening materials. Prerequisite: consent of instructor.
3 units, Aut (Kim, H)

KORLANG 2. First-Year Korean, Second Quarter
Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language.
4-5 units, Win (Kim, H)

KORLANG 3. First-Year Korean, Third Quarter
Continuation of 2. Prerequisite 2. Fulfills the University language requirement.
4-5 units, Spr (Kim, H)

KORLANG 3H. Beginning Korean for Heritage Learners, Third Quarter
For Korean background students. Focus is on reading, writing, and spelling rather than speaking and listening. Meetings and individual study. Sources include textbook, workbook, and digitized listening materials. Prerequisite: consent of instructor.
3 units, Spr (Staff)

KORLANG 21. Second-Year Korean, First Quarter
More complex sentences and grammatical patterns. Conversation in daily situations such as making a polite request or suggestion, reading simple texts, and Korean culture. Prerequisite: 3 or consent of instructor.
3-5 units, Aut (Staff)

KORLANG 22. Second-Year Korean, Second Quarter
Continuation of 21. Prerequisite 21.
3-5 units, Win (Staff)

KORLANG 23. Second-Year Korean, Third Quarter
Continuation of 22. Prerequisite: 22 or consent of instructor.
3-5 units, Spr (Staff)

KORLANG 101. Third-Year Korean, First Quarter
Materials about Korean culture and society. Proficiency in interpersonal, interpretive, and presentational communication. Vocabulary, reading, and aural/oral skills. Prerequisite: 23 or consent of instructor.
2-4 units, Aut (Kim, H)

KORLANG 102. Third-Year Korean, Second Quarter
Continuation of 101. Prerequisite: 101 or consent of instructor.
2-4 units, Win (Staff)

KORLANG 103. Third-Year Korean, Third Quarter
Continuation of 102. Prerequisite: 102 or consent of instructor.
2-4 units, Spr (Staff)

KORLANG 110. Korean Pronunciation and Intonation
Goal is intelligibility and fluency. Lab assignments. Prerequisite: 3 or consent of instructor.
1-2 units, not given this year

KORLANG 111. Medical Korean, First Quarter
Medical vocabulary; cultural attitude. Video clips, technical journal and prescription reading, and class simulations. Prerequisite: 23 or consent of instructor.
2-3 units, not given this year

KORLANG 112. Medical Korean, Second Quarter
Medical vocabulary; cultural attitude. Video clips, technical journal and prescription reading, and class simulations. Prerequisite: 23 or consent of instructor.
2 units, not given this year

KORLANG 120A. Korean Culture
Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.
1-3 units, not given this year

KORLANG 120B. Korean Culture
Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.
1-2 units, not given this year

KORLANG 120C. Korean Culture
Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.
1-2 units, not given this year

KORLANG 120K. Korean Language and Culture through Drama and Film
Korean culture and society through contemporary Korean drama and films. Advanced vocabulary , grammar, and idiomatic expressions. Prerequisite: 103 or consent of instructor.
2-3 units, Aut (Kim, H)

KORLANG 130. Reading Korean
Contemporary literature and academic texts. Prerequisite: 103 or consent of instructor.
2-3 units, Win (Kim, H)

KORLANG 141. Business Korean
Business-related vocabulary and cultural etiquette. Business letters, mock interviews, and resumes. May be repeated for credit. Prerequisite: 103 or consent of instructor.
2-3 units, Spr (Kim, H)

GRADUATE COURSES IN KOREAN LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

KORLANG 200. Directed Reading in Korean
Prerequisite: consent of instructor. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff, 1), Sum (Staff)

KORLANG 395. Graduate Studies in Korean
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

LATIN AMERICAN STUDIES (LATINAM) COURSES

UNDERGRADUATE COURSES IN LATIN AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

LATINAM 197. Directed Individual Research
For students engaged in interdisciplinary work that cannot be arranged by department. May be repeated for credit. Prerequisite: consent of instructor.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

LATINAM 198. Honors Thesis
Restricted to those writing an honors thesis in Latin American Studies.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

LATINAM 200. Seminar on Contemporary Issues in Latin American Studies
Guest scholars present analyses of major Latin American themes.
1 unit, Aut (Dirzo, R), Win (Dirzo, R), Spr (Dirzo, R)

LATINAM 202. Human Ecology of the Amazon
(Same as ANTHRO 161B, ANTHRO 261B, LATINAM 302) The ecosystems of the Amazon and their human inhabitants. The biotic and abiotic factors shaping human adaptation to the region. Ethnographic literature used to explore subsistence patterns and the resource use of native Amazonians. Current changes in these economies and lifeways due to acculturation and market forces, and the implications for conservation.
5 units, not given this year

GRADUATE COURSES IN LATIN AMERICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

LATINAM 302. Human Ecology of the Amazon
(Same as ANTHRO 161B, ANTHRO 261B, LATINAM 202) The ecosystems of the Amazon and their human inhabitants. The biotic and abiotic factors shaping human adaptation to the region. Ethnographic literature used to explore subsistence patterns and the resource use of native Amazonians. Current changes in these economies and lifeways due to acculturation and market forces, and the implications for conservation.
5 units, not given this year

LATINAM 398. Master's Thesis
Restricted to students writing a master's thesis in Latin American Studies. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

LATINAM 801. TGR Project
0 units

LAW, NONPROFESSIONAL (LAWGEN) COURSES

UNDERGRADUATE COURSES IN LAW, NONPROFESSIONAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

LAWGEN 106. Introduction to American Law
(Same as AMSTUD 179, POLISCI 122, PUBLPOL 302A) For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general. GER:DB-SocSci
3-5 units, Aut (Friedman, L)

GRADUATE COURSES IN LAW, NONPROFESSIONAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

LAWGEN 206Q. Thinking Like a Lawyer
(Same as GSBGEN 382). Open to all non-law graduate students at the University, this course provides students an analytical framework for understanding the core concepts of the law and familiarizes students with how lawyers analyze and structure their work. The course is taught by Dean Larry Kramer, Vice Dean Mark Kelman and Law School faculty in their areas of expertise, with one to two classes devoted to each topic. It introduces students to some of the foundational principles of law and reviews topics such as contracts, litigation, intellectual property, securities and employment law.
3-4 units, Win (Kelman, M; Kramer, L)

LAWGEN 209Q. Community Police Academy
The Department of Public Safety conducts this 9-week Winter Quarter course. It is a blend of classroom instruction and hands-on activities that will give the participants the opportunity to stand in an officer's shoes. The class is open to all Stanford students, staff, and residents. The goal with the Community Police Academy is to build trust and develop a partnership between the police department and the Stanford community. This class is designed to expand the participant's knowledge of the duties, responsibilities, decisions, and constraints that face law enforcement officers. While this course is open to all students throughout the University, the units will not accrue to Law Degree Candidates for credit toward a degree in Law (JD, JSM, JSD, or LLM).
1 unit, Win (Staff)

LINGUISTICS (LINGUIST) COURSES

UNDERGRADUATE COURSES IN LINGUISTICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

LINGUIST 1. Introduction to Linguistics
The cognitive organization of linguistic structure and the social nature of language use. Why language learning is difficult. Why computers have trouble understanding human languages. How languages differ from one another. How and why speakers of the same language speak differently. How language is used strategically. GER:DB-SocSci
4 units, Aut (Potts, K), Spr (Pereltsvaig, A)

LINGUIST 5N. What's Your Accent? Investigations in Acoustic Phonetics
(Stanford Introductory Seminar) Preference to freshmen. Phonetic variation across accents of English; experimental design; practical experience examining accents of seminar participants; acoustic analysis of speech using Praat. GER:DB-SocSci
3 units, Win (Sumner, M)

LINGUIST 65. African American Vernacular English
(Same as LINGUIST 265) The English vernacular spoken by African Americans in big city settings, and its relation to Creole English dialects spoken on the S. Carolina Sea Islands (Gullah), in the Caribbean, and in W. Africa. The history of expressive uses of African American English (in soundin' and rappin'), and its educational implications. Service Learning Course (certified by Haas Center). GER:DB-SocSci, EC-AmerCul
3-5 units, Win (Rickford, J)

LINGUIST 66. Vernacular English and Reading
(Same as LINGUIST 266) Literature on the relation between use of vernacular English varieties, such as African American vernacular English, Chicano English, and the development of literacy especially in standard English. Focus is on improving the reading skills of African American and Latino students in local schools through the Reading Road program developed at the University of Pennsylvania. Students must commit to tutoring one or more elementary students weekly, using the program. Recommended: LINGUIST 65/265.
4-5 units, not given this year

LINGUIST 83N. Translation
(Stanford Introductory Seminar) Preference to sophomores. What is a translation? The increased need for translations in the modern world due to factors such as tourism and terrorism, localization and globalization, diplomacy and treaties, law and religion, and literature and science. How to meet this need; different kinds of translation for different purposes; what makes one translation better than another; why some texts are more difficult to translate than others. Can some of this work be done by machines? Are there things that cannot be said in some languages? GER:DB-SocSci
3 units, Aut (Kay, M)

LINGUIST 90. Teaching Spoken English
Practical approach to teaching English to non-native speakers. Teaching principles and the features of English which present difficulties. Preparation of lessons, practice teaching in class, and tutoring of non-native speaker.
3-4 units, Spr (Romeo, K)

LINGUIST 105. Phonetics
(Same as LINGUIST 205A) The study of speech sounds: how to produce them, how to perceive them, and their acoustic properties. The influence of production and perception systems on sound change and phonological patterns. Acoustic analysis and experimental techniques. Lab exercises. Prerequisite: 110 or equivalent, or consent of instructor. GER:DB-SocSci
4 units, not given this year

LINGUIST 106. Introduction to Speech Perception
Basics of acoustic phonetics and audition. What do listeners perceive when they perceive speech. Examine current research including: the categorical perception of speech, cross-language speech perception, infant speech perception. Theoretical questions of interest to speech perception researchers and experimental methods used in the field.
4 units, Spr (Sumner, M)

LINGUIST 110. Introduction to Phonetics and Phonology
Differences in the sounds of the world's languages and how these sounds are made by the human vocal tract. Theories that account for cross-linguistic similarities in the face of differences. GER:DB-SocSci
4 units, Win (Sumner, M)

LINGUIST 112. Seminar in Phonology
(Same as LINGUIST 212A) Topics vary each year. Previous topics include variation in the phonology of words according to their contexts within larger expressions and the place of these phenomena in a theory of grammar. May be repeated for credit.
2-4 units, not given this year

LINGUIST 116. Morphology
A survey of words including their structures, pronunciations, meanings, and syntactic possibilities in a wide sampling of languages to provide a laboratory for investigating the nature of morphology.
4 units, not given this year

LINGUIST 120. Introduction to Syntax
Grammatical constructions, primarily English, and their consequences for a general theory of language. Practical experience in forming and testing linguistic hypotheses, reading, and constructing rules. GER:DB-SocSci
4 units, Aut (Staff)

LINGUIST 124. Introduction to Lexical Function Grammar
(Same as LINGUIST 224) Presentation of a formal model of grammar designed to allow precise, computationally tractable descriptions of cross-linguistic variation in syntactic structure. Concentration on the formal properties of the model, its flexibility in teasing out language specific and possibly universal characteristics of natural languages and the place of syntax as a component within a larger linguistic architecture. Prerequisite: 120 or consent of instructor
2-4 units, Spr (Staff)

LINGUIST 130A. Introduction to Linguistic Meaning
Linguistic meaning and its role in communication. Topics include ambiguity, vagueness, presupposition, intonational meaning, and Grice's theory of conversational implicature. Applications to issues in politics, the law, philosophy, advertising, and natural language processing. Those who have not taken logic, such as PHIL 150 or 151, should also enroll in 130C. Pre- or corequisite: 120, or consent of instructor. GER:DB-SocSci
4 units, Win (Potts, C)

LINGUIST 130B. Introduction to Lexical Semantics
Issues in the study of word meaning. Focus is on the core semantic properties and internal organization of the four major word categories in natural languages: nouns, verbs, adjectives, and prepositions. GER:DB-SocSci
4 units, not given this year

LINGUIST 130C. Logic Laboratory
Typically taken in conjunction with 130A/230A.
1 unit, Win (Staff)

LINGUIST 133. Introduction to Formal Pragmatics
(Same as LINGUIST 233) (Graduate students register for 233.) Mechanism underlying language use and felicity intuitions. Formal

models of discourse that incorporate many aspects of pragmatics such as presuppositions, speech acts, implicatures, relevance, optimality, and utility. Discussion of common ground, illocutionary acts, Gricean maxims and Neo-Gricean analysis, game and decision theory.

3-4 units, not given this year

LINGUIST 140. Language Acquisition I

(Same as LINGUIST 240) Processes of language acquisition in early childhood; stages in development; theoretical issues and research questions. Practical experience in data collection. GER:DB-SocSci

4 units, Aut (Clark, E)

LINGUIST 141. Language and Gesture

History of work on gesture, gestural systems associated with particular languages/cultures, and with specific activities - music, sports, traffic management, stock exchanges, etc. Examine gesture developmentally and how gesture is represented in painting and animation.

3 units, Win (Clark, E)

LINGUIST 142. Heritage Languages

The linguistic and cultural properties of Heritage languages, which are partially acquired and supplanted by a dominant language in childhood. Topics: Syntactic, phonological and morphological properties of heritage languages, implications from experimental HL research for language universals, cultural vs. linguistic knowledge, the role of schooling in HL competence, influence of the dominant language on the HL, and pedagogical issues for HL learners in the classroom. GER:DB-SocSci

3-4 units, Spr (Staff)

LINGUIST 143. Sign Languages

The linguistic structure of sign languages. How sign languages from around the world differ, and what properties they share. Accents and dialects in sign languages. How sign languages are similar to and different from spoken languages. How and why sign languages have emerged.

4 units, Spr (Potts, K)

LINGUIST 144. Introduction to Cognitive and Information Sciences

(Same as PHIL 190, PSYCH 132, SYMSYS 100) The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major. GER:DB-SocSci

4 units, Spr (McClelland, J; van Benthem, J)

LINGUIST 150. Language in Society

How language and society affect each other. Class, age, ethnic, and gender differences in speech. Prestige and stigma associated with different ways of speaking and the politics of language. The strategic use of language. Stylistic practice; how speakers use language to construct styles and adapt their language to different audiences and social contexts. GER:DB-SocSci, WIM

4 units, Win (Eckert, P)

LINGUIST 152. Sociolinguistics and Pidgin Creole Studies

(Same as LINGUIST 252) Introduction to pidgins and creoles, organized around the main stages in the pidgin-creole life cycle: pidginization, creolization, and decreolization. Focus is on transformations in the English language as it was transported from Britain to Africa, Asia, the Caribbean, and the Pacific. Resultant pidginized and creolized varieties such as Nigerian Pidgin English, Chinese Pidgin English, New Guinea Tok Pisin, Suriname Sranan, and the creole continua of Guyana, Jamaica, and Hawaii. Also French, Dutch, Portugese, Chinook, Motu, and Sango.

2-4 units, not given this year

LINGUIST 153. Language, Power, and Politics

The integral role language plays in politics; how power operates in linguistic practices and political interaction. Critical examination of how language is used to articulate, maintain and subvert relations of power in society, emphasizing language in the media, the political rhetoric associated with war, and the construction of truth in politics. The role of ethnographic analysis in aiding sociolinguistic understandings of how social actors use, interpret, and reinterpet political language.

3-4 units, not given this year

LINGUIST 154. Sociolinguistics of Language Contact

(Same as LINGUIST 254) The role of contact between speakers of different languages in processes of language borrowing, convergence, and shift. Attending both to linguistic aspects and social contexts, examine: second-language acquitision, bilingualism, code-switching, lexical and grammatical borrowing, first language attrition, language death, and the creation of new contact varieties such as jargons, mixed languages, pidgins, and creoles. Prerequisite: background in linguistics, at least one course in linguistics.

2-4 units, not given this year

LINGUIST 155. Hip Hop, Youth Identities, and the Politics of Language

(Same as AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, CSRE 121X, EDUC 121X) Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

3-4 units, Spr (Alim, H)

LINGUIST 156. Language and Gender

The role of language in the construction of gender, the maintenance of the gender order, and social change. Field projects explore hypotheses about the interaction of language and gender. No knowledge of linguistics required. GER:DB-SocSci, EC-Gender

4 units, Spr (Eckert, P)

LINGUIST 160. Introduction to Language Change

Principles of historical linguistics:, the nature of language change. Kinds and causes of change, variation and diffusion of changes through populations, differentiation of dialects and languages, determination and classification of historical relationships among languages, rates of change, the reconstruction of ancestral languages and intermediate changes, parallels with cultural and genetic evolutionary theory, and implications of variation and change for the description and explanation of language in general. Prerequisite: introductory course in linguistics or evolutionary theory. GER:DB-SocSci

4-5 units, Spr (Staff)

LINGUIST 161. The Classification of Languages: Genealogical and Typological Perspectives

Techniques for grouping languages. Genealogical classification organizes languages according to their family histories, revealing the linguistic DNA which identifies related languages in terms of shared historical origins. Typology demonstrates how the languages of the world are similar to and different from each other according to certain diagnostic structural properties. Prerequisite: one course in linguistics.

4 units, Spr (Staff)

LINGUIST 167. Languages of the World

The diversity of human languages, their sound systems, vocabularies, and grammars. Tracing historical relationships between languages and language families. Parallels with genetic evolutionary theory. Language policy, endangered languages and heritage languages. Classification of sign languages. GER:DB-SocSci

3-4 units, Aut (Pereltsvaig, A)

LINGUIST 170. The Arabic Language and Culture

(Same as AMELANG 36, LINGUIST 270) Arabic language from historical, social, strategic, and linguistic perspectives. History of the Arabic language and the stability of classical Arabic over the last 15 centuries. Why the functionality of classical Arabic has not changed as Latin, Old English, and Middle English have. Social aspects of the Arabic language, Ferguson's notion of diglossia. The main varieties of Arabic, differences among them, and when and where they are spoken. Role of Arabic and culture in current world politics, culture, and economy. Linguistic properties of Arabic such as root-based morphology, lexical ambiguity, and syntactic structure relating it to current linguistic theories.

3 units, not given this year

LINGUIST 173. The Structure of Russian

(Same as LINGUIST 273) A synchronic overview of contemporary standard Russian, including its sound system, word formation and grammatical structure. Emphasis is on problems presented by

Russian for current linguistic theory. The acquisition of Russian as a first language.

2-4 units, not given this year

LINGUIST 174. Linguistic Field Methods
(Same as ANTHRO 30, LINGUIST 274A) Practical training in the collection and analysis of linguistic data from native speakers of a language largely unknown to the investigator. Documentation of endangered languages. Research goals, field trip preparation, ethics (including human subjects, cooperation with local investigators, and governmental permits), working in the community, technical equipment, and analytical strategies. Emphasis is on the use of recording devices and computers in collection and analysis. Prerequisite: introductory course in linguistics.

3-5 units, not given this year

LINGUIST 180. From Languages to Information
(Same as CS 124, LINGUIST 280) Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition. Prerequisite: CS103, CS107, CS109.

3-4 units, Win (Jurafsky, D)

LINGUIST 181. Grammar Engineering
(Same as LINGUIST 281) Hands-on techniques for implementation of linguistic grammars, drawing on grammatical theory and engineering skills. The implementation of constraints in morphology, syntax, and semantics, working within a unification-based lexicalist framework. Focus is on developing small grammars for English and at least one other language. Prerequisite: basic syntactic theory or 120. No programming skills required.

1-4 units, not given this year

LINGUIST 182. Computational Theories of Syntax
(Same as LINGUIST 282) Salient features of modern syntactic theories, including HPSG, LFG, and TAG, motivated by computational concerns. Impact of work within these frameworks on the design of algorithms in computational linguistics, and its influence in both linguistics and computer science. Topics include: notions of unification; unification algorithms and their relation to linguistic theory; agenda-driven chart processing for analysis and synthesis; the interface with morphology, the lexicon, and semantics; and applications, notably machine translation.

3-4 units, not given this year

LINGUIST 185. Writing Systems in a Digital World
(Same as LINGUIST 284A) Writing systems and their behaviors. Classification of scripts as alphabetic, syllabic, and ideographic; what features typically belong to each group. What can be considered an ideal script. Topics include: why Japanese writing is considered a complex system; the influence of Indian writing on other syllabic scripts; how writing systems extend their reach to new languages; linguistic insights by studying this process; the Unicode standard; and font technology. Recommended: basic phonetics.

2-3 units, not given this year

LINGUIST 188. Natural Language Understanding
(Same as CS 224U, LINGUIST 288) Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal operators), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S: and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

3-4 units, not given this year

LINGUIST 191. Linguistics and the Teaching of English as a Second/Foreign Language
(Same as LINGUIST 291) Methodology and techniques for teaching languages, using concepts from linguistics and second language acquisition theory and research. Focus is on teaching English, but most principles and techniques applicable to any language. Optional 1-unit seminar in computer-assisted language learning. GER:DB-SocSci

4-5 units, Win (Hubbard, P; Rylance, C)

LINGUIST 197. Undergraduate Research Seminar
Research goals and methods in linguistics and related disciplines. Students work on a small project to define a focus for their linguistic studies and prepare for honors research. Presentations; final paper.

2 units, Win (Potts, K)

LINGUIST 198. Honors Research

1-15 units, Win (Staff), Spr (Staff)

LINGUIST 199. Independent Study

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN LINGUISTICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

LINGUIST 200. Foundations of Linguistic Theory
Theories that have shaped contemporary linguistics; recurrent themes and descriptive practice.

4 units, Win (Anttila, A)

LINGUIST 201. Advanced Introduction to Linguistics
Primarily for graduate students. The leading ideas of linguistic description and argumentation. Fundamental representational notions in phonology, syntax, and semantics, and the place of these notions in wider linguistic analysis.

4 units, not given this year

LINGUIST 205A. Phonetics
(Same as LINGUIST 105) The study of speech sounds: how to produce them, how to perceive them, and their acoustic properties. The influence of production and perception systems on sound change and phonological patterns. Acoustic analysis and experimental techniques. Lab exercises. Prerequisite: 110 or equivalent, or consent of instructor.

4 units, not given this year

LINGUIST 205B. Advanced Phonetics
Prerequisite: LINGUIST 205A.

2-4 units, not given this year

LINGUIST 207. Seminar in Phonetics
Topics vary. Current topic is phonetic variation in speech perception. Previous topics include ow variation is accommodated in current models of speech perception, and how perceptual models need to be altered to accommodate phonetic variation encountered by listeners. May be repeated for credit.

2-4 units, Aut (Sumner, M)

LINGUIST 210A. Phonology
Introduction to phonological theory and analysis based on cross-linguistic evidence. Topics: phonological representations including features, syllables, metrical structure; phonological processes including assimilation and dissimilation; and phonological typology and universals; optimality theory.

4 units, Aut (Anttila, A)

LINGUIST 210B. Advanced Phonology
The phonological organization of the lexicon. Topics include lexical phonology, phonological subregularities, gradient phonotactics, and lexical frequency effects.

4 units, Win (Kiparsky, P)

LINGUIST 211. Metrics
Principles of versification from a linguistic point of view. Traditional and optimality-theoretic approaches. The canonical system of English metrics, and its varieties and offshoots. The typology of metrical systems and its linguistic basis. The ideology of normative prosodic discourse in relation to changing poetic practice.

1-4 units, not given this year

LINGUIST 212A. Seminar in Phonology
(Same as LINGUIST 112) Topics vary each year. Previous topics include variation in the phonology of words according to their

contexts within larger expressions and the place of these phenomena in a theory of grammar. May be repeated for credit.
2-4 units, not given this year

LINGUIST 212B. Seminar in Phonology
May be repeated for credit.
1-4 units, not given this year

LINGUIST 213. Corpus Phonology
An introduction to constructing and using phonologically annotated corpora to test phonological hypotheses. Hands-on experience in corpus manipulation and phonological modeling.
2-4 units, Spr (Staff)

LINGUIST 214. Phonology Workshop
May be repeated for credit.
1-2 units, not given this year

LINGUIST 216. Morphology
How morphology fits into the lexicon and how the lexicon fits into grammar. Inflection and word-formation: blocking, productivity, analogy. Morphological categories. The interaction of morphology with phonology within the lexicon: level-ordering, prosodic morphology. Review of English morphology and analysis of representative material from languages with richer morphologies.
2-4 units, not given this year

LINGUIST 217. Morphosyntax
The role of morphology in grammar: how word structure serves syntax in the expression of meaning. Lexical semantics, Theta-roles, argument structure, and grammatical relations. Licensing: case, agreement, word order, and their interaction.
2-4 units, Aut (Kiparsky, P)

LINGUIST 218. Seminar on Morphological Theories
Word formation and the lexicon: empirical generalizations and theoretical approaches. Lexicalist and Distributed Morphology. How words are built and interpreted: constituency and headedness, morpheme order and scope, the mirror principle, bracketing paradoxes, the hierarchy of functional categories. Paradigms, blocking, gaps, periphrasis, syncretism. Locality, head movement vs. selection, constraints on allomorphy, incorporation, polysynthesis, cliticization and prosodic re-ordering phenomena.
2-4 units, Win (Kiparsky, P)

LINGUIST 219. Frequency and the Grammar of Alternations
Variationist, and psycholinguistic studies of how syntactic alternations (for example, the English dative, genitive, and passive) develop in time and space.
1-4 units, Aut (Bresnan, J)

LINGUIST 221A. Foundations of English Grammar
A systematic introduction to the formal analysis of English grammar using the framework of head-driven phrase structure grammar (HPSG). Topics: feature structure modeling, lexical and phrasal organization in terms of type hierarchies and constraint inheritance, clausal types, patterns of complementation, the auxiliary system, extraction dependencies, wh-constructions, and the syntax-semantics interface.
1-4 units, not given this year

LINGUIST 221B. Studies in Universal Grammar
Focus is on grammatical analysis of individual languages. Builds directly on the theoretical foundations presented in 221A. Topics vary each year.
1-4 units, not given this year

LINGUIST 222A. Foundations of Syntactic Theory I
The roles of the verb and the lexicon in the determination of sentence syntax and their treatment in modern grammatical theories. Empirical underpinnings of core phenomena, including the argument/adjunct distinction, argument structure and argument realization, control and raising, operations on argument structure and grammatical function changing rules. Motivations for a lexicalist approach rooted in principles of lexical expression and subcategorization satisfaction. Prerequisite: 120 or permission of instructor.
2-4 units, Aut (Levin, B)

LINGUIST 222B. Foundations of Syntactic Theory II
The nature of unbounded dependency constructions and their treatment in modern grammatical theories. Filler-gap dependencies, island constraints, and the relation between grammar and processing. Prerequisite: 222A.
2-4 units, Win (Sag, I)

LINGUIST 223. Introduction to Minimalist Syntax
Introduces the basics of Minimalist architecture and structure-building operations, with attention to the communication of syntax with the phonological and semantic interfaces. Topics include phrase structure, locality and phases, phrasal and head movement, functional categories, and features. A previous graduate-level syntax course, or permission of the instructor required.
2-4 units, Spr (Staff)

LINGUIST 224. Introduction to Lexical Function Grammar
(Same as LINGUIST 124) Presentation of a formal model of grammar designed to allow precise, computationally tractable descriptions of cross-linguistic variation in syntactic structure. Concentration on the formal properties of the model, its flexibility in teasing out language specific and possibly universal characteristics of natural languages and the place of syntax as a component within a larger linguistic architecture. Prerequisite: 120 or consent of instructor
2-4 units, Spr (Staff)

LINGUIST 224B. Advanced Topics in Lexical Functional Grammar
May be repeated for credit.
1-4 units, not given this year

LINGUIST 225A. Seminar in Syntax
1-2 units, not given this year

LINGUIST 227C. Projects in Syntax
Group research projects using quantitative syntactic data from texts, recordings, experiments, or historical records. Skills in extracting, graphically exploring, and analyzing naturalistic syntactic data, and in presenting results. May be repeated for credit. Prerequisite: 229A, B, or D, or equivalent.
2-4 units, not given this year

LINGUIST 229A. Laboratory Syntax I
Critiques of the empirical foundations of syntax. The roles of introspective, usage-based, experimental, and typological evidence. Modern methods of data collection and analysis used in syntax. Hands-on, practical work with data sets. May be repeated for credit.
1-4 units, Win (Bresnan, J)

LINGUIST 229B. Laboratory Syntax II
Hands-on use of methods for handling syntactic data, including corpus work on ecologically natural data and controlled experimental paradigms. Explanatory models of syntactic processing and their relation to theories of grammar. May be repeated for credit.
1-4 units, not given this year

LINGUIST 229C. Laboratory Syntax III
Hands-on use of methods for handling syntactic data, including corpus work on ecologically natural data and controlled experimental paradigms. Explanatory models of syntactic processing and their relation to theories of grammar. May be repeated for credit.
1-4 units, not given this year

LINGUIST 229D. Empirical Syntax Research Seminar
Recent work in syntax that employs data-rich methods like corpora and laboratory studies, emphasizing research by seminar participants. May be repeated for credit.
1-2 units, not given this year

LINGUIST 230A. Introduction to Semantics and Pragmatics
Conventional meaning and pragmatic enrichment, with special emphasis on the foundations of semantics and pragmatics, the central problems of the theory, the role of logic and model theory in semantic analysis, and interconnections with other aspects of language and communication.
2-4 units, Aut (Potts, C)

LINGUIST 230B. Semantics and Pragmatics
Expands on 230A. Standard approaches to formal semantics (Montague grammar, DRT, and basic dynamic semantics). Analyses of semantic phenomena in these frameworks. Prerequisites: 230A; or combination of 130A and PHIL 150 and 160.
2-4 units, not given this year

LINGUIST 232A. Lexical Semantics
Introduction to issues in word meaning, focused primarily around verbs. Overview of the core semantic properties of verbs and the organization of the verb lexicon. Approaches to lexical semantic representation, including semantic role lists, proto-roles, and causal and aspectual theories of event conceptualization.
2-4 units, Spr (Levin, B)

LINGUIST 232B. Seminar in Lexical Semantics
Topics have included: lexical categories; motion verbs; psych-verbs. May be repeated for credit with different content.
1-4 units, not given this year

LINGUIST 233. Introduction to Formal Pragmatics
(Same as LINGUIST 133) (Graduate students register for 233.) Mechanism underlying language use and felicity intuitions. Formal models of discourse that incorporate many aspects of pragmatics such as presuppositions, speech acts, implicatures, relevance, optimality, and utility. Discussion of common ground, illocutionary acts, Gricean maxims and Neo-Gricean analysis, game and decision theory.
3-4 units, not given this year

LINGUIST 234. Discourse Analysis
The organization of language above the sentence level, and the manifestation of language in context. Practical experience in working with discourse data.
4 units, Spr (Staff)

LINGUIST 235. Semantic Fieldwork
Techniques for evidence from less well-studied languages within formal semantic theory. Semantic phenomena, and techniques for investigating them, including scope, quantifiers, pronouns, focus, tense, aspect, mood, evidentiality, and information structure. Practical work on a language.
2-4 units, not given this year

LINGUIST 236. Seminar in Semantics: Lexical and Constructional Pragmatics
Case studies in how reliable pragmatic meanings arise from the interactions between conventionalized content, speaker intentions, hearer expectations, and general pragmatic pressures. Emphasis on corpus and psycholinguistic methods. Potential topics: exclamatives, affective demonstratives, discourse particles, appositives, scalar terms, negation; progression of topics to be decided largely by the participants. May be repeated for credit.
1-4 units, not given this year

LINGUIST 237. Seminar in Semantics: Semantics of Questions and Commands
Semantics of interrogatives and imperatives; propositional semantics of declaratives. Research emphasizing the meaning of questions. May be repeated for credit.
1-4 units, not given this year

LINGUIST 239. Semantics Research Seminar
Presentation of ongoing research in semantics. May be repeated for credit.
1-2 units, Aut (Levin, B), Win (Levin, B), Spr (Staff)

LINGUIST 240. Language Acquisition I
(Same as LINGUIST 140) Processes of language acquisition in early childhood; stages in development; theoretical issues and research questions. Practical experience in data collection.
4 units, Aut (Clark, E)

LINGUIST 241. Language Acquisition II
Constructions and the lexicon. May be repeated for credit.
1-4 units, Spr (Clark, E)

LINGUIST 242. Methods for Research in Language Acquisition
Research methods in developmental psycholinguistics
4 units, not given this year

LINGUIST 245. Experimental Design for Linguistics
Hypothesis formation, confound avoidance, power, general methods, and analysis of results. Students complete a pilot experiment; write-up; peer review; presentation.
4 units, not given this year

LINGUIST 250. Sociolinguistic Theory and Analysis
Methods of modeling the patterned variation of language in society. Emphasis is on variation, its relation to social structure and practice, and its role in linguistic change. Intersection between quantitative and qualitative analysis, combining insights of sociology and linguistic anthropology with quantitative linguistic data. Prerequisite: graduate standing in Linguistics or consent of instructor.
4 units, Aut (Rickford, J)

LINGUIST 251. Sociolinguistic Field Methods
Strengths and weaknesses of the principal methods of data collection in sociolinguistics.
4 units, Spr (Rickford, J)

LINGUIST 252. Sociolinguistics and Pidgin Creole Studies
(Same as LINGUIST 152) Introduction to pidgins and creoles, organized around the main stages in the pidgin-creole life cycle: pidginization, creolization, and decreolization. Focus is on transformations in the English language as it was transported from Britain to Africa, Asia, the Caribbean, and the Pacific. Resultant pidginized and creolized varieties such as Nigerian Pidgin English, Chinese Pidgin English, New Guinea Tok Pisin, Suriname Sranan, and the creole continua of Guyana, Jamaica, and Hawaii. Also French, Dutch, Portugese, Chinook, Motu, and Sango.
2-4 units, not given this year

LINGUIST 253. Race, Ethnicity, and Language
(Same as ANTHRO 320A, EDUC 389X) Seminar. The linguistic construction of race and ethnicity across a wide variety of contexts and communities. The course takes a comparative perspective and highlights how different racial/ethnic formations participate in similar, yet different, ways of doing race though language, interaction and culture. Readings draw heavily from perspectives in linguistic anthropology and sociolinguistics.
3-4 units, Win (Alim, H)

LINGUIST 254. Sociolinguistics of Language Contact
(Same as LINGUIST 154) The role of contact between speakers of different languages in processes of language borrowing, convergence, and shift. Attending both to linguistic aspects and social contexts, examine: second-language acquitision, bilingualism, code-switching, lexical and grammatical borrowing, first language attrition, language death, and the creation of new contact varieties such as jargons, mixed languages, pidgins, and creoles. Prerequisite: background in linguistics, at least one course in linguistics.
2-4 units, not given this year

LINGUIST 255. Seminar in Sociolinguistics: Contact Linguistics
Classical and recent works in contact linguistics including Weinreich, Tudgill, Winford. May be repeated for credit.
3-5 units, not given this year

LINGUIST 257. Seminar in Sociolinguistics: Community Studies of Variation
May be repeated for credit.
1-4 units, not given this year

LINGUIST 258. Analysis of Variation
The quantitative study of linguistic variability in time, space, and society emphasizing social constraints in variation. Hands-on work with variable data. Prerequisites: 105/205 and 250, or consent of instructor.
1-4 units, not given this year

LINGUIST 259. Topics in Sociolinguistics
Topics vary by quarter. Current topic is phonetic symbolism. Repeatable for credit
2-4 units, Aut (Eckert, P)

LINGUIST 260A. Historical Morphology and Phonology
Sound change and analogical change in the perspective of linguistic theory. Internal and comparative reconstruction.
4 units, not given this year

LINGUIST 260B. Historical Morphosyntax
Morphological and syntactic variation and change. Reanalysis, grammaticalization. The use of corpora and quantitative evidence.
2-4 units, not given this year

LINGUIST 262. Constructionalization
Discussion of recent proposals about how to enhance work on grammaticalization and lexicalization by adopting a construction grammar perspective.
2-4 units, Spr (Traugott, E)

LINGUIST 265. African American Vernacular English
(Same as LINGUIST 65) The English vernacular spoken by African Americans in big city settings, and its relation to Creole English dialects spoken on the S. Carolina Sea Islands (Gullah), in the

Caribbean, and in W. Africa. The history of expressive uses of African American English (in soundin' and rappin'), and its educational implications. Service Learning Course (certified by Haas Center).

3-5 units, Win (Rickford, J)

LINGUIST 266. Vernacular English and Reading
(Same as LINGUIST 66) Literature on the relation between use of vernacular English varieties, such as African American vernacular English, Chicano English, and the development of literacy especially in standard English. Focus is on improving the reading skills of African American and Latino students in local schools through the Reading Road program developed at the University of Pennsylvania. Students must commit to tutoring one or more elementary students weekly, using the program. Recommended: LINGUIST 65/265.

4-5 units, not given this year

LINGUIST 270. The Arabic Language and Culture
(Same as AMELANG 36, LINGUIST 170) Arabic language from historical, social, strategic, and linguistic perspectives. History of the Arabic language and the stability of classical Arabic over the last 15 centuries. Why the functionality of classical Arabic has not changed as Latin, Old English, and Middle English have. Social aspects of the Arabic language, Ferguson's notion of diglossia. The main varieties of Arabic, differences among them, and when and where they are spoken. Role of Arabic and culture in current world politics, culture, and economy. Linguistic properties of Arabic such as root-based morphology, lexical ambiguity, and syntactic structure relating it to current linguistic theories.

3 units, not given this year

LINGUIST 272. Structure of Finnish
Central topics in Finnish phonology/morphology and syntax/semantics and how they bear on current theoretical debates. Topics: stress; vowel harmony; clause structure; case; aspect; word order.

2-4 units, not given this year

LINGUIST 273. The Structure of Russian
(Same as LINGUIST 173) A synchronic overview of contemporary standard Russian, including its sound system, word formation and grammatical structure. Emphasis is on problems presented by Russian for current linguistic theory. The acquisition of Russian as a first language.

2-4 units, not given this year

LINGUIST 274A. Linguistic Field Methods
(Same as ANTHRO 30, LINGUIST 174) Practical training in the collection and analysis of linguistic data from native speakers of a language largely unknown to the investigator. Documentation of endangered languages. Research goals, field trip preparation, ethics (including human subjects, cooperation with local investigators, and governmental permits), working in the community, technical equipment, and analytical strategies. Emphasis is on the use of recording devices and computers in collection and analysis. Prerequisite: introductory course in linguistics.

3-5 units, not given this year

LINGUIST 274B. Field Methods II
Continuation of 274A, with a focus on phonetic topics in a targeted language. Prerequisite: 274A or consent of instructor.

2-4 units, not given this year

LINGUIST 277. Laboratory Methods in Psycholinguistics
Issues that commonly arise in the design and implementation of linguistic experiments and in the statistical analysis of empirical results. Topics in experimental design include selection of stimuli, blocking, and power analysis and sample size calculation. How to fit and interpret statistical models using the multilevel regression and Bayesian inference, as implemented in software packages R and Bugs. Topics include interpretation of model coefficients for fixed and random effects, collinearity, model criticism, as well as comparison and reporting of models. Theoretical issues worked out at lab sessions using examples from experiments and corpus studies, including those provided by students.

2-4 units, not given this year

LINGUIST 278. Programming for Linguists
Computer programming techniques for collecting and analyzing data in linguistic research. Introduction to the UNIX, regular expressions, and Python scripting. Hands-on experience gathering, formatting, and manipulating corpus, field, and experimental data, combining data from multiple sources, and working with existing tools. Knowledge of computer programming not required.

1-4 units, not given this year

LINGUIST 280. From Languages to Information
(Same as CS 124, LINGUIST 180) Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition. Prerequisite: CS103, CS107, CS109.

3-4 units, Win (Jurafsky, D)

LINGUIST 281. Grammar Engineering
(Same as LINGUIST 181) Hands-on techniques for implementation of linguistic grammars, drawing on grammatical theory and engineering skills. The implementation of constraints in morphology, syntax, and semantics, working within a unification-based lexicalist framework. Focus is on developing small grammars for English and at least one other language. Prerequisite: basic syntactic theory or 120. No programming skills required.

1-4 units, not given this year

LINGUIST 282. Computational Theories of Syntax
(Same as LINGUIST 182) Salient features of modern syntactic theories, including HPSG, LFG, and TAG, motivated by computational concerns. Impact of work within these frameworks on the design of algorithms in computational linguistics, and its influence in both linguistics and computer science. Topics include: notions of unification; unification algorithms and their relation to linguistic theory; agenda-driven chart processing for analysis and synthesis; the interface with morphology, the lexicon, and semantics; and applications, notably machine translation.

3-4 units, not given this year

LINGUIST 284. Natural Language Processing
(Same as CS 224N) Methods for processing human language information and the underlying computational properties of natural languages. Syntactic and semantic processing from linguistic and algorithmic perspectives. Focus is on modern quantitative techniques in NLP: using large corpora, statistical models for acquisition, translation, and interpretation; and representative systems. Prerequisites: CS124 or CS121/221.

3-4 units, Win (MacCartney, W)

LINGUIST 284A. Writing Systems in a Digital World
(Same as LINGUIST 185) Writing systems and their behaviors. Classification of scripts as alphabetic, syllabic, and ideographic; what features typically belong to each group. What can be considered an ideal script. Topics include: why Japanese writing is considered a complex system; the influence of Indian writing on other syllabic scripts; how writing systems extend their reach to new languages; linguistic insights by studying this process; the Unicode standard; and font technology. Recommended: basic phonetics.

2-3 units, not given this year

LINGUIST 285. Speech Recognition and Synthesis
(Same as CS 224S) Automatic speech recognition, speech synthesis, and dialogue systems. Focus is on key algorithms including noisy channel model, hidden Markov models (HMMs), Viterbi decoding, N-gram language modeling, unit selection synthesis, and roles of linguistic knowledge. Prerequisite: programming experience. Recommended: CS 221 or 229.

2-4 units, not given this year

LINGUIST 286. Information Retrieval and Web Search
(Same as CS 276) Text information retrieval systems; efficient text indexing; Boolean, vector space, and probabilistic retrieval models; ranking and rank aggregation; evaluating IR systems. Text clustering and classification: classification algorithms, latent semantic indexing, taxonomy induction; Web search engines including crawling and indexing, link-based algorithms, and web metadata. Prerequisites: CS 107, CS 109, CS 161.

3 units, Spr (Nayak, P; Raghavan, P)

LINGUIST 287. Extracting Social Meaning and Sentiment
(Same as CS 424P) Methods for extracting social meaning (speaker perspectives, emotions and attitudes) from text and speech. Topics include sentiment analysis and summarization, detection of deception, sarcasm, emotion, and personality. Analysis of mean-

sis of meaning-bearing characteristics of the speaker and topic, including text, discourse, prosodic and other cues. Prerequisite: CS 124 or 221 or 229 or permission of instructors.

3 units, Aut (Jurafsky, D; Potts, C)

LINGUIST 288. Natural Language Understanding
(Same as CS 224U, LINGUIST 188) Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal operators), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S: and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

3-4 units, not given this year

LINGUIST 289. Topics in Computational Linguistics: History of Computational Linguistics
Intellectual history of computational linguistics and natural language processing, together with related aspects of dialogue and speech processing, using primary sources. Reading of seminal early papers, interviews with historical figures, with the goal of understanding the origins and intellectual development of the field. Prerequisites: at least one of LING 180, 281, 283, 284, 286, or 288.

3-4 units, Win (Jurafsky, D; Kay, M)

LINGUIST 291. Linguistics and the Teaching of English as a Second/Foreign Language
(Same as LINGUIST 191) Methodology and techniques for teaching languages, using concepts from linguistics and second language acquisition theory and research. Focus is on teaching English, but most principles and techniques applicable to any language. Optional 1-unit seminar in computer-assisted language learning.

4-5 units, Win (Hubbard, P; Rylance, C)

LINGUIST 293. Research Seminar in Applied Linguistics
(Same as EDUC 435X) For graduate students in the schools of Education and Humanities and Sciences who are engaged in research pertaining to applied linguistic topics in original research. Topics: language policies and planning, language and gender, writing and critical thinking, foreign language education, and social applications of linguistic science. (SSPEP)

1-4 units, not given this year

LINGUIST 294. Linguistic Research Discussion Group
Restricted to first-year Linguistics Ph.D. students.

1 unit, Aut (Levin, B)

LINGUIST 390. M.A. Project

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

LINGUIST 394. TA Training Workshop
For second-year graduate students in Linguistics

1 unit, Aut (Levin, B)

LINGUIST 395. Research Workshop
Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.

1-2 units, Spr (Staff), Sum (Staff)

LINGUIST 395C. Research Workshop III
Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.

1-2 units, Sum (Staff)

LINGUIST 396. Research Projects in Linguistics
Mentored research project for first-year graduate students in linguistics.

2-3 units, Aut (Staff), Win (Staff)

LINGUIST 397. Directed Reading

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

LINGUIST 398. Directed Research

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

LINGUIST 399. Dissertation Research

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MANAGEMENT SCIENCE AND ENGINEERING (MS&E) COURSES

UNDERGRADUATE COURSES IN MANAGEMENT SCIENCE AND ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MS&E 22Q. The Flaw of Averages
(Stanford Introductory Seminar) Uncertain assumptions in business and public policy are often replaced with single ¿best guess¿ or average numbers. This leads to a fallacy as fundamental as the belief that the earth is flat, which I call the Flaw of Averages. It states, in effect, that: plans based on average assumptions are wrong on average. This class will discuss mitigations of the flaw of averages using simulation and other methods from probability management.

3 units, Aut (Savage, S)

MS&E 41. Financial Literacy
Practical knowledge about personal finance and money management including budgeting, pay checks, credit cards, banking, insurance, taxes, and saving. Class especially appropriate for those soon to be self-supporting. Limited enrollment.

1 unit, Win (Morrison, M), Spr (Morrison, M)

MS&E 52. Introduction to Decision Making
Experienced management consultants share lessons and war stories. Case studies, disguised examples from real engagements, and movie clips illustrate theories and concepts of decision analysis. Student teams critique decisions made in actual organizations. Topics include what makes a good decision, how decisions can be made better, framing and structuring techniques, modeling and analysis tools, biases and probability assessment, evaluation and appraisal methods, decision psychology, creativity and organizational leadership, and effective presentation styles. Not intended for MS&E majors.

3 units, Sum (Holtzman, S; Robinson, B)

MS&E 92Q. International Environmental Policy
(Stanford Introductory Seminar) Preference to sophomores. Science, economics, and politics of international environmental policy. Current negotiations on global climate change, including actors and potential solutions. Sources include briefing materials used in international negotiations and the U.S. Congress.

4 units, Win (Weyant, J)

MS&E 93Q. Nuclear Weapons, Energy, Proliferation, and Terrorism
(Stanford Introductory Seminar) Preference to sophomores. What are nuclear weapons; what do they do? How are they different from other weapons? What drives proliferation of nuclear weapons? Why do countries want them? Can they be eliminated? What about Iran and North Korea? What role does nuclear energy play? Can it help combat global climate change? What are the risks of nuclear terrorism? Recommended: a course in international relations, engineering, or physical science. GER:DB-EngrAppSci

3 units, Spr (Hecker, S)

MS&E 101. Undergraduate Directed Study
Subject of mutual interest to student and faculty member. Prerequisite: faculty sponsor.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 107. Interactive Management Science
(Same as MS&E 207) Analytical techniques such as linear and integer programming, Monte Carlo simulation, forecasting, decision analysis, and Markov chains in the environment of the spreadsheet. Probability management. Materials include spreadsheet add-ins for implementing these and other techniques. Emphasis is on building intuition through interactive modeling, and extending the applicability of this type of analysis through integration with existing business data structures. GER:DB-EngrAppSci

3 units, Aut (Savage, S)

MS&E 108. Senior Project
Restricted to MS&E majors in their senior year. Students carry out a major project in groups of four, applying techniques and concepts learned in the major. Project work includes problem identification and definition, data collection and synthesis, modeling, development of feasible solutions, and presentation of results. Service Learning Course (certified by Haas Center).

5 units, Win (Barley, S; Katila, R; Shachter, R; Hinds, P)

MS&E 111. Introduction to Optimization
(Same as ENGR 62) Formulation and analysis of linear optimization problems. Solution using Excel solver. Polyhedral geometry and duality theory. Applications to contingent claims analysis, production scheduling, pattern recognition, two-player zero-sum games, and network flows. Prerequisite: MATH 51. GER:DB-EngrAppSci

4 units, Aut (Van Roy, B), Spr (Goel, A)

MS&E 112. Mathematical Programming and Combinatorial Optimization
(Same as MS&E 212) Combinatorial and mathematical programming (integer and non-linear) techniques for optimization. Topics: linear program duality and LP solvers; integer programming; combinatorial optimization problems on networks including minimum spanning trees, shortest paths, and network flows; matching and assignment problems; dynamic programming; linear approximations to convex programs; NP-completeness. Hands-on exercises. Prerequisites: CS 106A or X; ENGR 62 or MATH 103. GER:DB-EngrAppSci

3 units, Win (Saberi, A)

MS&E 120. Probabilistic Analysis
Concepts and tools for the analysis of problems under uncertainty, focusing on model building and communication: structuring, processing, and presentation of probabilistic information. Examples from legal, social, medical, and physical problems. Spreadsheets illustrate and solve problems as a complement to analytical closed-form solutions. Topics: axioms of probability, probability trees, random variables, distributions, conditioning, expectation, change of variables, and limit theorems. Prerequisite: MATH 51. Recommended: knowledge of spreadsheets. GER:DB-EngrAppSci

5 units, Aut (Shachter, R)

MS&E 121. Introduction to Stochastic Modeling
Stochastic processes and models in operations research. Discrete and continuous time parameter Markov chains. Queuing theory, inventory theory, simulation. Prerequisite: 120 or Statistics 116. GER:DB-EngrAppSci

4 units, Spr (Glynn, P)

MS&E 130. Information Networks and Services
Architecture of the Internet and performance engineering of computer systems and networks. Switching, routing and shortest path algorithms. Congestion management and queueing networks. Peer-to-peer networking. Wireless and mobile networking. Information service engineering and management. Search engines and recommendation systems. Reputation systems and social networking technologies. Security and trust. Information markets. Select special topics and case studies. Prequisites: 111, 120, and CS 106A. GER:DB-EngrAppSci

3 units, Spr (Bambos, N)

MS&E 134. Organization Change and Information Systems
(Same as MS&E 234) Leading organizational change and Information Systems. Case method discussions and lectures. Themes include: real-time enterprise; reengineering; organization transformation, cross-functional teams, IT development, and leading IT. Course includes a group project that is defined and approved during the first two weeks of class. Limited enrollment. Prerequisites: CS 106A, 180, or equivalents.

4 units, Win (Tabrizi, B)

MS&E 140. Accounting for Managers and Entrepreneurs
(Same as MS&E 240) Non-majors and minors who have taken or are taking elementary accounting should not enroll. Introduction to accounting concepts and the operating characteristics of accounting systems. The principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Interpretation and use of accounting information for decision making. Designed for the user of accounting information and not as an introduction to a professional accounting career.

3-4 units, Aut (Stanton, F), Spr (Stanton, F), Sum (Stanton, F)

MS&E 142. Investment Science
(Undergraduates register for 142.) Theory and application of modern quantitative investment analysis from an engineering perspective. How investment concepts are used to evaluate and manage opportunities, portfolios, and investment products including stocks, bonds, mortgages, and annuities. Topics: deterministic cash flows (term structure of interest rates, bond portfolio immunization, project optimization); mean-variance theory (Markowitz model, capital asset pricing); and arbitrage pricing theory. Group project. Limited enrollment. Prerequisites: 120, ENGR 60, MATH 51, or equivalents. Recommended: 140, ENGR 62, knowledge of spreadsheets.

3 units, Aut (Primbs, J)

MS&E 152. Introduction to Decision Analysis
(Same as MS&E 152W) How to make good decisions in a complex, dynamic, and uncertain world. People often make decisions that on close examination they regard as wrong. Decision analysis uses a structured conversation based on actional thought to obtain clarity of action in a wide variety of domains. Topics: distinctions, possibilities and probabilities, relevance, value of information and experimentation, relevance and decision diagrams, risk attitude. Students seeking to fulfill the Writing in the Major requirement should register for MS&E 152W. GER:DB-EngrAppSci

3-4 units, Spr (Shachter, R)

MS&E 152W. Introduction to Decision Analysis
(Same as MS&E 152) How to make good decisions in a complex, dynamic, and uncertain world. People often make decisions that on close examination they regard as wrong. Decision analysis uses a structured conversation based on actional thought to obtain clarity of action in a wide variety of domains. Topics: distinctions, possibilities and probabilities, relevance, value of information and experimentation, relevance and decision diagrams, risk attitude. Students seeking to fulfill the Writing in the Major requirement should register for MS&E 152W. GER:DB-EngrAppSci, WIM

3-4 units, Spr (Shachter, R)

MS&E 175. Innovation, Creativity, and Change
Problem solving in organizations; creativity and innovation skills; thinking tools; creative organizations, teams, individuals, and communities. (Katila)

3-4 units, given next year

MS&E 178. The Spirit of Entrepreneurship
Students meet before and after MS&E 472 to prepare for and debrief after the sessions.

3 units, Aut (Blank, S), Win (Seelig, T)

MS&E 180. Organizations: Theory and Management
For undergraduates only; preference to MS&E majors. Classical and contemporary organization theory; the behavior of individuals, groups, and organizations. Limited enrollment. Students must attend first session.

4 units, Aut (Eisenhardt, K), Spr (Hinds, P)

MS&E 181. Issues in Technology and Work for a Postindustrial Economy
How changes in technology and organization are altering work and lives. Approaches to studying and designing work. How understanding work and work practices can assist engineers in designing better technologies and organizations. Topics include job design, distributed and virtual organizations, the blurring of boundaries between work and family life, computer supported cooperative work, trends in skill requirements and occupational structures, monitoring and surveillance in the workplace, downsizing and its effects on work systems, project work and project-based lifestyles, the growth of contingent employment, telecommuting, electronic commerce, and the changing nature of labor relations. Limited enrollment. Preference to MS&E and STS majors.

3 units, Spr (Barley, S)

MS&E 185. Global Work
Issues, challenges, and opportunities facing workers, teams, and organizations working across national boundaries. Topics include geographic distance, time zones, language and cultural differences, technologies to support distant collaboration, team dynamics, and corporate strategy. Limited enrollment.

4 units, Spr (Hinds, P)

MS&E 189. Social Networks: Theory, Methods, and Applications
The theoretical, substantive, and methodological foundations of social networks. The social network paradigm seeks to explain how social relations facilitate and constrain an actor's opportunities, behaviors, and cognitions. Topics include: network concepts and principles; network data collection, measurement, and analysis; and applications in management, engineering, and related disciplines.
3-4 units, Aut (Lifschitz, A)

MS&E 190. Methods and Models for Policy and Strategy Analysis
Guest lectures by departmental practitioners. Emphasis is on links among theory, application, and observation. Environmental, national security, and health policy; marketing, new technology, and new business strategy analyses. Comparisons between domains and methods.
3 units, Spr (Brandeau, M)

MS&E 193. Technology and National Security
(Same as MS&E 193W, MS&E 293) The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W.
3 units, Aut (Hecker, S; Perry, W)

MS&E 193W. Technology and National Security
(Same as MS&E 193, MS&E 293) The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W. WIM
3 units, Aut (Hecker, S; Perry, W)

MS&E 197. Ethics and Public Policy
(Same as PUBLPOL 103B, STS 110) Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations. GER:DB-Hum, EC-EthicReas, WIM
5 units, Win (McGinn, R)

MS&E 198. Applied Modeling of Energy and Environmental Markets
Economic principles in models of energy and environmental markets. Spreadsheet examples for developing insights and communicating with decision makers. Market-clearing conditions, controlling emissions through fees, diffusion of new technologies, resource depletion, cartel behavior, and model evaluation. Prerequisites: ECON 50 and spreadsheets, or consent of instructor.
1 unit, not given this year

GRADUATE COURSES IN MANAGEMENT SCIENCE AND ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MS&E 201. Dynamic Systems
Goal is to think dynamically in decision making, and recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; solutions of linear dynamic systems, equilibria, dynamic diagrams; eigenvalues and eigenvectors of linear systems, the concept of feedback; nonlinear dynamics, phase plane analysis, linearized analysis, Liapunov functions, catastrophe theory. Examples: grabber-holder dynamics, technology innovation dynamics, creation of new game dynamics in business competition, ecosystem dynamics, social dynamics, and stochastic exchange dynamics. Prerequisite: MATH 103 or equivalent.
3-4 units, Spr (Tse, E)

MS&E 206. Art of Mathematical Modeling
Practicum. Students build mathematical models of real-life, ill-framed problems. Emphasis is on framing the issues, articulating modeling components logically (drawing from student's mathematical background), and analyzing the resulting model. Hands-on modeling. Project work in small groups. Prerequisites: basic analysis, calculus and algebra, and probability theory. Recommended: decision analysis, optimization and dynamic systems.
3-4 units, Spr (Kieffel, H)

MS&E 207. Interactive Management Science
(Same as MS&E 107) Analytical techniques such as linear and integer programming, Monte Carlo simulation, forecasting, decision analysis, and Markov chains in the environment of the spreadsheet. Probability management. Materials include spreadsheet add-ins for implementing these and other techniques. Emphasis is on building intuition through interactive modeling, and extending the applicability of this type of analysis through integration with existing business data structures.
3 units, Aut (Savage, S)

MS&E 208A. Practical Training
MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 208B. Practical Training
MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 208C. Practical Training
MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 211. Linear and Nonlinear Optimization
Optimization theory and modeling. The role of prices, duality, optimality conditions, and algorithms in finding and recognizing solutions. Perspectives: problem formulation, analytical theory, computational methods, and recent applications in engineering, finance, and economics. Theories: finite dimensional derivatives, convexity, optimality, duality, and sensitivity. Methods: simplex and interior-point, gradient, Newton, and barrier. Prerequisite: MATH 51.
3-4 units, Aut (Tolman, C)

MS&E 212. Mathematical Programming and Combinatorial Optimization
(Same as MS&E 112) Combinatorial and mathematical programming (integer and non-linear) techniques for optimization. Topics: linear program duality and LP solvers; integer programming; combinatorial optimization problems on networks including minimum spanning trees, shortest paths, and network flows; matching and assignment problems; dynamic programming; linear approximations to convex programs; NP-completeness. Hands-on exercises. Prerequisites: CS 106A or X; ENGR 62 or MATH 103.
3 units, Win (Saberi, A)

MS&E 220. Probabilistic Analysis
Concepts and tools for the analysis of problems under uncertainty, focusing on model building and communication: the structuring, processing, and presentation of probabilistic information. Examples from legal, social, medical, and physical problems. Spreadsheets illustrate and solve problems as a complement to analytical closed-form solutions. Topics: axioms of probability, probability trees, random variables, distributions, conditioning, expectation, change of variables, and limit theorems. Prerequisite: MATH 51. Recommended: knowledge of spreadsheets.
3-4 units, Aut (Chiu, S)

MS&E 221. Stochastic Modeling
Focus is on time-dependent random phenomena. Topics: discrete and continuous time Markov chains, renewal processes, queueing theory, and applications. Emphasis is on building a framework to formulate and analyze probabilistic systems. Prerequisite: 220 or consent of instructor.
3 units, Win (Johari, R)

MS&E 223. Simulation
Discrete-event systems, generation of uniform and non-uniform random numbers, Monte Carlo methods, programming techniques for simulation, statistical analysis of simulation output, efficiency-improvement techniques, decision making using simulation, applications to systems in computer science, engineering, finance, and operations research. Prerequisites: working knowledge of a programming language such as C, C++, Java, or FORTRAN; probability; and statistical methods.
3 units, Spr (Haas, P)

MS&E 234. Organization Change and Information Systems
(Same as MS&E 134) Leading organizational change and information systems. Case method discussions and lectures. Themes include: real-time enterprise; reengineering; organization transformation, cross-functional teams, IT development, and leading IT. Course includes a group project that is defined and approved during the first two weeks of class. Limited enrollment. Prerequisites: CS 106A, 180, or equivalents.
4 units, Win (Tabrizi, B)

MS&E 236. Game Theory with Engineering Applications
Strategic interactions among multiple decision makers emphasizing applications to engineering systems. Topics: efficiency and fairness; collective decision making and cooperative games; static and dynamic noncooperative games; and complete and incomplete information models. Competition: Bertrand, Cournot, and Stackelberg models. Mechanism design: auctions, contracts. Examples from engineering problems. Prerequisites: MATH 51 and exposure to probability such as 120 or EE 178. Recommended: 211, concurrent enrollment in 241 or ECON 202.
3 units, alternate years, not given this year

MS&E 236H. Game Theory with Engineering Applications
Advanced and mathematically more rigorous version of MS&E 236. Strategic interactions among multiple decision makers emphasizing applications to engineering systems. Topics: efficiency and fairness; collective decision making and cooperative games; static and dynamic noncooperative games; and complete and incomplete information models. Competition: efficient markets; Bertrand, Cournot, and Stackelberg models. Mechanism design: auctions, contracts. Examples from engineering problems. Prerequisites: mathematical maturity; MATH 51; probability at the level of 220, STATS 116, or equivalent. Recommended: 211, concurrent enrollment in 241 or ECON 202.
3 units, Win (Johari, R), alternate years, not given next year

MS&E 237. The Social Data Revolution: Data Mining and Electronic Business
Hands-on exploration of current and emergent data sources and their impact on individuals, business and society: recommendation engines, reputation systems, social network analysis, and engagement metrics. Guest speakers, homework assignments and group projects (e.g., Twitter and Facebook apps) combine data strategy, machine learning, modern and traditional marketing, behavioral economics, and incentive design. Cases include Amazon.com, BestBuy, MySpace, Lufthansa, and startups. Prerequisites: intellectual curiosity, entrepreneurial spirit, some programming experience (details at weigend.com/teaching), and willingness to implement in the real world.
3 units, Spr (Weigend, A)

MS&E 239. Computational Advertising
Computational, economic, and optimization issues in online advertising, in contexts including web search, social networks, web surfing, and online multimedia. Overview of scientific and engineering issues arising in building online advertising platforms for Internet advertising formats, as well as ad pricing, ad auctions, and ad optimization. Research frontiers of this young discipline. Limited enrollment. Prerequisites: elementary probability and linear algebra.
3 units, Aut (Broder, A; Josifovski, V)

MS&E 240. Accounting for Managers and Entrepreneurs
(Same as MS&E 140) Non-majors and minors who have taken or are taking elementary accounting should not enroll. Introduction to accounting concepts and the operating characteristics of accounting systems. The principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Interpretation and use of accounting information for decision making. Designed for the user of accounting information and not as an introduction to a professional accounting career.
3-4 units, Aut (Stanton, F), Spr (Stanton, F), Sum (Stanton, F)

MS&E 241. Economic Analysis
Principal methods of economic analysis of the production activities of firms, including production technologies, cost and profit, and perfect and imperfect competition; individual choice, including preferences and demand; and the market-based system, including price formation, efficiency, and welfare. Practical applications of the methods presented. See 341 for continuation of 241. Recommended: 211, ECON 50.
3-4 units, Win (Weber, T)

MS&E 242. Investment Science
Theory and application of modern quantitative investment analysis from an engineering perspective. How investment concepts are used to evaluate and manage opportunities, portfolios, and investment products including stocks, bonds, mortgages, and annuities. Topics: deterministic cash flows (term structure of interest rates, bond portfolio immunization, project optimization); mean-variance theory (Markowitz model, capital asset pricing); and arbitrage pricing theory. Group project. Prerequisites: 120, ENGR 60, MATH 51, or equivalents. Recommended: 140, ENGR 62, knowledge of spreadsheets. Limited enrollment.
3 units, Aut (Primbs, J)

MS&E 242H. Investment Science Honors
Concepts of modern quantitative finance and investments. Basic concepts under certainty including arbitrage, term structure of interest rates, and bond portfolio immunization. A situation of uncertainty in one period. Topics: arbitrage; theorems of asset pricing; pricing measures; derivative securities; applications and estimating of financial risk measures; mean-variance portfolio analysis; and equilibrium and the capital asset pricing model. Group projects involving financial market data. Enrollment limited. Prerequisites: basic probability, statistics, and economics such as MS&E 120, 121, MATH 51, ENGR 60, or equivalents. No prior knowledge of finance required.
3 units, Aut (Giesecke, K)

MS&E 242S. Investment Science
Emphasis is on a cash flow approach. Topics include deterministic cash flow analysis (time value of money, present value, internal rate of return, taxes, inflation), fixed income securities, duration and bond portfolio immunization, term structure of interest rates (spot rates, discount factors, forward rates), Fisher-Weill duration and immunization, capital budgeting, dynamic optimization prob-

lems, investments under uncertainty, mean-variance portfolio theory, capital asset pricing, and basic options theory. Goal is to create a link between engineering analysis and business decision making.

3 units, Sum (Feinstein, C)

MS&E 243. Energy and Environmental Policy Analysis

(Same as ENVRES 243) Concepts, methods, and applications. Energy/environmental policy issues such as automobile fuel economy regulation, global climate change, research and development policy, and environmental benefit assessment. Group project. Prerequisite: MS&E 241 or ECON 50, 51.

3 units, Spr (Sweeney, J)

MS&E 245G. Finance for Non-MBAs

(Same as ECON 135) For graduate students and advanced undergraduates. The foundations of finance; applications in corporate finance and investment management. Financial decisions made by corporate managers and investors with focus on process valuation. Topics include criteria for investment decisions, valuation of financial assets and liabilities, relationships between risk and return, market efficiency, and the valuation of derivative securities. Corporate financial instruments including debt, equity, and convertible securities. Equivalent to core MBA finance course, FINANCE 220. Prerequisites: ECON 51, or ENGR 60, or equivalent; ability to use spreadsheets, and basic probability and statistics concepts including random variables, expected value, variance, covariance, and simple estimation and regression.

3-5 units, Win (Admati, A)

MS&E 247G. International Financial Management

(Same as FINANCE 323) With a daily volume of more than $1.8 trillion, the foreign exchange market is by far the largest financial market in the world and also one of the most important ones as it is impossible to avoid exchange rate risk in the global economy. Various aspects of the foreign exchange market. The role of governments and central banks. The markets for spot exchange, currency forwards, options, swaps, international bonds, and international equities. For each of these markets, the valuation of instruments traded in these markets and, through cases, the application of these instruments to managing exposure to exchange rates, financing in international capital markets, and international capital budgeting.

4 units

MS&E 247S. International Investments

International financial markets, their comparative behavior and interrelations. Focus is on assets traded in liquid markets: currencies, equities, bonds, swaps, and derivatives. Topics: institutional arrangements, taxation and regulation, international arbitrage and parity conditions, valuation of target firms for cross-border acquisitions, direct foreign investment, international diversification and portfolio management, derivative instruments and dynamic investment strategies, international performance analysis, international capital flows and financial crises, and topics of current relevance and importance.

3 units, Sum (Fu, Y)

MS&E 248. Economics of Natural Resources

Intertemporal economic analysis of natural resource use, particularly energy, and including air, water, and other depletable mineral and biological resources. Emphasis is on an integrating theory for depletable and renewable resources. Stock-flow relationships; optimal choices over time; short- and long-run equilibrium conditions; depletion/extinction conditions; market failure mechanisms (common-property, public goods, discount rate distortions, rule-of-capture); policy options. Prerequisite: 241 or ECON 51.

3-4 units, Aut (Sweeney, J)

MS&E 249. Economic Growth and Development

What generates economic growth. Emphasis is on theory accompanied by intuition, illustrated with country cases. Topics: the equation of motion of an economy; optimal growth theory; calculus of variations and optimal control approaches; deriving the Euler and Pontriaguine equations from economic reasoning. Applications: former planned economies in Russia and E. Europe; the present global crisis: causes and consequences; a comparative study of India and China. The links between economic growth and civilization; the causes of the rise and decline of civilizations; lessons for the future.

3 units, Sum (De La Grandville, O)

MS&E 250A. Engineering Risk Analysis

The techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, human, environmental aspects). Elements of decision analysis; probabilistic risk analysis (fault trees, event trees, systems dynamics); economic analysis of failure consequences (human safety and long-term economic discounting); and case studies such as space systems, nuclear power plants, and medical systems. Public and private sectors. Prerequisites: ENGR 60 or equivalent, probability, and decision analysis.

3 units, Win (Pate-Cornell, E)

MS&E 250B. Project Course in Engineering Risk Analysis

Students, individually or in groups, choose, define, formulate, and resolve a real risk management problem, preferably from a local firm or institution. Oral presentation and report required. Scope of the project is adapted to the number of students involved. Three phases: risk assessment, communication, and management. Emphasis is on the use of probability for the treatment of uncertainties and sensitivity to problem boundaries. Limited enrollment. Prerequisites: MS&E 250A and consent of instructor.

3 units, Spr (Pate-Cornell, E)

MS&E 251. Stochastic Decision Models

Efficient formulation and computational solution of sequential decision problems under uncertainty. Markov decision chains and stochastic programming. Maximum expected present value and rate of return. Optimality of simple policies: myopic, linear, index, acceptance limit, and (s,S). Optimal stationary and periodic infinite-horizon policies. Applications to investment, options, overbooking, inventory, production, purchasing, selling, quality, repair, sequencing, queues, capacity, transportation. MATLAB is used. Prerequisites: probability, linear programming.

3 units, not given this year

MS&E 252. Decision Analysis I: Foundations of Decision Analysis

Coherent approach to decision making, using the metaphor of developing a structured conversation having desirable properties, and producing actional thought that leads to clarity of action. Socratic instruction; computational problem sessions. Emphasis is on creation of distinctions, representation of uncertainty by probability, development of alternatives, specification of preference, and the role of these elements in creating a normative approach to decisions. Information gathering opportunities in terms of a value measure. Relevance and decision diagrams to represent inference and decision. Principles are applied to decisions in business, technology, law, and medicine. See 352 for continuation.

3-4 units, Aut (Howard, R)

MS&E 254. The Ethical Analyst

The ethical responsibility for consequences of professional analysts who use technical knowledge in support of any individual, organization, or government. The means to form ethical judgments; questioning the desirability of physical coercion and deception as a means to reach any end. Human action and relations in society in the light of previous thought, and research on the desired form of social interactions. Attitudes toward ethical dilemmas through an explicit personal code.

1-3 units, Spr (Howard, R)

MS&E 255. Decision Systems I

(Formerly MS&E 451.) Professional tools and techniques for designing decision systems that help when facing decisions such as buying a car, bidding on the Internet, hiring NFL players, making charitable donations, or choosing medical treatment. Demonstrations; small project. Topics: automatic decision diagram formulation, decision-class analysis, and dynamic sensitivity analysis. No programming required. Recommended: 252 or equivalent.

2-3 units, Win (Holtzman, S)

MS&E 256. Technology Assessment and Regulation of Medical Devices
(Formerly 475.) Regulatory approval and reimbursement for new medical technologies as a key component of product commercialization. The regulatory and payer environment in the U.S. and abroad, and common methods of health technology assessment. Framework to identify factors relevant to adoption of new medical devices, and the management of those factors in the design and development phases. Case studies; guest speakers from government (FDA) and industry.
1-3 units, Spr (Pietzsch, J)

MS&E 260. Introduction to Operations Management
Operations management focuses on the effective planning, scheduling, and control of manufacturing and service entities. This course introduces students to a broad range of key issues in operations management. Topics include determination of optimal facility location, production planning, optimal timing and sizing of capacity expansion, and inventory control. Prerequisites: basic probability and optimization.
3-4 units, Aut (Erhun Oguz, F), Sum (Mora Carrasco, H; McCoy, J)

MS&E 261. Inventory Control and Production Systems
Topics in the planning and control of manufacturing systems. The functions of inventory, determination of order quantities and safety stocks, alternative inventory replenishment systems, item forecasting, production-inventory systems, materials requirements planning (MRP), just-in-time systems, master and operations scheduling, supply chain management, and service operations. Limited enrollment. Prerequisite: 120, or STATS 116, or equivalent.
3 units, Win (Hausman, W)

MS&E 262. Supply Chain Management
Definition of a supply chain; coordination difficulties; pitfalls and opportunities in supply chain management; inventory/service tradeoffs; performance measurement and incentives. Global supply chain management; mass customization; supplier management. Design and redesign of products and processes for supply chain management; tools for analysis; industrial applications; current industry initiatives. Enrollment limited to 50. Prerequisite: 260 or 261.
3 units, Spr (Hausman, W)

MS&E 264. Sustainable Product Development and Manufacturing
Strategies and techniques for development of sustainable products and manufacturing processes. Topics: strategic decisions in new product development when environmental and resource externalities are accounted for; effect of regulatory requirements on ability of a firm to achieve its business objectives; contributions of sustainable products/processes to the firm's competitive advantage and operational efficiency and to enabling entrepreneurial opportunities; industrial ecology and life cycle analysis techniques in integrating traditional product development requirements with those of the environment and society. Maybe repeatable for credit once.
3 units, Aut (Rafinejad, D)

MS&E 265. Supply Chain Logistics
Student teams redesign the manufacturing and distribution system of a medium-sized manufacturer. Focus is on the transportation system, inventory policies for a regional warehouse, design of a national distribution system, improvements of work flow, and layout of the manufacturing plant. The redesign is at a detailed operational level consistent with a strategy of integrating the functions of manufacturing and distribution. Analytical and game software is used. Knowledge of inventory theory, linear/integer programming, economic analysis, and applied probability is required. Emphasis is on group learning. Limited enrollment. Prerequisites: senior or graduate standing, 160, ENGR 60 and 62, or consent of instructor.
4 units, alternate years, not given this year

MS&E 266. Management of New Product Development
Techniques of managing or leading the process of new product development that have been found effective. Emphasis is placed on how much control is desirable and how that control can be exercised in a setting where creativity has traditionally played a larger role than discipline. Topics: design for manufacturability, assessing the market, imposing discipline on the new product development process, selecting the appropriate portfolio of new product development projects, disruptive technology, product development at internet speed, uncertainty in product development, role of experimentation in new product development, creating an effective development organization, and developing products to hit cost targets.
3 units, Win (Carlson, R)

MS&E 268. Operations Strategy
The development and implementation of the operations functional strategy. The integration of operations strategy with business and corporate strategies of a manufacturing-based firm. Topics: types and characteristics of manufacturing technologies, quality management, capacity planning and facilities choice, organization and control of operations, and operations' role in corporate strategy. Prerequisites: 260 or 261, or equivalent experience.
3 units, Spr (Carlson, R)

MS&E 270. Strategy in Technology-Based Companies
For graduate students only. Introduction to the basic concepts of strategy, with emphasis on high technology firms. Topics: competitive positioning, resource-based perspectives, co-opetition and standards setting, and complexity/evolutionary perspectives. Limited enrollment.
3-4 units, Aut (Eisenhardt, K), Win (Katila, R)

MS&E 271. Global Entrepreneurial Marketing
Skills needed to market new technology-based products to customers around the world. Case method discussions. Cases include startups and global high tech firms. Course themes: marketing toolkit, targeting markets and customers, product marketing and management, partners and distribution, sales and negotiation, and outbound marketing. Team-based take-home final exam. Limited enrollment.
3-4 units, Win (Kosnik, T; Novitsky, D; Ramfelt, L; Smith, L), Spr (Kosnik, T; Novitsky, D; Ramfelt, L; Smith, L)

MS&E 273. Technology Venture Formation
Open to graduate students interested in high-technology entrepreneurship. Key components of starting a venture-scale high-tech business: opportunity assessment, market sizing, go to market and distribution strategy, R&D and ops plans, venture capital, legal considerations, and team building. Teaching team includes serial entrepreneurs and venture capitalists. Student teams write and present a business plan to top tier venture capitalists. Enrollment limited. Recommended: MS&E 270, 271, or equivalents.
3-4 units, Aut (Lyons, M; MacLean, A)

MS&E 274. Dynamic Entrepreneurial Strategy
Primarily for graduate students. How entrepreneurial strategy focuses on creating structural change or responding to change induced externally. Grabber-holder dynamics as an analytical framework for developing entrepreneurial strategy to increase success in creating and shaping the diffusion of new technology or product innovation dynamics. Topics: First mover versus follower advantage in an emerging market; latecomer advantage and strategy in a mature market; strategy to break through stagnation; and strategy to turn danger into opportunity. Modeling, case studies, and term project.
3 units, Win (Tse, E)

MS&E 276. Entrepreneurial Management and Finance
For graduate students only with a preference for engineering and science majors. Emphasis on managing high-growth ventures, especially those based on technology products and services. Students develop a set of skills and approaches to becoming effective entrepreneurial managers. Topics include turning opportunities into reality, raising capital and financial management, venture operations and organizational administration, handling growth and adversity. Limited enrollment. Prerequisites: MS&E 140 and ENGR 60, or equivalents.
3 units, Spr (Byers, T; Lin, P)

MS&E 277. Creativity and Innovation
Factors that promote and inhibit creativity of individuals, teams, and organizations. Creativity tools, assessment metrics, and exercises; workshops, field trips, and case studies. Each student completes an individual creativity portfolio and participates in a long-term team project. Enrollment limited to 32. See http://creativity.stanford.edu.
4 units, Spr (Seelig, T)

MS&E 280. Organizational Behavior: Evidence in Action
Organization theory; concepts and functions of management; behavior of the individual, work group, and organization. Emphasis is on cases and related discussion. Enrollment limited; priority to MS&E students.

3-4 units, Win (Siino, R)

MS&E 282. Innovation and Implementation in Complex Organizations
The difficulty of moving new ideas through large organizations. Executives from large companies describe cases; student teams analyze the cases and provide recommendations. Final project. Enrollment limited to 12. Prerequisites: master¿s standing and consent of instructors.

3 units, not given this year

MS&E 287. Treating Business Practices as Prototypes
Multidisciplinary. Students work in teams to apply the design process to practices such as talent management, organizational design, or communication with external stakeholders in organizations that may include a software firm, a professional services firm, and an airline, and treat the targeted practices as prototypes. Experience in collaboration and design. Limited enrollment.

3-4 units, not given this year

MS&E 288. Creating Infectious Action
Offered by the d.school. Teams of master's students from disciplines including engineering, design, business, behavioral sciences, and education attempt to spread positive behavior through projects that include spreading the adoption of the Firefox web browser, applying methods from hip hop to fuel the spread of fads, and spreading financially responsible individual behavior. Industry experts and academics provide guidance.

3-4 units, not given this year

MS&E 289. Designing for Sustainable Abundance
Hands-on, team-based, multidisciplinary class, tackles design challenges such as how to expand the use of bicycles for short trips, attempting to develop solutions that positively impact environmental and economic sustainability as well as physical and emotional health and wellbeing. Close interaction with the teaching team, support from project sponsors, and the varied perspectives of guest speakers, including Steve Bishop of IDEO, Adam Lowry of Method and Andrew Ruben of Walmart.

3-4 units, Spr (Dunn, D; Waisberg, N)

MS&E 292. Health Policy Modeling
Primarily for master's students; also open to undergraduates and doctoral students. The application of mathematical, statistical, economic, and systems models to problems in health policy. Areas include: disease screening, prevention, and treatment; assessment of new technologies; bioterrorism response; and drug control policies.

3 units, Win (Brandeau, M)

MS&E 293. Technology and National Security
(Same as MS&E 193, MS&E 193W) The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W.

3 units, Aut (Hecker, S; Perry, W)

MS&E 294. Climate Policy Analysis
Design and application of formal analytical methods in climate policy development. Issues include instrument design, technology development, resource management, multiparty negotiation, and dealing with complexity and uncertainty. Links among art, theory, and practice. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy making application. Recommended: background in economics, optimization, and decision analysis.

3 units, alternate years, not given this year

MS&E 295. Energy Policy Analysis
Design and application of formal analytical methods for policy and technology assessments of energy efficiency and renewable energy options. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy and corporate strategy development. Recommended: background in economics, optimization, and decision analysis.

3 units, Win (Weyant, J), alternate years, not given next year

MS&E 296. Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport
Issues of sustainable mobility, vehicles, fuels, air pollution, and CO2 emissions from transport. Primarily focused on the U.S. passenger transport system; some attention to freight transport, and to Europe and key developing countries. Tools of analysis primarily spreadsheets, but applications using econometrics encouraged for the class project. Problem sets; project.

3 units, Spr (Schipper, L)

MS&E 299. Voluntary Social Systems
Ethical theory, feasibility, and desirability of a social order in which coercion by individuals and government is minimized and people pursue ends on a voluntary basis. Topics: efficacy and ethics; use rights for property; contracts and torts; spontaneous order and free markets; crime and punishment based on restitution; guardian-ward theory for dealing with incompetents; the effects of state action-hypothesis of reverse results; applications to help the needy, armed intervention, victimless crimes, and environmental protection; transition strategies to a voluntary society.

1-3 units, Win (Howard, R)

MS&E 300. Ph.D. Qualifying Tutorial or Paper
Restricted to Ph.D. students assigned tutorials as part of the MS&E Ph.D. qualifying process. Enrollment optional.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 301. Dissertation Research
Prerequisite: doctoral candidacy.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 310. Linear Programming
Formulation of standard linear programming models. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method and the state of art interior-point algorithms. Sensitivity analyses, economic interpretations, and primal-dual methods. Relaxations of harder optimization problems and recent convex conic linear programs. Applications include game equilibrium facility location. Prerequisite: MATH 113 or consent of instructor.

3 units, Win (Ye, Y)

MS&E 311. Optimization
Applications, theories, and algorithms for finite-dimensional linear and nonlinear optimization problems with continuous variables. Elements of convex analysis, first- and second-order optimality conditions, sensitivity and duality. Algorithms for unconstrained optimization, and linearly and nonlinearly constrained problems. Modern applications in communication, game theory, auction, and economics. Prerequisites: MATH 113, 115, or equivalent.

3 units, Win (Ye, Y)

MS&E 312. Advanced Methods in Numerical Optimization
(Same as CME 334) Topics include interior-point methods, relaxation methods for nonlinear discrete optimization, sequential quadratic programming methods, optimal control and decomposition methods. Topic chosen in first class; different topics for individuals or groups possible. Individual or team projects. May be repeated for credit.

3 units, Aut (Murray, W)

MS&E 313. Vector Space Optimization
Optimization theory from the unified framework of vector space theory: treating together problems of mathematical programming, calculus of variations, optimal control, estimation, and other optimization problems. Emphasis is on geometric interpretation. Duality theory. Topics: vector spaces including function spaces; Hilbert space and the projection theorem; dual spaces and the separating hyperplane theorem; linear operators and adjoints; optimization of functionals, including theory of necessary conditions in general spaces, and convex optimization theory; constrained optimization including Fenchel duality theory. Prerequisite: MATH 115.

3 units, Aut (Luenberger, D), alternate years, not given next year

MS&E 314. Linear and Conic Optimization with Applications
(Same as CME 336) Linear, semidefinite, conic, and convex nonlinear optimization problems as generalizations of classical linear programming. Algorithms include the interior-point, barrier function, and cutting plane methods. Related convex analysis, includ-

ing the separating hyperplane theorem, Farkas lemma, dual cones, optimality conditions, and conic inequalities. Complexity and/or computation efficiency analysis. Applications to combinatorial optimization, sensor network localization, support vector machine, and graph realization. Prerequisite: MS&E 211 or equivalent.

3 units, alternate years, not given this year

MS&E 315. Numerical Optimization

(Same as CME 304) Solution of nonlinear equations; unconstrained optimization; linear programming; quadratic programming; global optimization; general linearly and nonlinearly constrained optimization. Theory and algorithms to solve these problems. Prerequisite: background in analysis and numerical linear algebra.

3 units, Win (Murray, W)

MS&E 316. Discrete Mathematics and Algorithms

(Same as CME 305) Topics: enumeration such as Cayley's theorem and Prufer codes, SDR, flows and cuts (deterministic and randomized algorithms), probabilistic methods and random graphs, asymptotics (NP-hardness and approximation algorithms). Topics illustrated with EE, CS, and bioinformatics applications. Prerequisites: MATH 51 or 103 or equivalents.

3 units, Win (Saberi, A)

MS&E 318. Large-Scale Numerical Optimization

(Same as CME 338) The main algorithms and software for constrained optimization emphasizing the sparse-matrix methods needed for their implementation. Iterative methods for linear equations and least squares. The simplex method. Basic factorization and updates. Interior methods. The reduced-gradient method, augmented Lagrangian methods, and SQP methods. Prerequisites: Basic numerical linear algebra, including LU, QR, and SVD factorizations, and an interest in MATLAB, sparse-matrix methods, and gradient-based algorithms for constrained optimization. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108, 200, 302, 304, 334, or 335.

3 units, Spr (Saunders, M)

MS&E 319. Approximation Algorithms

Combinatorial and mathematical programming techniques to derive approximation algorithms for NP-hard optimization problems. Possible topics include: greedy algorithms for vertex/set cover; rounding LP relaxations of integer programs; primal-dual algorithms; semidefinite relaxations. May be repeated for credit. Prerequisites: 112 or CS 161.

3 units, Spr (Saberi, A), alternate years, not given next year

MS&E 321. Stochastic Systems

Topics in stochastic processes, emphasizing applications. Markov chains in discrete and continuous time; Markov processes in general state space; Lyapunov functions; regenerative process theory; renewal theory; martingales, Brownian motion, and diffusion processes. Application to queueing theory, storage theory, reliability, and finance. Prerequisites: 221 or STATS 217; MATH 113, 115. (Glynn)

3 units, Spr (Glynn, P)

MS&E 322. Stochastic Calculus and Control

Ito integral, existence and uniqueness of solutions of stochastic differential equations (SDEs), diffusion approximations, numerical solutions of SDEs, controlled diffusions and the Hamilton-Jacobi-Bellman equation, and statistical inference of SDEs. Applications to finance and queueing theory. Prerequisites: 221 or STATS 217: MATH 113, 115.

3 units, not given this year

MS&E 323. Stochastic Simulation

Emphasis is on the theoretical foundations of simulation methodology. Generation of uniform and non-uniform random variables. Discrete-event simulation and generalized semi-Markov processes. Output analysis (autoregressive, regenerative, spectral, and stationary times series methods). Variance reduction techniques (antithetic variables, common random numbers, control variables, discrete-time, conversion, importance sampling). Stochastic optimization (likelihood ratio method, perturbation analysis, stochastic approximation). Simulation in a parallel environment. Prerequisite: MS&E 221 or equivalent.

3 units, not given this year

MS&E 325. Topics in Stochastic Optimization

Algorithms for optimization problems with inputs from a known probability distribution or a known class of probability distributions. Topics: Markov decision processes; optimization with sparse priors; multi-armed bandit problems and the Gittins' index; regret bounds for multi-armed bandit problems; stochastic knapsack and the adaptivity gap; budgeted learning; adversarial queueing theory; stochastic scheduling and routing; stochastic inventory problems; multi-stage and multi-objective stochastic optimization. Prerequisites: MS&E 221 or equivalent; and MS&E 212 or CS 261 or equivalent.

3 units, alternate years, not given this year

MS&E 332. Security and Risk in Computer Networks

Risk management of large scale computing and networking systems with respect to security, data integrity, performance collapse, and service disruption. Qualitative and analytical basis for assessment, modeling, control, and mitigation of network risks. Stochastic risk models. Contact process. Random fields on networks. Virus and worm propagation dynamics and containment. Denial of service attacks. Intruder detection technologies. Distributed network attacks and countermeasures. Disaster recovery networks. Network protection services and resource placement. Autonomic self-defending networks. Economics of risk management. Emphasis is on analytics and quantitative methods.

3 units, not given this year

MS&E 334. Computation of Equilibria

Topics: Sperner's lemma, fixed point theorems, and existence of Nash and Market equilibria. Alternate convex and linear completarity program formulations. Combinatorial algorithms. Complexity classes related to fixed points theorems and reductions to equilibrium problems. Similar solutions in cooperative game theory and fair division.

3 units, not given this year

MS&E 335. Queueing and Scheduling in Processing Networks

Advanced stochastic modeling and control of systems involving queueing and scheduling operations. Stability analysis of queueing systems. Key results on single queues and queueing networks. Controlled queueing systems. Dynamic routing and scheduling in processing networks. Applications to modeling, analysis and performance engineering of computing systems, communication networks, flexible manufacturing, and service systems. Prerequisite: 221 or equivalent.

3 units, Aut (Bambos, N)

MS&E 336. Topics in Game Theory with Engineering Applications

Seminar. Recent research applying economic methods to engineering problems. Recent topics include: incentives in networked systems; mechanism design in engineered systems; and dynamics and learning in games. Prerequisites: mathematics at the level of MATH 115; game theory at the level of 246 or ECON 203; probability at the level of 220; optimization at the level of 211. May be repeated for credit.

3 units, Spr (Johari, R)

MS&E 337. Information Networks

(Same as CME 337) Network structure of the Internet and the web. Modeling, scale-free graphs, small-world phenomenon. Algorithmic implications in searching and inter-domain routing; the effect of structure on performance. Game theoretic issues, routing games, and network creation games. Security issues, vulnerability, and robustness. Prerequisite: basic probability and graph theory.

3 units, alternate years, not given this year

MS&E 339. Approximate Dynamic Programming

Approximation algorithms for large-scale dynamic programming. Real-time dynamic programming and reinforcement learning algorithms. Generalizations of value iteration, policy iteration, and linear programming approaches. Recent research topics. Prerequisite: 251, 351, CS 221, CS 228, or CS 229.

3 units, not given this year

MS&E 341. Advanced Economic Analysis

Builds on 241 concepts. Market structure and industrial organization (oligopoly, strategic behavior of firms, game theoretic models); economics of uncertainty; general equilibrium theory and economic efficiency (formulation, Walras' Law, existence, uniqueness, duality between efficiency and general equilibrium; trade); intertemporal equilibrium and asset markets; public goods, externalities. Background for advanced economics. Prerequisite: 241.

3 units, alternate years, not given this year

MS&E 342. Advanced Investment Science
Topics: forwards and futures contracts, continuous and discrete time models of stock price behavior, geometric Brownian motion, Ito's lemma, basic options theory, Black-Scholes equation, advanced options techniques, models and applications of stochastic interest rate processes, and optimal portfolio growth. Computational issues and general theory. Teams work on independent projects. Prerequisite: 242.

3 units, Win (Luenberger, D)

MS&E 343. Optimal Control Theory with Applications in Economics
Classical and nonclassical optimal control applications in economics. Necessary and sufficient optimality conditions: maximum principle and HJB equation. Applications: single-person decision problems such as dynamic pricing, investment, marketing, and harvesting of renewable resources; multi-agent games such as dynamic oligopolies with open and closed-loop equilibria, capital accumulation, and dynamic pricing; and design of economic mechanisms such as screening contracts, regulation, and auctions. Prerequisites: course in dynamic systems and multivariable calculus.

3 units, Win (Weber, T), alternate years, not given next year

MS&E 344. Applied Information Economics
The strategic acquisition, pricing, transfer, and use of information. Theoretical findings applied to real-world settings. Topics: optimal risk bearing, adverse selection, signaling, screening, nonlinear and state-contingent pricing, design of contests, incentives and organizations, strategic information transmission, long-run relationships, negative information value, research and invention, leakage and espionage, imperfect competition, information sharing, search and advertising, learning, and real-option exercise games. Prerequisites: 211, 220, 241. Recommended: 341.

3 units, not given this year

MS&E 345. Advanced Topics in Financial Engineering
Derivative pricing theory from an engineering perspective. Underlying principles that apply to all derivative securities; general frameworks to model and price derivative securities on equities, interest rates, and credit. Topics in hedging and risk management. Prerequisites: derivative pricing and stochastic differential equations; and 220, 221, 242, 342, or consent of instructor. Recommended: Matlab. (Primbs)

3 units, Aut (Primbs, J)

MS&E 347. Credit Risk: Modeling and Management
Credit risk modeling, valuation, and hedging emphasizing underlying economic, probabilistic, and statistical concepts. Point processes and their compensators. Structural, incomplete information and reduced form approaches. Single name products: corporate bonds, equity, equity options, credit and equity default swaps, forwards and swaptions. Multiname modeling: index and tranche swaps and options, collateralized debt obligations. Implementation, calibration and testing of models. Industry and market practice. Data and implementation driven group projects that focus on problems in the financial industry. Prerequisites: stochastic processes at the level of MSE 321, 322 or equivalent, and financial engineering at the level of MSE 342, MATH 180, MATH 240, FINANCE 622 or equivalent

3 units, Spr (Giesecke, K)

MS&E 348. Optimization of Uncertainty and Applications in Finance
How to make optimal decisions in the presence of uncertainty, solution techniques for large-scale systems resulting from decision problems under uncertainty, and applications in finance. Decision trees, utility, two-stage and multi-stage decision problems, approaches to stochastic programming, model formulation; large-scale systems, Benders and Dantzig-Wolfe decomposition, Monte Carlo sampling and variance reduction techniques, risk management, portfolio optimization, asset-liability management, mortgage finance. Projects involving the practical application of optimization under uncertainty to financial planning.

3 units, Win (Infanger, G)

MS&E 349. Capital Deployment
Methods for efficiently allocating capital among alternatives, constructing business plans, determining the value of risky projects, and creating alternatives that enhance value. Prerequisites: 242, 342.

3 units, alternate years, not given this year

MS&E 351. Dynamic Programming and Stochastic Control
Markov population decision chains in discrete and continuous time. Risk posture. Present value and Cesaro overtaking optimality. Optimal stopping. Successive approximation, policy improvement, and linear programming methods. Team decisions and stochastic programs; quadratic costs and certainty equivalents. Maximum principle. Controlled diffusions. Examples from inventory, overbooking, options, investment, queues, reliability, quality, capacity, transportation. MATLAB. Prerequisites: MATH 113, 115; Markov chains; linear programming.

3 units, Spr (Van Roy, B)

MS&E 352. Decision Analysis II: Professional Decision Analysis
How to organize the decision conversation, the role of the decision analysis cycle and the model sequence, assessing the quality of decisions, framing decisions, the decision hierarchy, strategy tables for alternative development, creating spare and effective decision diagrams, biases in assessment, knowledge maps, uncertainty about probability. Sensitivity analysis, approximations, value of revelation, joint information, options, flexibility, bidding, assessing and using corporate risk attitude, risk sharing and scaling, and decisions involving health and safety. See 353 for continuation. Prerequisite: 252.

3-4 units, Win (Howard, R)

MS&E 353. Decision Analysis III: Frontiers of Decision Analysis
The concept of decision composite; probabilistic insurance and other challenges to the normative approach; the relationship of decision analysis to classical inference and data analysis procedures; the likelihood and exchangeability principles; inference, decision, and experimentation using conjugate distributions; developing a risk attitude based on general properties; alternative decision aiding practices such as analytic hierarchy and fuzzy approaches. Student presentations on current research. Goal is to prepare doctoral students for research. Prerequisite: 352.

3 units, Spr (Howard, R)

MS&E 355. Influence Diagrams and Probabilistics Networks
Network representations for reasoning under uncertainty: influence diagrams, belief networks, and Markov networks. Structuring and assessment of decision problems under uncertainty. Learning from evidence. Conditional independence and requisite information. Node reductions. Belief propagation and revision. Simulation. Linear-quadratic-Gaussian decision models and Kalman filters. Dynamic processes. Bayesian meta-analysis. Prerequisites: 220, 252, or equivalents, or consent of instructor.

3 units, alternate years, not given this year

MS&E 361. Supply Chain Optimization
Characterization and computation of optimal and nearly optimal multiperiod supply chain policies with known or uncertain demands using dynamic, lattice, network, and convex and concave programming. Cooperation: sharing benefits of alliances. Competition. Leontief-substitution and network-flow models. Lattice programming: comparison of optima; existence and comparison of equilibria of non-cooperative games. Stochastic comparison. Invariant properties of optimal flows: graphical optimization of supply chains. Optimality of myopic policies. Prerequisites: MATH 115, optimization theory, probability.

3 units, not given this year

MS&E 362. Advanced Models in Production and Operations
The design and operation of production-inventory systems. Topics include production scheduling, capacity planning, sequencing, assembly-line balancing, dynamic scheduling, and multigoal optimizations. Readings primarily from journal articles. Prerequisite: 260.

3 units, Aut (Carlson, R), alternate years, not given next year

MS&E 364. Multi-echelon Inventory Models
Theoretical treatment of control problems arising in inventory management, production, and distribution systems. Inventory control for single and multi-location systems. Emphasis is on operat-

ing characteristics, performance measures, and optimal operating and control policies. Dynamic programming and applications in inventory control. Prerequisite: STATS 217 or equivalent, linear programming.

3 units, Spr (Hausman, W), alternate years, not given next year

MS&E 365. Advanced Models in Operations Management
Primarily for doctoral students. Content varies. Topics based on recent literature and working papers. May be repeated for credit. Prerequisite: MS&E 246.

3 units, not given this year

MS&E 371. Innovation and Strategic Change
Doctoral research seminar, limited to Ph.D. students. Current research on innovation strategy. Topics: scientific discovery, innovation search, organizational learning, evolutionary approaches, and incremental and radical change. Topics change yearly. Recommended: course in statistics or research methods.

2-3 units, alternate years, not given this year

MS&E 372. Entrepreneurship Doctoral Research Seminar
Classic and current research on entrepreneurship. Limited enrollment, restricted to PhD students. Prerequisites: SOC 363 or equivalent, and permission of instructor.

3 units, Win (Eesley, C), alternate years, not given next year

MS&E 374. Dynamic Corporate Strategy
Restricted to Ph.D. students. Research on the creation and shaping of disruptive industry dynamics and how companies can formulate and implement strategies to excel in such changing environments. Dynamic system model approach; case studies. Prerequisites: 201 or equivalent, 274.

3 units, Win (Tse, E), alternate years, not given next year

MS&E 376. Strategy Doctoral Research Seminar
Classic and current research on business and corporate strategy. Limited enrollment, restricted to PhD students. Prerequisites: SOC 363 or equivalent, and permission of instructor.

3 units, Aut (Eisenhardt, K)

MS&E 380. Doctoral Research Seminar in Organizations
Limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.

3 units, not given this year

MS&E 381A. Doctoral Research Seminar in Work, Technology, and Organization: Theoretical Underpinnings
Enrollment limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.

2-3 units, not given this year

MS&E 381B. Doctoral Research Seminar in Work, Technology, and Organization: The Study of Work
Enrollment limited to Ph.D. students. Topics from current published literature and working papers. Prerequisite: consent of instructor.

2-3 units, not given this year

MS&E 381C. Doctoral Research Seminar in Work, Technology, and Organization: The Study of Technology
Enrollment limited to Ph.D. students. Topics from current literature and working papers. Prerequisite: consent of instructor.

2-3 units, not given this year

MS&E 383. Doctoral Seminar on Ethnographic Research
For graduate students; upper-level undergraduates with consent of instructor. Ethnosemantic interviewing and participant observation. Techniques for taking, managing, and analyzing field notes and other qualitative data. 15 hours per week outside class collecting and analyzing own data. Methods texts and ethnographies offer examples of how to analyze and communicate ethnographic data. Prerequisite: consent of instructor. (Barley)

3 units, Win (Barley, S)

MS&E 384. Groups and Teams
Research on groups and teams in organizations from the perspective of organizational behavior and social psychology. Topics include group effectiveness, norms, group composition, diversity, conflict, group dynamics, temporal issues in groups, geographically distributed teams, and intergroup relations.

3 units, not given this year

MS&E 389. Seminar on Organizational Theory
(Same as EDUC 375A, SOC 363A) The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.

5 units, Aut (Powell, W)

MS&E 390. Doctoral Research Seminar in Health Systems Modeling
Restricted to Ph.D. students, or by consent of instructor. Doctoral research seminar covering current topics in health policy, health systems modeling, and health innovation. May be repeated for credit.

1-3 units, Aut (Brandeau, M), Win (Brandeau, M), Spr (Brandeau, M)

MS&E 406. Mathematical Modeling Seminar
Mathematical modeling issues in participants' current research. Topics such as modularity, variable endogenization, parameter estimation, and orders of effect. Students share their models for discussion. Limited enrollment. Recommended: 206.

1 unit, alternate years, not given this year

MS&E 408. Directed Reading and Research
Directed study and research on a subject of mutual interest to student and faculty member. Prerequisite: faculty sponsor. (Staff)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MS&E 409. Operations Research Colloquium
Speakers drawn from a wide variety of backgrounds across topics broadly related to operations research. Graduate Students Only.

1 unit, Aut (Johari, R), Win (Johari, R), Spr (Johari, R)

MS&E 444. Investment Practice
Theory of real options, soft derivatives, and related ideas. Problems from financial engineering and risk management. Examples from industry. Small group projects formulate and design solutions to actual industry problems. Enrollment limited to 30.

3-4 units, Spr (Giesecke, K)

MS&E 445. Projects in Wealth Management
Recent theory and standard practice in portfolio design for institutions, individuals, and funds. Student projects and case studies derived from the financial industry.

3-4 units, Spr (Woehrmann, P)

MS&E 446. Policy and Economics Research Roundtable (PERR)
Research in progress or contemplated in policy and economics areas. Emphasis depends on research interests of participants, but is likely to include energy, environment, transportation, or technology policy and analysis. May be repeated for credit.

1 unit, Aut (Sweeney, J), Win (Sweeney, J), Spr (Sweeney, J)

MS&E 450. Lessons in Decision Making
Entrepreneurs, senior management consultants, and executives from Fortune 500 companies share real-world stories and insights from their experience in decision making.

1 unit, Spr (Howard, R)

MS&E 452. Decision Analysis Projects: Helping Real Leaders Make Real Decisions
A virtual consulting firm directed by professional decision analysts who offer advice and guidance as student teams help local organizations make a current business strategy or public policy decision. Projects for businesses, governments, or other institutions typically include start-up venture funding, R&D portfolio planning, new product or market entry, acquisition or partnering, cost reduction, program design, or regulatory policy decisions. Emphasis is on developing clarity of action and delivering insights to clients. Satisfies MS&E project course requirement. Prerequiste: 252. Recommended: 352.

3 units, Spr (Robinson, B)

MS&E 453. Decision Analysis Applications: Business Strategy and Public Policy
How decision analysis is used to make decisions in organizations. Who applies these methods to what decisions, and when, where, and why. Case studies: entrepreneurial ventures, consulting projects, litigation, chip manufacturing, consumer electronics, Corvette design, blockbuster movies, R&D priorities, real estate portfolios, HIV/HCV drug trial design, cancer diagnostics, Mars contamination, oil E&P, economics and energy pricing, nuclear waste, climate change, marine resources, bioterrorism preparedness, nu-

clear weapons control, effective interactions, and ethics. Corequisite: MS&E 252 recommended.
2-3 units, Aut (Robinson, B)

MS&E 454. Decision Analysis Seminar
Current research and related topics presented by doctoral students and invited speakers. May be repeated for credit. Prerequisite: 252.
1 unit, Aut (Howard, R), Win (Howard, R), Spr (Howard, R)

MS&E 464. Global Project Coordination
Students engage in projects that are global in nature, and related to the planning, design, and operations of supply chains, marketing, manufacturing, and product development. Project teams from Stanford and an overseas university work on common projects using telephones, faxes, email, Internet, video conferences, and face-to-face meetings. As part of the project, students travel to Hong Kong. Applications due in November. See http://www.stanford.edu/class/msande464/.
3-4 units, Win (Chiu, S)

MS&E 472. Entrepreneurial Thought Leaders' Seminar
Entrepreneurial leaders share lessons from real-world experiences across entrepreneurial settings. ETL speakers include entrepreneurs, leaders from global technology companies, venture capitalists, and best-selling authors. Half-hour talks followed by half hour of class interaction. Required web discussion. May be repeated for credit.
1 unit, Aut (Byers, T; Seelig, T; Kosnik, T), Win (Byers, T; Seelig, T; Kosnik, T), Spr (Byers, T; Seelig, T; Kosnik, T)

MS&E 485A. Introduction to Crosscultural Design
Preparation for 485B. Workshop and initial project work in teams.
1-2 units, not given this year

MS&E 485B. Crosscultural Design
The design of products and services for a global world. How to design products or services to be used across cultures; how to design for a culture other than one's own; and how the process of design is approached in different cultures. Prerequisite: 485A.
3-4 units, not given this year

MS&E 491. Clean Energy Developement
Project course for advanced undergraduates and graduate students. Low-depleting and low-polluting energy, such as solar, wind and biomass. Clean energy and entrepreneurship. Student teams conceive, prepare, and present a business plan for a real or realistic clean energy development (an individual project or an entire company). Presentations, discussions, and guest lectures.
3 units, Spr (Borison, A; Hamm, G)

MS&E 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MASTER OF LIBERAL ARTS (MLA) COURSES

MLA 9. European Thought and Culture in the 19th Century
Major European thinkers and writers and their intellectual significance from the Enlightenment to modernism. Works by Voltaire, Austen, Wordsworth, Marx, Nietzsche, and Freud.
4 units, not given this year

MLA 100E. MLA Natural Science Elective
1-2 units, Aut (Paulson, L), Win (Paulson, L), Spr (Paulson, L), Sum (Paulson, L)

MLA 101A. Foundations I
Required of and limited to first-year MLA students. First of three quarter foundation course. Introduction to the main political, philosophical, literary, and artistic trends that inform the liberal arts vision of the world and that underlie the MLA curriculum.
4 units, Aut (Steidle, E)

MLA 101B. Foundations II: the Middle Ages and Renaissance.
Required of and limited to first-year MLA students. Second of three quarter foundation course. Introduction to the main political, philosophical, literary, and artistic trends that inform the liberal arts vision of the world and that underlie the MLA curriculum.
4 units, Win (Steidle, E)

MLA 101C. Foundations III: the Enlightenment through Modernism
Required of and limited to first-year MLA students. First of three quarter foundation course. Introduction to the main political, philosophical, literary, and artistic trends that inform the liberal arts vision of the world and that underlie the MLA curriculum.
4 units, Spr (Junkerman, C)

MLA 102. An Introduction to Interdisciplinary Graduate Study
Limited to and required of second-year MLA students. Historical, literary, artistic, medical, and theological issues are covered. Focus is on skills and information needed to pursue MLA graduate work at Stanford: writing a critical, argumentative graduate paper; conducting library research; expectations of seminar participation. Readings include Homer, Thucydides, Camus, Mann, Kushner, and sacred, scientific, and historical writings.
4 units, Aut (Paulson, L)

MLA 262. The Economics of Life and Death
4 units, Sum (Bhattacharya, J)

MLA 278. James Joyce's Ulysses
4 units, Win (Staff)

MLA 279. When Worlds Collide: The Trial of Galileo
4 units, Win (Staff)

MLA 280. British and American Fiction in the 19th and early 20th Century
4 units, Win (Staff)

MLA 300. Oxford Summer Programme
2-4 units, Sum (Paulson, L)

MLA 398. MLA Thesis in Progress
Group meetings provide peer critiques, motivations, and advice under the direction of the Associate Dean.
0 units, Aut (Paulson, L), Win (Paulson, L), Spr (Paulson, L), Sum (Paulson, L)

MLA 399. MLA Thesis Final Quarter
Students write a 75-100 page thesis that evolves out of work they pursued during their MLA studies.
6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Paulson, L)

MATERIALS SCIENCE AND ENGINEERING (MATSCI) COURSES

UNDERGRADUATE COURSES IN MATERIALS SCIENCE AND ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MATSCI 81N. Bioengineering Materials to Heal the Body
(Stanford Introductory Seminar) Preference to freshmen. How scientists and engineers are designing new materials for surgeon to use in replacing body parts such as heart tissue or the spinal cord. How cells, in the body and transplanted stem cells, communicate with implanted materials. Real-world examples of materials developed for tissue engineering and regenerative medicine therapies. Students identify a clinically important disease or injury that requires a better material, research approaches to the problem, and debate possible engineering solutions. GER:DB-EngrAppSci
3 units, Win (Heilshorn, S)

MATSCI 100. Undergraduate Independent Study
Independent study in materials science under supervision of a faculty member.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 150. Undergraduate Research
Participation in a research project.
3-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 151. Microstructure and Mechanical Properties
(Same as MATSCI 251) Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary de-

formation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: ENGR 50 or equivalent. GER:DB-EngrAppSci

3-4 units, Aut (Staff)

MATSCI 152. Electronic Materials Engineering

Materials science and engineering for electronic device applications. Kinetic molecular theory and thermally activated processes; band structure and electrical conductivity of metals and semiconductors; intrinsic and extrinsic semiconductors; diffusion; elementary p-n junction theory; operating principles of metal-oxide-semiconductor field effect transistors. Semiconductor processing including crystal growth, oxidation kinetics, ion implantation, thin film deposition, etching, and photolithography. Prerequisite: ENGR 50 or equivalent. GER:DB-EngrAppSci

4 units, Spr (Dionne, J)

MATSCI 153. Nanostructure and Characterization

The structure of materials at the nanoscale is in most cases the same crystalline form as the natural phase. Structures of materials such as semiconductors, ceramics, metals, and nanotubes; classification of these materials according to the principles of crystallography. Primary methods of structural characterization, X-ray diffraction, and electron microscopy; their applications to study such nanostructures. GER:DB-EngrAppSci

4 units, Win (Sinclair, R; Earhart, C)

MATSCI 154. Solid State Thermodynamics

The principles of thermodynamics and relationships between thermodynamic variables. Equilibrium in thermodynamic systems. Thermodynamics of multicomponent systems. GER:DB-EngrAppSci

4 units, Aut (Barnett, D)

MATSCI 155. Nanomaterials Synthesis

The science of synthesis of nanometer scale materials. Examples including solution phase synthesis of nanoparticles, the vapor-liquid-solid approach to growing nanowires, formation of mesoporous materials from block-copolymer solutions, and formation of photonic crystals. Relationship of the synthesis phenomena to the materials science driving forces and kinetic mechanisms. Materials science concepts including capillarity, Gibbs free energy, phase diagrams, and driving forces. GER:DB-EngrAppSci

4 units, Spr (Clemens, B)

MATSCI 156. Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution

(Same as MATSCI 256) Operating principles and applications of emerging technological solutions to the energy demands of the world. The scale of global energy usage and requirements for possible solutions. Basic physics and chemistry of solar cells, fuel cells, and batteries. Performance issues, including economics, from the ideal device to the installed system. The promise of materials research for providing next generation solutions. GER:DB-EngrAppSci

3-4 units, Aut (Clemens, B)

MATSCI 157. Quantum Mechanics of Nanoscale Materials

Introduction to quantum mechanics and its application to the properties of materials. The Schrödinger equation, uncertainty principle, bound states and periodic potentials, angular momentum, quantum statistics, and perturbation theory. Applications to electronic band structure in semiconductors, metals, and nanostructures; vibrational properties of solids; light/matter interaction and lasers; bonding; magnetic materials; nanotechnology. Prerequisites: working knowledge of calculus and high school physics. GER:DB-EngrAppSci

4 units, Win (Lindenberg, A)

MATSCI 159Q. Japanese Companies and Japanese Society

(Stanford Introductory Seminar) (Same as ENGR 159Q) Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course. GER:DB-SocSci

3 units, Spr (Sinclair, R)

MATSCI 160. Nanomaterials Laboratory

Preference to sophomores and juniors. Hands-on approach to synthesis and characterization of nanoscale materials. How to make, pattern, and analyze the latest nanotech materials, including nanoparticles, nanowires, and self-assembled monolayers. Techniques such as soft lithography, self-assembly, and surface functionalization. The VLS mechanism of nanowire growth, nanoparticle size control, self-assembly mechanisms, and surface energy considerations. Laboratory projects. Enrollment limited to 24. GER:DB-EngrAppSci

4 units, Spr (Melosh, N)

MATSCI 161. Nanocharacterization Laboratory

(Same as MATSCI 171) The development of standard lab procedures for materials scientists emphasizing microscopy, metallography, and technical writing. Techniques: optical, scanning-electron, atomic-force microscopy; and metallographic specimen preparation. The relationships among microscopic observation, material properties, and processing. Prerequisite: ENGR 50 or equivalent. GER:DB-EngrAppSci, WIM

3-4 units, Spr (McGehee, M)

MATSCI 162. X-Ray Diffraction Laboratory

(Same as MATSCI 172) Experimental x-ray diffraction techniques for microstructural analysis of materials, emphasizing powder and single-crystal techniques. Diffraction from epitaxial and polycrystalline thin films, multilayers, and amorphorous materials using medium and high resolution configurations. Determination of phase purity, crystallinity, relaxation, stress, and texture in the materials. Advanced experimental x-ray diffraction techniques: reciprocal lattice mapping, reflectivity, and grazing incidence diffraction. Enrollment limited to 20. GER:DB-EngrAppSci

3-4 units, Win (Vailionis, A)

MATSCI 163. Mechanical Behavior Laboratory

(Same as MATSCI 173) Experimental techniques for the study of the mechanical behavior of engineering materials in bulk and thin film form, including tension testing, nanoindentation, and wafer curvature stress analysis. Metallic and polymeric systems. Prerequisite: ENGR 50. GER:DB-EngrAppSci

3-4 units, Aut (Earhart, C)

MATSCI 164. Electronic and Photonic Materials and Devices Laboratory

Lab course. Current electronic and photonic materials and devices. Device physics and micro-fabrication techniques. Students design, fabricate, and perform physical characterization on the devices they have fabricated. Established techniques and materials such as photolithography, metal evaporation, and Si technology; and novel ones such as soft lithography and organic semiconductors. Prerequisite: 152 or 199 or consent of instructor. GER:DB-EngrAppSci, WIM

4 units, Aut (Salleo, A)

MATSCI 190. Organic and Biological Materials

(Same as MATSCI 210) Unique physical and chemical properties of organic materials and their uses.The relationship between structure and physical properties, and techniques to determine chemical structure and molecular ordering. Examples include liquid crystals, dendrimers, carbon nanotubes, hydrogels, and biopolymers such as lipids, protein, and DNA. Prerequisite: Thermodynamics and ENGR 50 or equivalent. GER:DB-EngrAppSci

3-4 units, Spr (Heilshorn, S)

MATSCI 192. Materials Chemistry

(Same as MATSCI 202) Chemical principles of materials: atomic and molecular bonding; acid and base chemistry; redox and electrochemistry; colloidal and surface chemistry; materials synthesis; and nanoscale chemistry. GER:DB-EngrAppSci

3-4 units, Aut (Dionne, J)

MATSCI 193. Atomic Arrangements in Solids

(Same as MATSCI 203) Atomic arrangements in perfect and imperfect solids, especially important metals, ceramics, and semiconductors. Elements of formal crystallography, including development of point groups and space groups. GER:DB-EngrAppSci

3-4 units, Aut (Reed, E)

MATSCI 194. Thermodynamics and Phase Equilibria

(Same as MATSCI 204) The principles of heterogeneous equilibria and their application to phase diagrams. Thermodynamics of solutions; chemical reactions; non-stoichiometry in compounds; first order phase transitions and metastability; thermodynamics of surfaces, elastic solids, dielectrics, and magnetic solids. GER:DB-EngrAppSci

3-4 units, Win (Salleo, A)

MATSCI 195. Waves and Diffraction in Solids
(Same as MATSCI 205) The elementary principals of x-ray, vibrational, and electron waves in solids. Basic wave behavior including Fourier analysis, interference, diffraction, and polarization. Examples of wave systems, including electromagnetic waves from Maxwell's equations. Diffracted intensity in reciprocal space and experimental techniques such as electron and x-ray diffraction. Lattice vibrations in solids, including vibrational modes, dispersion relationship, density of states, and thermal properties. Free electron model. Basic quantum mechanics and statistical mechanics including Fermi-Dirac and Bose-Einstein statistics. Prerequisite: 193/203 or consent of instructor. GER:DB-EngrAppSci

3-4 units, Win (Clemens, B)

MATSCI 196. Imperfections in Solids
(Same as MATSCI 206) Atomic and molecular scale defects and their importance to the physical and mechanical properties of bulk and nanoscale materials. Point defects and dislocations in crystals. Imperfections in amorphous solids. Structure and properties of interfaces. Prerequisite: 193/203. GER:DB-EngrAppSci

3-4 units, Win (Dauskardt, R; Oliver, M)

MATSCI 197. Rate Processes in Materials
(Same as MATSCI 207) Diffusion and phase transformations in solids. Diffusion topics: Fick's laws, atomic theory of diffusion, and diffusion in alloys. Phase transformation topics: nucleation, growth, diffusional transformations, spinodal decomposition, and interface phenomena. Material builds on the mathematical, thermodynamic, and statistical mechanical foundations in the prerequisites. Prerequisites: 194/204. GER:DB-EngrAppSci

3-4 units, Spr (McIntyre, P)

MATSCI 198. Mechanical Properties of Materials
(Same as MATSCI 208) Introduction to the mechanical behavior of solids, emphasizing the relationships between microstructure and mechanical properties. Elastic, anelastic, and plastic properties of materials. The relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislocation theory to strengthening mechanisms in crystalline solids. The phenomena of creep, fracture, and fatigue and their controlling mechanisms. Prerequisites: 193/203. GER:DB-EngrAppSci

3-4 units, Spr (Dauskardt, R)

MATSCI 199. Electronic and Optical Properties of Solids
(Same as MATSCI 209) The concepts of electronic energy bands and transports applied to metals, semiconductors, and insulators. The behavior of electronic and optical devices including p-n junctions, MOS-capacitors, MOSFETs, optical waveguides, quantum-well lasers, light amplifiers, and metallo-dielectric light guides. Emphasis is on relationships between structure and physical properties. Elementary quantum and statistical mechanics concepts are used. Prerequisite: 195/205 or equivalent. GER:DB-EngrAppSci

3-4 units, Spr (Brongersma, M)

GRADUATE COURSES IN MATERIALS SCIENCE AND ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MATSCI 171. Nanocharacterization Laboratory
(Same as MATSCI 161) The development of standard lab procedures for materials scientists emphasizing microscopy, metallography, and technical writing. Techniques: optical, scanning-electron, atomic-force microscopy; and metallographic specimen preparation. The relationships among microscopic observation, material properties, and processing. Prerequisite: ENGR 50 or equivalent.

3-4 units, Spr (McGehee, M)

MATSCI 172. X-Ray Diffraction Laboratory
(Same as MATSCI 162) Experimental x-ray diffraction techniques for microstructural analysis of materials, emphasizing powder and single-crystal techniques. Diffraction from epitaxial and polycrystalline thin films, multilayers, and amorphorous materials using medium and high resolution configurations. Determination of phase purity, crystallinity, relaxation, stress, and texture in the materials. Advanced experimental x-ray diffraction techniques: reciprocal lattice mapping, reflectivity, and grazing incidence diffraction. Enrollment limited to 20.

3-4 units, Win (Vailionis, A)

MATSCI 173. Mechanical Behavior Laboratory
(Same as MATSCI 163) Experimental techniques for the study of the mechanical behavior of engineering materials in bulk and thin film form, including tension testing, nanoindentation, and wafer curvature stress analysis. Metallic and polymeric systems. Prerequisite: ENGR 50.

3-4 units, Aut (Earhart, C)

MATSCI 200. Master's Research
Participation in a research project.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 202. Materials Chemistry
(Same as MATSCI 192) Chemical principles of materials: atomic and molecular bonding; acid and base chemistry; redox and electrochemistry; colloidal and surface chemistry; materials synthesis; and nanoscale chemistry.

3-4 units, Aut (Dionne, J)

MATSCI 203. Atomic Arrangements in Solids
(Same as MATSCI 193) Atomic arrangements in perfect and imperfect solids, especially important metals, ceramics, and semiconductors. Elements of formal crystallography, including development of point groups and space groups.

3-4 units, Aut (Reed, E)

MATSCI 204. Thermodynamics and Phase Equilibria
(Same as MATSCI 194) The principles of heterogeneous equilibria and their application to phase diagrams. Thermodynamics of solutions; chemical reactions; non-stoichiometry in compounds; first order phase transitions and metastability; thermodynamics of surfaces, elastic solids, dielectrics, and magnetic solids.

3-4 units, Win (Salleo, A)

MATSCI 205. Waves and Diffraction in Solids
(Same as MATSCI 195) The elementary principals of x-ray, vibrational, and electron waves in solids. Basic wave behavior including Fourier analysis, interference, diffraction, and polarization. Examples of wave systems, including electromagnetic waves from Maxwell's equations. Diffracted intensity in reciprocal space and experimental techniques such as electron and x-ray diffraction. Lattice vibrations in solids, including vibrational modes, dispersion relationship, density of states, and thermal properties. Free electron model. Basic quantum mechanics and statistical mechanics including Fermi-Dirac and Bose-Einstein statistics. Prerequisite: 193/203 or consent of instructor.

3-4 units, Win (Clemens, B)

MATSCI 206. Imperfections in Solids
(Same as MATSCI 196) Atomic and molecular scale defects and their importance to the physical and mechanical properties of bulk and nanoscale materials. Point defects and dislocations in crystals. Imperfections in amorphous solids. Structure and properties of interfaces. Prerequisite: 193/203.

3-4 units, Win (Dauskardt, R; Oliver, M)

MATSCI 207. Rate Processes in Materials
(Same as MATSCI 197) Diffusion and phase transformations in solids. Diffusion topics: Fick's laws, atomic theory of diffusion, and diffusion in alloys. Phase transformation topics: nucleation, growth, diffusional transformations, spinodal decomposition, and interface phenomena. Material builds on the mathematical, thermodynamic, and statistical mechanical foundations in the prerequisites. Prerequisites: 194/204.

3-4 units, Spr (McIntyre, P)

MATSCI 208. Mechanical Properties of Materials
(Same as MATSCI 198) Introduction to the mechanical behavior of solids, emphasizing the relationships between microstructure and mechanical properties. Elastic, anelastic, and plastic properties of materials. The relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislocation theory to strengthening mechanisms in crystalline solids. The phenomena of creep, fracture, and fatigue and their controlling mechanisms. Prerequisites: 193/203.

3-4 units, Spr (Dauskardt, R)

MATSCI 209. Electronic and Optical Properties of Solids
(Same as MATSCI 199) The concepts of electronic energy bands and transports applied to metals, semiconductors, and insulators. The behavior of electronic and optical devices including p-n junctions, MOS-capacitors, MOSFETs, optical waveguides, quantum-well lasers, light amplifiers, and metallo-dielectric light guides. Emphasis is on relationships between structure and physical prop-

erties. Elementary quantum and statistical mechanics concepts are used. Prerequisite: 195/205 or equivalent.

3-4 units, Spr (Brongersma, M)

MATSCI 210. Organic and Biological Materials

(Same as MATSCI 190) Unique physical and chemical properties of organic materials and their uses.The relationship between structure and physical properties, and techniques to determine chemical structure and molecular ordering. Examples include liquid crystals, dendrimers, carbon nanotubes, hydrogels, and biopolymers such as lipids, protein, and DNA. Prerequisite: Thermodynamics and ENGR 50 or equivalent.

3-4 units, Spr (Heilshorn, S)

MATSCI 230. Materials Science Colloquium

May be repeated for credit.

1 unit, Aut (Cui, Y; Lindenberg, A), Win (Melosh, N; Dionne, J), Spr (Heilshorn, S; Reed, E)

MATSCI 251. Microstructure and Mechanical Properties

(Same as MATSCI 151) Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary deformation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: ENGR 50 or equivalent.

3-4 units, Aut (Staff)

MATSCI 256. Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution

(Same as MATSCI 156) Operating principles and applications of emerging technological solutions to the energy demands of the world. The scale of global energy usage and requirements for possible solutions. Basic physics and chemistry of solar cells, fuel cells, and batteries. Performance issues, including economics, from the ideal device to the installed system. The promise of materials research for providing next generation solutions.

3-4 units, Aut (Clemens, B)

MATSCI 299. Practical Training

Educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Following the internship, students complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Student is responsible for arranging own employment. See department student services manager before enrolling.

3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 300. Ph.D. Research

Participation in a research project.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 302. Solar Cells

Theory of conventional p-n junction and excitonic solar cells. Design, fabrication, and characterization of crystalline silicon, amorphous silicon, CdTe, CIGS, and tandem and organic solar cells. Emerging solar cell concepts such as intermediate band gap and bioinspired solar cells. Emphasis is on the materials science aspects of solar cells research. Module design and economic hurdles that must be overcome for solar cell technology to generate a significant fraction of the world¿s electricity. Group project to explore one solar cell approach in depth. SCPD offering.

3 units, not given this year

MATSCI 303. Principles, Materials and Devices of Batteries

Thermodynamics and electrochemistry for batteries. Emphasis on lithium ion batteries, but also different types including lead acid, nickel metal hydride, metal air, sodium sulfur and redox flow. Battery electrode materials, electrolytes, separators, additives and electrode-electrolyte interface. Electrochemical techniques; advanced battery materials with nanotechnology; battery device structure. Prerequisites: undergraduate chemistry.

3 units, Aut (Cui, Y)

MATSCI 311. Lasers in Materials Processing

Principles of laser operation. Optically and electrically pumped lasers. Materials for solid-state lasers. Fundamentals of laser/materials interactions. Applications in thin film technology and microfabrication; laser annealing of defects and crystallization of amorphous films. Laser-induced shock waves. Extreme non-equilibrium laser processing; ultra-fast (femtosecond) lasers and their novel uses; micro- and nanofabrication of fluidic and photonic devices; intracellular nano-surgery.

3 units, Spr (Salleo, A)

MATSCI 312. New Methods in Thin Film Synthesis

Materials base for engineering new classes of coatings and devices. Techniques to grow thin films at atomic scale and to fabricate multilayers/superlattices at nanoscale. Vacuum growth techniques including evaporation, molecular beam epitaxy (MBE), sputtering, ion beam assisted deposition, laser ablation, chemical vapor deposition (CVD), and electroplating. Future direction of material synthesis such as nanocluster deposition and nanoparticles self-assembly. Relationships between deposition parameters and film properties. Applications of thin film synthesis in microelectronics, nanotechnology, and biology. SCPD offering.

3 units, not given this year

MATSCI 316. Nanoscale Science, Engineering, and Technology

Sample application areas: renewable energy including nanoscaled photovoltaic cells, hydrogen storage, fuel cells, and nanoelectronics. Nanofabrication techniques including: self-assembly of amphiphilic molecules, block copolymers, organic-inorganic mesostructures, colloidal crystals, organic monolayers, proteins, DNA and abalone shells; biologically inspired growth of materials; photolithography, electron beam lithography, and scanning probe lithography; and synthesis of carbon nanotubes, nanowire, and nanocrystals. Other nanotechnology topics may be explored through a group project. SCPD offering.

3 units, Spr (Cui, Y)

MATSCI 320. Nanocharacterization of Materials

Current methods of directly examining the microstructure of materials. Topics: optical microscopy, scanning electron and focused ion beam microscopy, field ion microscopy, transmission electron microscopy, scanning probe microscopy, and microanalytical surface science methods. Emphasis is on the electron-optical techniques. Recommended: 193/203.

3 units, alternate years, not given this year

MATSCI 321. Transmission Electron Microscopy

Image formation and interpretation. The contrast phenomena associated with perfect and imperfect crystals from a physical point of view and from a formal treatment of electron diffraction theory. The importance of electron diffraction to systematic analysis and recent imaging developments. Recommended: 193/203, 195/205, or equivalent.

3 units, Win (Sinclair, R; Pelton, A)

MATSCI 322. Transmission Electron Microscopy Laboratory

Experimental application of electron microscopy to typical materials science studies. Topics include microscope operation and alignment, diffraction modes and analysis, bright-field/dark-field analysis of defects, high resolution imaging, and analytical techniques for compositional analysis (EDAX). Enrollment limited to 12. Prerequisites: 321, consent of instructor.

3 units, Spr (Marshall, A)

MATSCI 323. Thin Film and Interface Microanalysis

The science and technology of microanalytical techniques, including Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), secondary ion mass spectroscopy (SIMS), ion scattering spectroscopy (ISS), and x-ray photoelectron spectroscopy (XPS or ESCA). Generic processes such as sputtering and high-vacuum generation. Prerequisite: some prior exposure to atomic and electronic structure of solids. SCPD offering.

3 units, not given this year

MATSCI 325. X-Ray Diffraction

Diffraction theory and its relationship to structural determination in solids. Focus is on applications of x-rays; concepts can be applied to neutron and electron diffraction. Topics: Fourier analysis, kinematic theory, Patterson functions, diffraction from layered and amorphous materials, single crystal diffraction, dynamic theory, defect determination, surface diffraction, techniques for data analysis, and determination of particle size and strain. Prerequisites: 193/203, 195/205.

3 units, not given this year

MATSCI 326. X-Ray Science and Techniques

X-ray interaction with matter; diffraction from ordered and disordered materials; x-ray absorption, photoemission, and coherent scattering; x-ray microsocopy. Sources including synchrontrons,

high harmonic generation, x-ray lasers. Time-resolved techniques and detector technology.

3 units, not given this year

MATSCI 331. Atom-based computational methods for materials

Introduction to atom-based computational methods for materials with emphasis on quantum methods. Topics include density functional theory, tight-binding and empirical approaches. Computation of optical, electronic, phonon properties. Bulk materials, interfaces, nanostructures. Molecular dynamics. Prerequisites - undergraduate quantum mechanics.

3 units, Win (Reed, E)

MATSCI 343. Organic Semiconductors for Electronics and Photonics

The science of organic semiconductors and their use in electronic and photonic devices. Topics: methods for fabricating thin films and devices; relationship between chemical structure and molecular packing on properties such as band gap, charge carrier mobility and luminescence efficiency; doping; field-effect transistors; light-emitting diodes; lasers; biosensors; photodetectors and photovoltaic cells. SCPD offering.

3 units, alternate years, not given this year

MATSCI 346. Nanophotonics

(Same as EE 336) Recent developments in micro- and nanophotonic materials and devices. Basic concepts of photonic crystals. Integrated photonic circuits. Photonic crystal fibers. Superprism effects. Optical properties of metallic nanostructures. Subwavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: electromagnetic theory at the level of 242.

3 units, Win (Fan, S; Brongersma, M)

MATSCI 347. Introduction to Magnetism and Magnetic Nanostructures

Atomic origins of magnetic moments, magnetic exchange and ferromagnetism, types of magnetic order, magnetic anisotropy, domains, domain walls, hysteresis loops, hard and soft magnetic materials, demagnetization factors, and applications of magnetic materials, especially magnetic nanostructures and nanotechnology. Tools include finite-element and micromagnetic modeling. Design topics include electromagnet and permanent magnet, electronic article surveillance, magnetic inductors, bio-magnetic sensors, and magnetic drug delivery. Design projects, team work, and computer-aided design. Prerequisites: PHYSICS 29 and 43, or college-level electricity and magnetism.

3 units, Spr (Wang, S; White, R)

MATSCI 351. Failure Analysis for Emerging Technologies

Introduction to root cause failure analysis investigation of emerging technologies such as high tech electronic and medical devices. Real case studies illustration of design errors, manufacturing defects, misuse and environmental degradation that resulted in fracture, fatigue, cracking or corrosion. Understanding material degradation modes and mechanisms. Examples on analytical characterization techniques such as scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectroscoopy (FTIR), time of flight secondary ion mass spectroscopy (TOF-SIMS), mechanical testing, finite element analysis (FEA) and electrochemical tesing.

3 units, Aut (Guyer, E; James, B)

MATSCI 353. Mechanical Properties of Thin Films

The mechanical properties of thin films on substrates. The mechanics of thin films and of the atomic processes which cause stresses to develop during thin film growth. Experimental techniques for studying stresses in and mechanical properties of thin films. Elastic, plastic, and diffusional deformation of thin films on substrates as a function of temperature and microstructure. Effects of deformation and fracture on the processing of thin film materials. Prerequisite: 198/208.

3 units, not given this year

MATSCI 358. Fracture and Fatigue of Materials and Thin Film Structures

Linear-elastic and elastic-plastic fracture mechanics from a materials science perspective, emphasizing microstructure and the micromechanisms of fracture. Plane strain fracture toughness and resistance curve behavior. Mechanisms of failure associated with cohesion and adhesion in bulk materials, composites, and thin film structures. Fracture mechanics approaches to toughening and subcritical crack-growth processes, with examples and applications involving cyclic fatigue and environmentally assisted subcritical crack growth. Prerequisite: 151/251, 198/208, or equivalent. SCPD offering.

3 units, Win (Dauskardt, R)

MATSCI 359. Crystalline Anisotropy

(Same as ME 336) Matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetism, thermodynamics, and optical properties of solids, on the level of J. F. Nye's Physical Properties of Crystals. Homework sets use Mathematica.

3 units, Win (Barnett, D)

MATSCI 380. Nano-Biotechnology

Literature based. Principles that make nanoscale materials unique, applications to biology, and how biological systems can create nanomaterials. Molecular sensing, drug delivery, bio-inspired synthesis, self-assembling systems, and nanomaterial based therapies. Interactions at the nanoscale. Applications and opportunities for new technology.

3 units, Aut (Melosh, N)

MATSCI 381. Biomaterials in Regenerative Medicine

(Same as BIOE 361) Materials design and engineering for regenerative medicine. How materials interact with cells through their micro- and nanostructure, mechanical properties, degradation characteristics, surface chemistry, and biochemistry. Examples include novel materials for drug and gene delivery, materials for stem cell proliferation and differentiation, and tissue engineering scaffolds. Prerequisites: undergraduate chemistry, and cell/molecular biology or biochemistry.

3 units, alternate years, not given this year

MATSCI 382. Bio-chips, Imaging and Nanomedicine

(Same as EE 225) The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

3 units, Win (Wang, S)

MATSCI 399. Graduate Independent Study

Under supervision of a faculty member.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 400. Participation in Materials Science Teaching

May be repeated for credit.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MATSCI 801. TGR Project for MS Students

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATSCI 802. TGR Dissertation for Ph.D Students

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATHEMATICAL AND COMPUTATIONAL SCIENCE (MCS) COURSES

For information on undergraduate programs in Mathematical and Computational Science, see page 000 of this bulletin.

UNDERGRADUATE COURSES IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MCS 100. Mathematics of Sports

(Same as STATS 50) The use of mathematics, statistics, and probability in the analysis of sports performance, sports records, and strategy. Topics include mathematical analysis of the physics of sports and the determinations of optimal strategies. New diagnostic

statistics and strategies for each sport. Corequisite: STATS 116. GER:DB-Math

3 units, not given this year

MATHEMATICS (MATH) COURSES

UNDERGRADUATE COURSES IN MATHEMATICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MATH 19. Calculus

Introduction to differential calculus of functions of one variable. Topics: review of elementary functions including exponentials and logarithms, limits, rates of change, the derivative, and applications. Math 19, 20, and 21 cover the same material as Math 41 and 42, but in three quarters rather than two. Prerequisites: precalculus, including trigonometry, advanced algebra, and analysis of elementary functions. GER:DB-Math

3 units, Aut (Bahuaud, E), Win (Staff), Sum (Staff)

MATH 20. Calculus

Continuation of 19. Applications of differential calculus; introduction to integral calculus of functions of one variable, including: the definite integral, methods of symbolic and numerical integration, applications of the definite integral. Prerequisites: 19 or equivalent. GER:DB-Math

3 units, Win (Bahuaud, E), Spr (Zuniga, J)

MATH 21. Calculus

Continuation of 20. Applications of integral calculus, introduction to differential equations, infinite series. Prerequisite: 20 or equivalent. GER:DB-Math

4 units, Spr (Bahuaud, E)

MATH 41. Calculus (accelerated)

Introduction to differential and integral calculus of functions of one variable. Topics: limits, rates of change, the derivative and applications, introduction to the definite integral and integration. Math 41 and 42 cover the same material as Math 19-20-21, but in two quarters rather than three. Prerequisites: trigonometry, advanced algebra, and analysis of elementary functions, including exponentials and logarithms. GER:DB-Math

5 units, Aut (Lucianovic, M)

MATH 41A. Calculus ACE

Students attend MATH 41 lectures with different recitation sessions, four hours instead of two, emphasizing engineering applications. Prerequisite: application; see http://soe.stanford.edu/edp/programs/ace.html. GER:DB-Math

6 units, Aut (Zuniga, J; Nance, T; Tzeng, Y)

MATH 42. Calculus (Accelerated)

Continuation of 41. Methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations, infinite series. Prerequisite: 41 or equivalent. GER:DB-Math

5 units, Aut (Licata, A; Stiennon, N), Win (Lucianovic, M)

MATH 42A. Calculus ACE

Students attend MATH 41 lectures with different recitation sessions, four hours instead of two, emphasizing engineering applications. Prerequisite: application; see http://soe.stanford.edu/edp/programs/ace.html. GER:DB-Math

6 units, Aut (Licata, A), Win (Lucianovic, M)

MATH 50V. Multivariable Differential Calculus

Differential calculus for functions of two or more variables. Topics: vectors and vector-valued functions in 2-space and 3-space, tangent and normal vectors, curvature, functions of two or more variables, partial derivatives and differentiability, directional derivatives and gradients, maxima and minima, and optimization using Lagrange multipliers. Prerequisites: two quarters of single variable calculus, or consent of instructor. GER:DB-Math

4 units, Sum (Sanders, M)

MATH 51. Linear Algebra and Differential Calculus of Several Variables

Geometry and algebra of vectors, systems of linear equations, matrices and linear transformations, diagonalization and eigenvectors, vector valued functions and functions of several variables, parametric curves, partial derivatives and gradients, the derivative as a matrix, chain rule in several variables, constrained and unconstrained optimization. Prerequisite: 21, or 42, or a score of 4 on the BC Advanced Placement exam or 5 on the AB Advanced Placement exam, or consent of instructor. GER:DB-Math

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Toussaint, A)

MATH 51A. Linear Algebra and Differential Calculus of Several Variables, ACE

Students attend MATH 51 lectures with different recitation sessions: four hours per week instead of two, emphasizing engineering applications. Prerequisite: application; see http://soe.stanford.edu/edp/programs/ace.html. GER:DB-Math

6 units, Aut (Staff), Win (Staff), Spr (Staff)

MATH 51H. Honors Multivariable Mathematics

For prospective Mathematics majors in the honors program and students from other areas of science or engineering who have a strong mathematics background. Three quarter sequence covers the material of 51, 52, 53, and additional advanced calculus and ordinary and partial differential equations. Unified treatment of multivariable calculus, linear algebra, and differential equations with a different order of topics and emphasis from standard courses. Students should know one-variable calculus and have an interest in a theoretical approach to the subject. Prerequisite: score of 5 on BC Advanced Placement exam, or consent of instructor. GER:DB-Math

5 units, Aut (Simon, L)

MATH 51M. Introduction to MATLAB for Multivariable Mathematics

Corequisite: MATH 51.

1 unit, Aut (Staff)

MATH 52. Integral Calculus of Several Variables

Iterated integrals, line and surface integrals, vector analysis with applications to vector potentials and conservative vector fields, physical interpretations. Divergence theorem and the theorems of Green, Gauss, and Stokes. Prerequisite: 51 and 42 or equivalents. GER:DB-Math

5 units, Aut (Wieczorek, W), Win (Staff), Spr (Brumfiel, G)

MATH 52H. Honors Multivariable Mathematics

Continuation of 51H. Prerequisite: 51H. GER:DB-Math

5 units, Win (Eliashberg, Y)

MATH 52V. Multivariable Integral Calculus

Integral calculus for functions of two or more variables. Topics: double and triple integrals, change of variables and the Jacobian, vector fields, line integrals, independence of path and the fundamental theorem of line integrals, Green's theorem, divergence theorem, Stokes's theorem. Prerequisites: one quarter of multivariable differential calculus (comparable to 50V or 51), or consent of instructor. GER:DB-Math

5 units, Sum (Sanders, M)

MATH 53. Ordinary Differential Equations with Linear Algebra

Ordinary differential equations and initial value problems, systems of linear differential equations with constant coefficients, applications of second-order equations to oscillations, matrix exponentials, Laplace transforms, stability of non-linear systems and phase plane analysis, numerical methods. Prerequisite: 51 and 42 or equivalents. GER:DB-Math

5 units, Aut (Fish, J), Win (Brendle, S), Spr (Dembo, A), Sum (Lisi, S)

MATH 53H. Honors Multivariable Mathematics

Continuation of 52H. Prerequisite: 52H. GER:DB-Math

5 units, Spr (Eliashberg, Y)

MATH 70SI. The Game of Go: Strategy, Theory, and History

Strategy and mathematical theories of the game of Go, with guest appearance by a professional Go player.

1 unit, Spr (Bump, D)

MATH 87Q. Mathematics of Knots, Braids, Links, and Tangles
(Stanford Introductory Seminar) Preference to sophomores. Types of knots and how knots can be distinguished from one another by means of numerical or polynomial invariants. The geometry and algebra of braids, including their relationships to knots. Topology of surfaces. Brief summary of applications to biology, chemistry, and physics.
3 units, Win (Wieczorek, W)

MATH 100. Mathematics for Elementary School Teachers
Mathematics and pedagogical strategies. Core mathematical content in grades K-6, classroom presentation, how to handle student errors, and mathematical issues that come up during instruction.
4 units, not given this year

MATH 104. Applied Matrix Theory
Linear algebra for applications in science and engineering: orthogonality, projections, the four fundamental subspaces of a matrix, spectral theory for symmetric matrices, the singular value decomposition, the QR decomposition, least-squares, the condition number of a matrix, algorithms for solving linear systems. Prerequisites: MATH 51 and MATH 52 or 53. GER:DB-Math
3 units, Aut (Bernstein, J), Win (Candes, E), Sum (Koytcheff, R)

MATH 106. Functions of a Complex Variable
Complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, Cauchy integral formula, residues, elementary conformal mappings. Prerequisite: 52. GER:DB-Math
3 units, Aut (Staff), Spr (Liu, T), Sum (Brumfiel, G)

MATH 108. Introduction to Combinatorics and Its Applications
Topics: graphs, trees (Cayley's Theorem, application to phylogony), eigenvalues, basic enumeration (permutations, Stirling and Bell numbers), recurrences, generating functions, basic asymptotics. Prerequisites: 51 or 103 or equivalent. GER:DB-Math
3 units, Aut (Thorne, F)

MATH 109. Applied Group Theory
Applications of the theory of groups. Topics: elements of group theory, groups of symmetries, matrix groups, group actions, and applications to combinatorics and computing. Applications: rotational symmetry groups, the study of the Platonic solids, crystallographic groups and their applications in chemistry and physics. GER:DB-Math
3 units, Win (Ionel, E)

MATH 110. Applied Number Theory and Field Theory
Number theory and its applications to modern cryptography. Topics: congruences, finite fields, primality testing and factorization, public key cryptography, error correcting codes, and elliptic curves, emphasizing algorithms. GER:DB-Math
3 units, Spr (Li, J)

MATH 111. Computational Commutative Algebra
Introduction to the theory of commutative rings, ideals, and modules. Systems of polynomial equations in several variables from the algorithmic viewpoint. Groebner bases, Buchberger's algorithm, elimination theory. Applications to algebraic geometry and to geometric problems. GER:DB-Math
3 units, not given this year

MATH 113. Linear Algebra and Matrix Theory
Algebraic properties of matrices and their interpretation in geometric terms. The relationship between the algebraic and geometric points of view and matters fundamental to the study and solution of linear equations. Topics: linear equations, vector spaces, linear dependence, bases and coordinate systems; linear transformations and matrices; similarity; eigenvectors and eigenvalues; diagonalization. GER:DB-Math
3 units, Win (Galatius, S), Spr (Licata, J)

MATH 113V. Linear Algebra
Topics: matrices, linear equations, vector spaces, linear dependence, bases and coordinates, linear transformations, similarity, eigenvectors and eigenvalues, and diagonalization. Prerequisites: two quarters of single variable calculus, or consent of instructor. GER:DB-Math
3 units, Sum (Sanders, M)

MATH 115. Functions of a Real Variable
The development of real analysis in Euclidean space: sequences and series, limits, continuous functions, derivatives, integrals. Basic point set topology. Honors math majors and students who intend to do graduate work in mathematics should take 171. Prerequisite: 51. GER:DB-Math
3 units, Aut (Staff), Win (Staff), Spr (Liu, T), Sum (Brumfiel, G)

MATH 116. Complex Analysis
Analytic functions, Cauchy integral formula, power series and Laurent series, calculus of residues and applications, conformal mapping, analytic continuation, introduction to Riemann surfaces, Fourier series and integrals. Prerequisites: 52, and 115 or 171. GER:DB-Math
3 units, Win (Ryzhik, L)

MATH 120. Modern Algebra
Groups acting on sets, examples of finite groups, Sylow theorems, solvable and simple groups. Fields, rings, and ideals; polynomial rings over a field; PID and non-PID. Unique factorization domains. GER:DB-Math, WIM
3 units, Aut (Vakil, R), Spr (Venkatesh, A)

MATH 121. Modern Algebra II
Continuation of 120. Field of fractions, field theory and Galois theory. Modules over a PID, quotient modules, non-free modules. Canonical forms, generalized eigenspaces, quotients and duality for vector spaces. Prerequisite: MATH 120. GER:DB-Math
3 units, Win (Carlsson, G)

MATH 122. GROUP REPRESENTATIONS
Group representations and group rings, tensor algebra, character theory. Bilinear and quadratic forms, semisimplicity. Induced representations. Classification of representations, applications. Prerequisites: MATH 120, and either MATH 121 or consent of instructor.
3 units, Spr (Bump, D)

MATH 131P. Partial Differential Equations I
An introduction to PDE; particularly suitable for non-Math majors. Topics include physical examples of PDE's, method of characteristics, D'Alembert's formula, maximum principles, heat kernel, Duhamel's principle, separation of variables, Fourier series, Harmonic functions, Bessel functions, spherical harmonics. Students who have taken MATH 171 should consider taking MATH 173 rather than 131p. Prerequisite: 53. GER:DB-Math
3 units, Aut (Hohloch, S), Win (Garapon, P)

MATH 132. Partial Differential Equations II
Laplace's equation and properties of harmonic functions. Green's functions. Distributions and Fourier transforms. Eigenvalue problems and generalized Fourier series. Numerical solutions. Prerequisite: 131P. GER:DB-Math
3 units, Spr (Garapon, P)

MATH 136. Stochastic Processes
(Same as STATS 219) Introduction to measure theory, Lp spaces and Hilbert spaces. Random variables, expectation, conditional expectation, conditional distribution. Uniform integrability, almost sure and Lp convergence. Stochastic processes: definition, stationarity, sample path continuity. Examples: random walk, Markov chains, Gaussian processes, Poisson processes, Martingales. Construction and basic properties of Brownian motion. Prerequisite: STATS 116 or MATH 151 or equivalent. Recommended: MATH 115 or equivalent. GER:DB-Math
3 units, Aut (Zuniga, J)

MATH 137. Mathematical Methods of Classical Mechanics
Newtonian mechanics. Lagrangian formalism. E. Noether's theorem. Oscillations. Rigid bodies. Introduction to symplectic geometry. Hamiltonian formalism. Legendre transform. Variational principles. Geometric optics. Introduction to the theory of integrable systems. Prerequisites: 51, 52, 53, or 51H, 52H, 53H. GER:DB-Math
3 units, not given this year

MATH 138. Celestial Mechanics
Mathematically rigorous introduction to the classical N-body problem: the motion of N particles evolving according to Newton's law. Topics include: the Kepler problem and its symmetries; other central force problems; conservation theorems; variational methods; Hamilton-Jacobi theory; the role of equilibrium points and stability; and symplectic methods. Prerequisites: 53, and 115 or 171. GER:DB-Math
3 units, not given this year

MATH 143. Differential Geometry
Geometry of curves and surfaces in three-space and higher dimensional manifolds. Parallel transport, curvature, and geodesics. Surfaces with constant curvature. Minimal surfaces. GER:DB-Math
3 units, Win (Schoen, R)

MATH 145. Algebraic Geometry
Real algebraic curves, Hilbert's nullstellensatz, complex affine and projective curves, Bezout's theorem, the degree/genus formula, Riemann surfaces, Riemann-Roch theorem. Prerequisites: 106 or 116, and 109 or 120. Recommended: familiarity with surfaces equivalent to 143, 146, 147, or 148. GER:DB-Math
3 units, not given this year

MATH 146. Analysis on Manifolds
Differentiable manifolds, tangent space, submanifolds, implicit function theorem, differential forms, vector and tensor fields. Frobenius' theorem, DeRham theory. Prerequisite: 52 or 52H. GER:DB-Math
3 units, Aut (Ionel, E), alternate years, not given next year

MATH 147. Differential Topology
Smooth manifolds, transversality, Sards' theorem, embeddings, degree of a map, Borsuk-Ulam theorem, Hopf degree theorem, Jordan curve theorem. Prerequisite: 115 or 171. GER:DB-Math
3 units, alternate years, not given this year

MATH 148. Algebraic Topology
Fundamental group, covering spaces, Euler characteristic, homology, classification of surfaces, knots. Prerequisite: 109 or 120. GER:DB-Math
3 units, Spr (Staff), alternate years, not given next year

MATH 151. Introduction to Probability Theory
Counting; axioms of probability; conditioning and independence; expectation and variance; discrete and continuous random variables and distributions; joint distributions and dependence; central limit theorem and laws of large numbers. Prerequisite: 52 or consent of instructor. GER:DB-Math
3 units, Win (Kargin, V)

MATH 152. Elementary Theory of Numbers
Euclid's algorithm, fundamental theorems on divisibility; prime numbers; congruence of numbers; theorems of Fermat, Euler, Wilson; congruences of first and higher degrees; quadratic residues; introduction to the theory of binary quadratic forms; quadratic reciprocity; partitions. GER:DB-Math
3 units, Aut (Soundararajan, K)

MATH 154. Algebraic Number Theory
Properties of number fields and Dedekind domains, quadratic and cyclotomic fields, applications to some classical Diophantine equations; introduction to elliptic curves. Prerequisites: 120 and 121, especially modules over principal ideal domains and Galois theory of finite fields. GER:DB-Math
3 units, Spr (Conrad, B), alternate years, not given next year

MATH 155. Analytic Number Theory
Topics in analytic number theory such as the distribution of prime numbers, the prime number theorem, twin primes and Goldbach's conjecture, the theory of quadratic forms, Dirichlet's class number formula, Dirichlet's theorem on primes in arithmetic progressions, and the fifteen theorem. Prerequisite: 152, or familiarity with the Euclidean algorithm, congruences, residue classes and reduced residue classes, primitive roots, and quadratic reciprocity. GER:DB-Math
3 units, alternate years, not given this year

MATH 159. Discrete Probabilistic Methods
Modern discrete probabilistic methods suitable for analyzing discrete structures of the type arising in number theory, graph theory, combinatorics, computer science, information theory and molecular sequence analysis. Prerequisite: STATS 116/MATH 151 or equivalent.
3 units, Win (Kargin, V)

MATH 161. Set Theory
Informal and axiomatic set theory: sets, relations, functions, and set-theoretical operations. The Zermelo-Fraenkel axiom system and the special role of the axiom of choice and its various equivalents. Well-orderings and ordinal numbers; transfinite induction and transfinite recursion. Equinumerosity and cardinal numbers; Cantor's Alephs and cardinal arithmetic. Open problems in set theory. GER:DB-Math
3 units, Win (White, B)

MATH 162. Philosophy of Mathematics
(Same as PHIL 162, PHIL 262) (Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor. GER:DB-Math
4 units, not given this year

MATH 171. Fundamental Concepts of Analysis
Recommended for Mathematics majors and required of honors Mathematics majors. Similar to 115 but altered content and more theoretical orientation. Properties of Riemann integrals, continuous functions and convergence in metric spaces; compact metric spaces, basic point set topology. Prerequisites: 51 and 52, or 51H and 52H. WIM GER:DB-Math, WIM
3 units, Aut (Bump, D), Spr (Vasy, A)

MATH 172. Lebesgue Integration and Fourier Analysis
Similar to 205A, but for undergraduate Math majors and graduate students in other disciplines. Topics include Lebesgue measure on Euclidean space, Lebesgue integration, L^p spaces, the Fourier transform, the Hardy-Littlewood maximal function and Lebesgue differentiation. Prerequisite: 171 or consent of instructor. GER:DB-Math
3 units, Spr (Soundararajan, K)

MATH 173. Theory of Partial Differential Equations
A rigorous introduction to PDE accessible to advanced undergraduates. Elliptic, parabolic, and hyperbolic equations in many space dimensions including basic properties of solutions such as maximum principles, causality, and conservation laws. Methods include the Fourier transform as well as more classical methods. The Lebesgue integral will be used throughout, but a summary of its properties will be provided to make the course accessible to students who have not had 172 or 205A. Prerequisite: 171 or equivalent.
3 units, Win (Schoen, R)

MATH 174. Calculus of Variations
Historical development of the theory, its connections to physics and mechanics, its independent mathematical interest, and its contacts with daily life experience. Applications to minimal surfaces and to capillary surface interfaces. Prerequisite: MATH 171 or equivalent.
3 units, not given this year

MATH 174A. Topics in Analysis and Differential Equations with Applications
For students planning graduate work in mathematics or physics, and for honors math majors and other students at ease with rigorous proofs and qualitative discussion. Topics may include: geometric theory of ODEs with applications to dynamics; mathematical foundations of classical mechanics including variational principles, Lagrangian and Hamiltonian formalisms, theory of integrable systems; theorems of existence and uniqueness; Sturm-Liouville theory. Prerequisite: 53H or 171, or consent of instructor. GER:DB-Math
3 units, not given this year

MATH 174B. Honors Analysis
Continuation of 174A. Topics may include: introduction to PDEs including transport equations, Laplace, wave, and heat equations; techniques of solution including separation of variables and Green¿s functions; Fourier series and integrals; introduction to the theory of distributions; mathematical foundations of quantum mechanics. Prerequisite: 174A. GER:DB-Math
3 units, not given this year

MATH 175. Elementary Functional Analysis
Linear operators on Hilbert space. Spectral theory of compact operators; applications to integral equations. Elements of Banach space theory. Prerequisite: 115 or 171. GER:DB-Math
3 units, Spr (Simon, L)

MATH 180. Introduction to Financial Mathematics
Financial derivatives: contracts and options. Hedging and risk management. Arbitrage, interest rate, and discounted value. Geometric random walk and Brownian motion as models of risky assets. Initial boundary value problems for the heat and related partial differential equations. Self-financing replicating portfolio. Black-Scholes pricing of European options. Dividends. Implied volatility. Optimal stopping and American options. Prerequisite: 53. Corequisites: 131, 151 or STATS 116. GER:DB-Math
3 units, Aut (Staff)

MATH 193. Polya Problem Solving Seminar
Topics in mathematics and problem solving strategies with an eye towards the Putnam Competition. Topics may include parity, the pigeonhole principle, number theory, recurrence, generating functions, and probability. Students present solutions to the class. Open to anyone with an interest in mathematics.
1 unit, Aut (Soundararajan, K)

MATH 196. Undergraduate Colloquium
Weekly lectures by different experts on topics in pure and applied mathematics that go beyond the standard curriculum. May be repeated for credit for up to 3 units. Does not count toward the math major or minor.
1 unit, Aut (Conrad, B), Win (Conrad, B), Spr (Conrad, B)

MATH 197. Senior Honors Thesis
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

MATH 198. Category Theory and Functional Programming
An introduction to category theory and its applications in computer science: in particular to Haskell, a programming language with many language elements inspired by category theory. Students should have some familiarity with linear algebra, discrete mathematics and functional programming. Recommended corequisite: CS 242.
1 unit, not given this year

MATH 199. Independent Work
Undergraduates pursue a reading program; topics limited to those not in regular department course offerings. Credit can fulfill the elective requirement for math majors. Approval of Undergraduate Affairs Committee is required to use credit for honors majors area requirement.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN MATHEMATICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MATH 205A. Real Analysis
Basic measure theory and the theory of Lebesgue integration. Prerequisite: 171 or equivalent.
3 units, Aut (White, B)

MATH 205B. Real Analysis
Point set topology, basic functional analysis, Fourier series, and Fourier transform. Prerequisites: 171 and 205A or equivalent.
3 units, Win (Vasy, A)

MATH 210A. Modern Algebra
Basic commutative ring and module theory, tensor algebra, homological constructions, linear and multilinear algebra, introduction to representation theory. Prerequisite: 121 or equivalent.
3 units, Aut (Vakil, R)

MATH 210B. Modern Algebra
Continuation of 210A. Topics in group theory, Galois theory, commutative algebra, introductions to algebraic number theory and algebraic geometry.
3 units, Win (Brumfiel, G)

MATH 210C. Modern Algebra
Continuation of 210B. Semisimple rings and modules, representation theory, Lie algebras, Lie groups and their representations.
3 units, Spr (Venkatesh, A)

MATH 215A. Complex Analysis, Geometry, and Topology
Analytic functions, complex integration, Cauchy's theorem, residue theorem, argument principle, conformal mappings, Riemann mapping theorem, Picard's theorem, elliptic functions, analytic continuation and Riemann surfaces.
3 units, Aut (Li, J)

MATH 215B. Complex Analysis, Geometry, and Topology
Topics: fundamental group and covering spaces, homology, cohomology, products, basic homotopy theory, and applications. Prerequisites: 113, 120, and 171, or equivalent; 215A is not a prerequisite for 215B.
3 units, Win (Staff)

MATH 215C. Complex Analysis, Geometry, and Topology
Differentiable manifolds, transversality, degree of a mapping, vector fields, intersection theory, and Poincare duality. Differential forms and the DeRham theorem. Prerequisite: 215B or equivalent.
3 units, Spr (Mirzakhani, M)

MATH 216A. Introduction to Algebraic Geometry
Algebraic curves, algebraic varieties, sheaves, cohomology, Riemann-Roch theorem. Classification of algebraic surfaces, moduli spaces, deformation theory and obstruction theory, the notion of schemes. May be repeated for credit. Prerequisites: 210ABC or equivalent.
3 units, not given this year

MATH 216B. Introduction to Algebraic Geometry
Continuation of 216A. May be repeated for credit.
3 units, not given this year

MATH 216C. Introduction to Algebraic Geometry
Continuation of 216B. May be repeated for credit.
3 units, not given this year

MATH 217A. Differential Geometry
Smooth manifolds and submanifolds, tensors and forms, Lie and exterior derivative, DeRham cohomology, distributions and the Frobenius theorem, vector bundles, connection theory, parallel transport and curvature, affine connections, geodesics and the exponential map, connections on the principal frame bundle. Prerequisite: 215C or equivalent.
3 units, Spr (Brendle, S)

MATH 217B. Differential Geometry
Riemannian manifolds, Levi-Civita connection, Riemann curvature tensor, Riemannian exponential map and geodesic normal coordinates, Jacobi fields, completeness, spaces of constant curvature, bi-invariant metrics on compact Lie groups, symmetric and locally symmetric spaces, equations for Riemannian submanifolds and Riemannian submersions. Prerequisite: 217A.
3 units, Aut (Schoen, R)

MATH 220. Partial Differential Equations of Applied Mathematics
(Same as CME 303) First-order partial differential equations; method of characteristics; weak solutions; elliptic, parabolic, and hyperbolic equations; Fourier transform; Fourier series; and eigenvalue problems. Prerequisite: foundation in multivariable calculus and ordinary differential equations.
3 units, Aut (Ryzhik, L)

MATH 221. Mathematical Methods of Imaging
Mathematical methods of imaging: array imaging using Kirchhoff migration and beamforming, resolution theory for broad and narrow band array imaging in homogeneous media, topics in high-frequency, variable background imaging with velocity estimation, interferometric imaging methods, the role of noise and inhomogeneities, and variational problems that arise in optimizing the performance of imaging algorithms and the deblurring of images. Prerequisite: 220.
3 units, not given this year

MATH 222. Computational Methods for Fronts, Interfaces, and Waves
High-order methods for multidimensional systems of conservation laws and Hamilton-Jacobi equations (central schemes, discontinuous Galerkin methods, relaxation methods). Level set methods and fast marching methods. Computation of multi-valued solutions. Multi-scale analysis, including wavelet-based methods. Boundary schemes (perfectly matched layers). Examples from (but not limited to) geometrical optics, transport equations, reaction-diffusion equations, imaging, and signal processing.
3 units, not given this year

MATH 224. Topics in Mathematical Biology
Mathematical models for biological processes based on ordinary and partial differential equations. Topics: population and infectious diseases dynamics, biological oscillators, reaction diffusion models, biological waves, and pattern formation. Prerequisites: 53 and 131, or equivalents.
3 units, not given this year

MATH 226. Numerical Solution of Partial Differential Equations
(Same as CME 306) Hyperbolic partial differential equations: stability, convergence and qualitative properties; nonlinear hyperbolic equations and systems; combined solution methods from elliptic, parabolic, and hyperbolic problems. Examples include: Burger's equation, Euler equations for compressible flow, Navier-Stokes equations for incompressible flow. Prerequisites: MATH 220A or CME 302.
3 units, Spr (Garapon, P)

MATH 227. Partial Differential Equations and Diffusion Processes
Parabolic and elliptic partial differential equations and their relation to diffusion processes. First order equations and optimal control. Emphasis is on applications to mathematical finance. Prerequisites: MATH 131 and MATH 136/STATS 219, or equivalents.
3 units, Win (Ryzhik, L)

MATH 228. Stochastic Methods in Engineering
(Same as CME 308) Review of basic probability; Monte Carlo simulation; state space models and time series; parameter estimation, prediction, and filtering; Markov chains and processes; stochastic control; and stochastic differential equations. Examples from various engineering disciplines. Prerequisites: exposure to probability; background in real variables and analysis.
3 units, Spr (Papanicolaou, G)

MATH 230A. Theory of Probability
(Same as STATS 310A) Mathematical tools: asymptotics, metric spaces; measure and integration; Lp spaces; some Hilbert spaces theory. Probability: independence, Borel-Cantelli lemmas, almost sure and Lp convergence, weak and strong laws of large numbers. Weak convergence and characteristic functions; central limit theorems; local limit theorems; Poisson convergence. Prerequisites: 116, MATH 171.
2-4 units, Aut (Montanari, A)

MATH 230B. Theory of Probability
(Same as STATS 310B) Stopping times, 0-1 laws, Kolmogorov consistency theorem. Uniform integrability. Radon-Nikodym theorem, branching processes, conditional expectation, discrete time martingales. Exchangeability. Large deviations. Laws of the iterated logarithm. Birkhoff's and Kingman's ergodic theorems. Recurrence, entropy. Prerequisite: 310A or MATH 230A.
2-4 units, Win (Diaconis, P)

MATH 230C. Theory of Probability
(Same as STATS 310C) Continuous time stochastic processes: martingales, Brownian motion, stationary independent increments, Markov jump processes and Gaussian processes. Invariance principle, random walks, LIL and functional CLT. Markov and strong Markov property. Infinitely divisible laws. Some ergodic theory. Prerequisite: 310B or MATH 230B.
2-4 units, Spr (Dembo, A)

MATH 231A. An Introduction to Random Matrix Theory
(Same as STATS 351A) Patterns in the eigenvalue distribution of typical large matrices, which also show up in physics (energy distribution in scattering experiments), combinatorics (length of longest increasing subsequence), first passage percolation and number theory (zeros of the zeta function). Classical compact ensembles (random orthogonal matrices). The tools of determinental point processes.
3 units, not given this year

MATH 231B. The Spectrum of Large Random Matrices
Asymptotics of eigenvalues of large random matrices, focusing on Wigner matrices and the Gaussian unitary ensemble: the combinatorics of non-crossing partitions and word graphs, concentration inequalities, Cauchy-Stieltjes transform, Hermite polynomials, Fredholm determinants, Laplace asymptotic method, special functions (Airy, Painleve), and stochastic calculus. Prerequisities: STATS 310A or MATH 205A.
3 units, not given this year

MATH 231C. Free Probability
Background from operator theory, addition and multiplication theorems for operators, spectral properties of infinite-dimensional operators, the free additive and multiplicative convolutions of probability measures and their classical counterparts, asymptotic freeness of large random matrices, and free entropy and free dimension. Prerequisite: STATS 310B or equivalent.
3 units, not given this year

MATH 232. Topics in Probability: Malliavin Calculus, Fractional Brownian Motion and Applications
Malliavin calculus: derivative and divergence operators, Skorohod integral. Fractional Brownian motion: relavance for financial mathematics, Ito and Tanaka formula, driving force for the heat equation. Ito formula for irregular Gaussian processes and other applications of Malliavin calculus. May be repeated for credit. Prerequisites: MATH 236, STATS 310C or equivalent.
3 units, not given this year

MATH 233. Probabilistic Methods in Analysis
Proofs and constructions in analysis obtained from basic results in Probability Theory and a 'probabilistic way of thinking.' Topics: Rademacher functions, Gaussian processes, entropy.
3 units, not given this year

MATH 234. Large Deviations
(Same as STATS 374) Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramer's and Sanov's theorems and their Markov extensions. Applications in statistics, information theory, and statistical mechanics. Prerequisite: MATH 230A or STATS 310.
3 units, not given this year

MATH 236. Introduction to Stochastic Differential Equations
Brownian motion, stochastic integrals, and diffusions as solutions of stochastic differential equations. Functionals of diffusions and their connection with partial differential equations. Random walk approximation of diffusions. Prerequisite: 136 or equivalent and differential equations.
3 units, Win (Papanicolaou, G)

MATH 237. Default and Systemic Risk
Introduction to mathematical models of complex static and dynamic stochastic systems that undergo sudden regime change in response to small changes in parameters. Examples from materials science (phase transitions), power grid models, financial and banking systems. Special emphasis on mean field models and their large deviations, including computational issues of uncertainty quantification.
3 units, Spr (Papanicolaou, G)

MATH 238. Mathematical Finance
(Same as STATS 250) Stochastic models of financial markets. Forward and futures contracts. European options and equivalent martingale measures. Hedging strategies and management of risk. Term structure models and interest rate derivatives. Optimal stopping and American options. Corequisites: MATH 236 and 227 or equivalent.
3 units, Win (Papanicolaou, G)

MATH 239. Computation and Simulation in Finance
Monte Carlo, finite difference, tree, and transform methods for the numerical solution of partial differential equations in finance. Emphasis is on derivative security pricing. Prerequisite: 238 or equivalent.
3 units, Spr (Staff)

MATH 240. Topics in Financial Mathematics: Fixed Income Models
Introduction to continuous time models for arbitrage-free pricing of interest rate derivatives. Bonds, yields, and the construction of yield curves. Caps, floors, swaps, swaptions, and bond options. Short rate models. Yield curve models. Forward measures. Forward and futures. LIBOR and swap market models. Prerequisite: MATH 238.
3 units, not given this year

MATH 243. Functions of Several Complex Variables
3 units, Win (Eliashberg, Y)

MATH 244. Riemann Surfaces
Compact Riemann surfaces and algebraic curves; cohomology of sheaves; Serre duality; Riemann-Roch theorem and application; Jacobians; Abel's theorem. May be repeated for credit.
3 units, not given this year

MATH 245A. Topics in Algebraic Geometry: Moduli Theory
Topics in the study of moduli spaces: Grothendieck's Quot scheme, Hilbert scheme, boundedness, semistable reduction, fine and coarse moduli space, geometric invariant theory, deformation theory, and universal families. Examples of moduli spaces including moduli of curves, moduli of vector bundles and moduli of maps. May be repeated for credit.
3 units, Aut (Li, J)

MATH 245B. Topics in Algebraic Geometry: Intersection Theory
Topics such as intersection theory on surfaces, toric varieties, and homogeneous spaces; numerical criteria for positivity; Chow groups and rings. May be repeated for credit.
3 units, Win (Vakil, R)

MATH 245C. Topics in Algebraic Geometry: Alterations
3 units, Spr (Conrad, B)

MATH 247. Topics in Group Theory
Topics include the Burnside basis theorem, classification of p-groups, regular and powerful groups, Sylow theorems, the Frattini argument, nilpotent groups, solvable groups, theorems of P. Hall, group cohomology, and the Schur-Zassenhaus theorem. The classical groups and introduction to the classification of finite simple groups and its applications. May be repeated for credit.
3 units, not given this year

MATH 248. Topics in arithmetic geometry: modular curves
The theory of modular curves from an arithmetic and moduli-theoretic perspective, linking the complex-analytic theory with algebro-geometric considerations, including q-expansions and the arithmetic of modular forms. Prerequisites: familiarity with classical modular forms, basic commutative algebra, and schemes at the level of Math 216a, b. May be repeated for credit.
3 units, Win (Conrad, B)

MATH 248A. Algebraic Number Theory
Structure theory and Galois theory of local and global fields, finiteness theorems for class numbers and units, adelic techniques. Prerequisites: MATH 210A,B.
3 units, not given this year

MATH 249A. Transcendental Number Theory
3 units, Aut (Soundararajan, K)

MATH 249B. Topics in Number Theory: Geometry of Numbers
3 units, Win (Venkatesh, A)

MATH 249C. Topics in Number Theory: Additive Combinatorics
3 units, Spr (Thorne, F)

MATH 250. Topics in Algebra
3 units, not given this year

MATH 252. Algebraic Groups
Smooth affine groups over general fields, quotients, tori, solvable groups, reductive groups, root systems, Existence and Isomorphism theorem, structure theory. If time permits, classification theory over interesting fields. Prerequisites: 210A, 210B, and familiarity with algebraic varieties over general fields.
3 units, Win (Conrad, B)

MATH 254. Geometric Methods in the Theory of Ordinary Differential Equations
Topics may include: structural stability and perturbation theory of dynamical systems; hyperbolic theory; first order PDE; normal forms, bifurcation theory; Hamiltonian systems, their geometry and applications. May be repeated for credit.
3 units, not given this year

MATH 256A. Partial Differential Equations
The theory of linear and nonlinear partial differential equations, beginning with linear theory involving use of Fourier transform and Sobolev spaces. Topics: Schauder and L2 estimates for elliptic and parabolic equations; De Giorgi-Nash-Moser theory for elliptic equations; nonlinear equations such as the minimal surface equation, geometric flow problems, and nonlinear hyperbolic equations.
3 units, Spr (Simon, L)

MATH 256B. Partial Differential Equations
Continuation of 256A.
3 units, Win (Vasy, A)

MATH 257A. Symplectic Geometry and Topology
Linear symplectic geometry and linear Hamiltonian systems. Symplectic manifolds and their Lagrangian submanifolds, local properties. Symplectic geometry and mechanics. Contact geometry and contact manifolds. Relations between symplectic and contact manifolds. Hamiltonian systems with symmetries. Momentum map and its properties. May be repeated for credit.
3 units, Aut (Ionel, E)

MATH 257B. Symplectic Geometry and Topology
Continuation of 257A. May be repeated for credit.
3 units, Win (Ionel, E)

MATH 258. Topics in Geometric Analysis
May be repeated for credit.
3 units, Aut (Schoen, R)

MATH 261A. Functional Analysis
Geometry of linear topological spaces. Linear operators and functionals. Spectral theory. Calculus for vector-valued functions. Operational calculus. Banach algebras. Special topics in functional analysis. May be repeated for credit.
3 units, not given this year

MATH 263A. Lie Groups and Lie Algebras
Definitions, examples, properties. Semi-simple Lie algebras, their structure and classification. Cartan decomposition: real Lie algebras. Representation theory: Cartan-Stiefel diagram, weights. Weyl character formula. Orthogonal and symplectic representations. May be repeated for credit. Prerequisite: 210 or equivalent.
3 units, Win (Bump, D)

MATH 263B. Lie Groups and Lie Algebras
Continuation of 263A. May be repeated for credit.
3 units, Spr (Bump, D)

MATH 264. Infinite Dimensional Lie Algebra
3 units, not given this year

MATH 266. Computational Signal Processing and Wavelets
Theoretical and computational aspects of signal processing. Topics: time-frequency transforms; wavelet bases and wavelet packets; linear and nonlinear multiresolution approximations; estimation and restoration of signals; signal compression. May be repeated for credit.
3 units, not given this year

MATH 269. Topics in symplectic geometry
May be repeated for credit.
3 units, Win (Eliashberg, Y)

MATH 270. Geometry and Topology of Complex Manifolds
Complex manifolds, Kahler manifolds, curvature, Hodge theory, Lefschetz theorem, Kahler-Einstein equation, Hermitian-Einstein equations, deformation of complex structures. May be repeated for credit.
3 units, not given this year

MATH 271. The H-Principle
The language of jets. Thom transversality theorem. Holonomic approximation theorem. Applications: immersion theory and its generaliazations. Differential relations and Gromov's h-principle for open manifolds. Applications to symplectic geometry. Microflexibility. Mappings with simple singularities and their applications. Method of convex integration. Nash-Kuiper C^1-isometric embedding theorem.
3 units, not given this year

MATH 272. Topics in Partial Differential Equations
3 units, not given this year

MATH 282A. Low Dimensional Topology
The theory of surfaces and 3-manifolds. Curves on surfaces, the classification of diffeomorphisms of surfaces, and Teichmuller space. The mapping class group and the braid group. Knot theory, including knot invariants. Decomposition of 3-manifolds: triangulations, Heegaard splittings, Dehn surgery. Loop theorem, sphere theorem, incompressible surfaces. Geometric structures, particularly hyperbolic structures on surfaces and 3-manifolds.
3 units, Aut (Mirzakhani, M)

MATH 282B. Homotopy Theory
Homotopy groups, fibrations, spectral sequences, simplicial methods, Dold-Thom theorem, models for loop spaces, homotopy limits and colimits, stable homotopy theory.
3 units, Win (Galatius, S)

MATH 282C. Fiber Bundles and Cobordism
Possible topics: principal bundles, vector bundles, classifying spaces. Connections on bundles, curvature. Topology of gauge groups and gauge equivalence classes of connections. Characteristic classes and K-theory, including Bott periodicity, algebraic K-theory, and indices of elliptic operators. Spectral sequences of Atiyah-Hirzebruch, Serre, and Adams. Cobordism theory, Pontryagin-Thom theorem, calculation of unoriented and complex cobordism. May be repeated for credit.
3 units, Spr (Carlsson, G)

MATH 283A. Topics in Topology
3 units, Win (Carlsson, G)

MATH 284A. Geometry and Topology in Dimension 3
The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.
3 units, not given this year

MATH 284B. Geometry and Topology in Dimension 3
The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.
3 units, not given this year

MATH 286. Topics in Differential Geometry
May be repeated for credit.
3 units, Spr (Bernstein, J)

MATH 290B. Model Theory B
(Same as PHIL 350B) Decidable theories. Model-theoretic background. Arithmetic of addition, real closed and algebraically closed fields, weak second order arithmetic, theories of terms, theories of arrays, temporal logic. Combining decision procedures. May be repeated for credit. Prerequisite: 151,152 or equivalents.
1-3 units, not given this year

MATH 292A. Set Theory
(Same as PHIL 352A) The basics of axiomatic set theory; the systems of Zermelo-Fraenkel and Bernays-Gödel. Topics: cardinal and ordinal numbers, the cumulative hierarchy and the role of the axiom of choice. Models of set theory, including the constructible sets and models constructed by the method of forcing. Consistency and independence results for the axiom of choice, the continuum hypothesis, and other unsettled mathematical and set-theoretical problems. Prerequisites: PHIL151 and MATH 161, or equivalents.
3 units, Win (Mints, G)

MATH 293A. Proof Theory
(Same as PHIL 353A) Gentzen's natural deduction and sequential calculi for first-order propositional and predicate logics. Normalization and cut-elimination procedures. Relationships with computational lambda calculi and automated deduction. Prerequisites: 151, 152, and 161, or equivalents.
3 units, not given this year

MATH 295. Computation and Algorithms in Mathematics
Use of computer and algorithmic techniques in various areas of mathematics. Computational experiments. Topics may include polynomial manipulation, Groebner bases, computational geometry, and randomness. May be repeated for credit.
3 units, not given this year

MATH 301. Advanced Topics in Convex Optimization
Modern developments in convex optimization: semidefinite programming; novel and efficient first-order algorithms for smooth and nonsmooth convex optimization. Emphasis on numerical methods suitable for large scale problems arising in science and engineering. Prerequisites: convex optimization (EE 364), linear algebra (MATH 104), numerical linear algebra (CME 302); background in probability, statistics, real analysis and numerical optimization.
3 units, Win (Candes, E)

MATH 355. Graduate Teaching Seminar
Required of and limited to first-year Mathematics graduate students.
1 unit, Spr (White, B; Lucianovic, M)

MATH 360. Advanced Reading and Research
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MATH 361. Research Seminar Participation
Participation in a faculty-led seminar which has no specific course number. (Staff)
1-3 units, Aut (Staff), Win (White, B), Spr (Kerckhoff, S), Sum (Staff)

MATH 381. Seminar in Analysis
1-3 units, by arrangement

MATH 384. Seminar in Geometry
1 unit, by arrangement

MATH 385. Seminar in Topology
1-3 units, by arrangement

MATH 388. Seminar in Probability and Stochastic Processes
1-3 units, by arrangement

MATH 389. Seminar in Mathematical Biology
1-3 units, by arrangement

MATH 391. Research Seminar in Logic and the Foundations of Mathematics
(Same as PHIL 391) Contemporary work. May be repeated a total of three times for credit.
1-3 units, Aut (Mints, G; Feferman, S), Win (Mints, G; Feferman, S), Spr (Staff)

MATH 395. Classics in Geometry and Topology
Original papers in geometry and in algebraic and geometric topology. May be repeated for credit.
3 units, Spr (Staff)

MATH 396. Graduate Progress
Results and current research of graduate and postdoctoral students. May be repeated for credit.
1 unit, not given this year

MATH 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MECHANICAL ENGINEERING (ME) COURSES

UNDERGRADUATE COURSES IN MECHANICAL ENGINEERING

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ME 10AX. Design Thinking and the Art of Innovation
Techniques that designers use to create innovative solutions to difficult problems that cross domains. Project-based. Approaches to problem identification and problem solving. Tools such as need finding, structured brainstorming, synthesis, rapid prototyping, and visual communication. Field trips to a local design firm, a robotics lab, and a prototyping lab. The pleasures of creative design and hands-on development of tangible solutions. Design has a unique

approach to looking at both the problem domain and the solution domain in issues where technology, social issues, human behavior, and business needs overlap.

2 units, Aut (Burnett, W)

ME 11AX. Graphic Design: The Art of Product Branding

Onsite course. Comprehensive approach to corporate product branding. Working with a current 1185 design client, students experience the development of a product brand from naming and developing positioning to the creation of a logo, web site, and collateral. Final presentations of overall brands to corporate executives. Field trips to the client site, and workshops with naming, positioning, and design professionals.

2 units, Aut (Burke, P)

ME 12N. The Jet Engine

(Stanford Introductory Seminar) Preference to freshmen. How a jet engine works; the technologies and analytical techniques required to understand them. Dynamics, thermodynamics, turbomachinery, combustion, advanced materials, cooling technologies, and control systems. Visits to research laboratories, examination of a partially disassembled engine, and probable operation of a small jet engine. Prerequisites: high school physics. GER:DB-EngrAppSci

3 units, Aut (Eaton, J)

ME 14N. How Stuff Is Made

(Stanford Introductory Seminar) The design and engineering of products and processes. Machined, fabric, food, and electrical goods. Tradeoffs in choice of serial, continuous, and batch fabrication. Final project: students research and create a web site about the engineering aspects of a product and its processes. Field trips to manufacturing facilities.

3 units, Aut (Pruitt, B)

ME 18Q. Teamology: Creative Teams and Individual Development

(Stanford Introductory Seminar) Preference to sophomores. Roles on a problem solving team that best suit individual creative characteristics. Two teams are formed for teaching experientially how to develop less conscious abilities from teammates creative in those roles. Reinforcement teams have members with similar personalities; problem solving teams are composed of people with maximally different personalities.

3 units, Aut (Wilde, D)

ME 21N. Renaissance Machine Design

(Stanford Introductory Seminar) Preference to freshmen. Technological innovations of the 1400s that accompanied the proliferation of monumental art and architecture by Brunelleschi, da Vinci, and others who designed machines and invented novel construction, fresco, and bronze-casting techniques. The social and political climate, from the perspective of a machine designer, that made possible and demanded engineering expertise from prominent artists. Hands-on projectsto provide a physical understanding of Renaissance-era engineering challenges and introduce the pleasure of creative engineering design. Technical background not required. GER:DB-EngrAppSci

3 units, Spr (Cutkosky, M)

ME 25N. Global Warming and Climate Change: Fact or Fiction

(Stanford Introductory Seminar) Preference to freshmen. Scientific arguments concerning debates between the view that anthropogenic activities are not causing global warming versus the view that these activities are responsible for a global warming that results in significant climate change. Consequences of increased demand for energy. Prerequisites: high school physics, chemistry, and biology.

3 units, Win (Bowman, C)

ME 26N. Think Like a Designer

(Stanford Introductory Seminar) Introduces students to techniques designers use to create highly innovative solutions across domains. The project-based class will emphasize approaches to problem identification and problem solving. Topics include need-finding, structured brainstorming, synthesis, rapid prototyping, and visual communication; field trips to a local design firm, a robotics lab, and a machining lab. A secondary goal of the seminar is to introduce students to the pleasures of creative design and hands-on development of tangible solutions.

3 units, Aut (Banerjee, S)

ME 28SI. Professional Design Practices

Lab. Professional skills are developed through web-based portfolio and resume building. Additionally, visits to local design consulting firms and in house design groups will help solidify students understanding of the designer in the professional workplace.

1 unit, Aut (Burnett, W)

ME 29SI. Cars: A Crash Course

Focus is on the basic mechanics and significance of cars. Topics include a basic, real-world understanding of automobile workings, histories, industries, cultural impact, and related media. Field trips to Tesla Motors and Go-Kart Racer will be organized, and there will be guest appearances by local automotive historians and enthusiasts. Students will get hands on experience with maintaining real cars, see high performance engines run, and have the opportunity to learn how to drive a manual transmission.

1 unit, Aut (Gerdes, C)

ME 70. Introductory Fluids Engineering

Elements of fluid mechanics as applied to engineering problems. Equations of motion for incompressible ideal flow. Hydrostatics. Control volume laws for mass, momentum, and energy. Bernoulli equation. Dimensional analysis and similarity. Flow in ducts. Boundary layer flows. Lift and drag. Lab experiment demonstrations. Prerequisites: ENGR 14 and 30. GER:DB-EngrAppSci

4 units, Win (Santiago, J), Spr (Cappelli, M)

ME 80. Mechanics of Materials

Mechanics of materials and deformation of structural members. Topics include stress and deformation analysis under axial loading, torsion and bending, column buckling and pressure vessels. Introduction to stress transformation and multiaxial loading. Prerequisite: ENGR 14. GER:DB-EngrAppSci

4 units, Aut (Levenston, M), Spr (Cai, W)

ME 101. Visual Thinking

Lecture/lab. Visual thinking and language skills are developed and exercised in the context of solving design problems. Exercises for the mind's eye. Rapid visualization and prototyping with emphasis on fluent and flexible idea production. The relationship between visual thinking and the creative process. Enrollment limited to 60. GER:DB-EngrAppSci

3 units, Aut (Northway, D; Gleason, P), Win (Meissner, S; Kessin, J), Spr (Northway, D)

ME 103D. Engineering Drawing and Design

Designed to accompany 203. The fundamentals of engineering drawing including orthographic projection, dimensioning, sectioning, exploded and auxiliary views, and assembly drawings. Homework drawings are of parts fabricated by the student in the lab. Assignments in 203 supported by material in 103D and sequenced on the assumption that the student is enrolled in both courses simultaneously.

1 unit, Aut (Milroy, J), Win (Milroy, J)

ME 104. The Designer's Voice

How to develop a point of view about a design career in order to articulate a design vision, inspire a design studio, or infect a business with a culture of design thinking. Focus is on the integration of work and worldview, professional values, design language, and the development of the designer¿s voice. Role play, guest speakers, individual mentoring and coaching, student journals. Restricted to undergraduate Product Design seniors.

1 unit, Aut (Evans, D; Burnett, W)

ME 104B. Designing the Authentic Life

A design thinking approach to help students develop a point of view about their career. Introduction to design thinking, the integration of work and worldview, and practices that support vocation formation. Seminar-style discussions, role playing, writing assignments, guest speakers, and individual mentoring and coaching. Participants required to keep a journal. Enrollment limited to 45 juniors and seniors from any major. See http://www.designingtheauthenticlife.org

2 units, Aut (Burnett, W; Evans, D), Win (Burnett, W; Evans, D), Spr (Burnett, W; Evans, D)

ME 110. Design Sketching

Freehand sketching, rendering, and design development. Students develop a design sketching portfolio for review by program faculty. May be repeated for credit.

1 unit, Aut (Li, W; Scott, W), Win (Li, W; Scott, W), Spr (Li, W; Scott, W)

ME 112. Mechanical Systems Design
Lecture/lab. Characteristics of machine elements including gears, bearings, and shafts. Design for fatigue life. Electric motor fundamentals. Transmission design for maximizing output power or efficiency. Mechanism types, linkage analysis and kinematic synthesis. Team-based design projects emphasizing the balance of physical with virtual prototyping based on engineering analysis. Lab for dissection of mechanical systems and project design reviews. Prerequisites: 80, 101. Recommended: 203, ENGR 15. GER:DB-EngrAppSci
4 units, Win (Cutkosky, M)

ME 113. Mechanical Engineering Design
Capstone course. Mechanical engineering design is experienced by students as they work on team projects obtained from industry or other organizations. Prerequisites: 80,101,112, 203. Enrollment priority to ME majors. GER:DB-EngrAppSci
4 units, Spr (Nelson, D)

ME 115A. Introduction to Human ValueS in Design
Lecture/lab. . Introduces the central philosophy of the product design program, emphasizing the relation between technical and human values, the innovation process, and design methodology. Lab exercises include development of simple product concepts visualized in rapidly executed three-dimensional mockups. Prerequisite: 101.
3 units, Aut (Kelley, D)

ME 115B. Product Design Methods
Problem-finding, problem-solving, intermediate creativity methods and effective techniques for researching and presenting product concepts. Individual- and team-based design projects emphasizing advanced visual thinking and prototyping skills. Prerequisite: ME115A GER:DB-EngrAppSci
3 units, Win (Edson, J)

ME 115C. Design and Business Factors
Design and Business Factors: Introduces business concepts critical to determining the success of new products and services. Students will learn to estimate the cost of R&D for new product development. Using financial analysis, ROI, and tollgates to reduce development risk will be explored using case studies and simulations. Students will develop a bill of materials and a profit and loss statement for a sample product concept, prototype a design consultancy, and create a business proposal for a proposed new product company.
3 units, Spr (Burnett, W; Siddiqui, O)

ME 116. Advanced Product Design: Formgiving
Small- and medium-scale design projects are carried to a high degree of aesthetic refinement. Emphasis is on form development, design process, and model making. Prerequisites: ME 115B, ARTSTUDI 160. GER:DB-EngrAppSci
4 units, Aut (Lukic, B)

ME 120. History and Philosophy of Design
Major schools of 19th- and 20th-century design (arts and crafts movement, bauhaus, industrial design, and postmodernism) are analyzed in terms of their continuing cultural relevance. The relation of design to art, technology, and politics; readings from principal theorists, practitioners, and critics; recent controversies in industrial and graphic design, architecture, and urbanism. Enrollment limited to 40.
3 units, Spr (Katz, B)

ME 131A. Heat Transfer
The principles of heat transfer by conduction, convection, and radiation with examples from the engineering of practical devices and systems. Topics include transient and steady conduction, conduction by extended surfaces, boundary layer theory for forced and natural convection, boiling, heat exchangers, and graybody radiative exchange. Prerequisites: 70, ENGR 30. Recommended: intermediate calculus, ordinary differential equations. GER:DB-EngrAppSci
3-4 units, Aut (Goodson, K)

ME 131B. Fluid Mechanics: Compressible Flow and Turbomachinery
Engineering applications involving compressible flow: aircraft and rocket propulsion, power generation; application of mass, momentum, energy and entropy balance to compressible flows; variable area isentropic flow, normal shock waves, adiabatic flow with friction, flow with heat addition. Operation of flow systems: the propulsion system. Turbomachinery: pumps, compressors, turbines. Angular momentum analysis of turbomachine performance, centrifugal and axial flow machines, effect of blade geometry, dimensionless performance of turbomachines; hydraulic turbines; steam turbines; wind turbines. Compressible flow turbomachinery: the aircraft engine. Prerequisites: 70, ENGR 30. GER:DB-EngrAppSci
4 units, Win (Lele, S)

ME 140. Advanced Thermal Systems
Capstone course. Thermal analysis and engineering emphasizing integrating heat transfer, fluid mechanics, and thermodynamics into a unified approach to treating complex systems. Mixtures, humidity, chemical and phase equilibrium, and availability. Labs apply principles through hands-on experience with a turbojet engine, PEM fuel cell, and hybrid solid/oxygen rocket motor. Use of MATLAB as a computational tool. Prerequisites: ENGR 30, ME 70, and 131A,B. GER:DB-EngrAppSci
5 units, Spr (Mitchell, R)

ME 150. Internal Combustion Engines
Internal combustion engines including conventional and turbocharged spark ignition, and diesel engines. Lectures: basic engine cycles, engine components, methods of analysis of engine performance, pollutant emissions, and methods of engine testing. Lab involves hands-on experience with engines and test hardware. Limited enrollment. Prerequisites: 140. GER:DB-EngrAppSci
3 units, Aut (Edwards, C)

ME 161. Dynamic Systems, Vibrations and Control
(Same as ME 261) (Graduate students only enroll in 261.) Modeling, analysis, and measurement of mechanical and electromechanical systems. Numerical and closed form solutions of ordinary differential equations governing the behavior of single and multiple degree of freedom systems. Stability, resonance, amplification and attenuation, and control system design. Prerequisite: background in dynamics and calculus such as ENGR 15 and MATH 43. Recommended: CME 102, and familiarity with differential equations, linear algebra, and basic electronics. GER:DB-EngrAppSci
3-4 units, Aut (Mitiguy, P)

ME 190. Ethical Issues in Mechanical Engineering
Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; whistle blowing; engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations, and engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies and field research. Enrollment limited to 25 Mechanical Engineering majors.
4 units, not given this year

ME 191. Engineering Problems and Experimental Investigation
Directed study and research for undergraduates on a subject of mutual interest to student and staff member. Student must find faculty sponsor and have approval of adviser.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 191H. Honors Research
Student must find faculty honors adviser and apply for admission to the honors program. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 196. Design and Manufacturing Forum
(Same as ME 396) Invited speakers address issues of interest to design and manufacturing engineering and business students. Sponsored by the Product Realization Network at Stanford.
1 unit, Win (Reis, R), Spr (Reis, R)

GRADUATE COURSES IN MECHANICAL ENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ME 201. Dim Sum of Mechanical Engineering
Introduction to research in mechanical engineering for M.S. students and upper-division undergraduates. Weekly presentations by current ME Ph.D. and second-year fellowship students to show research opportunities across the department. Strategies for getting involved in a research project. (Sheppard)
1 unit, Aut (Kuhl, E; Gardella, I)

ME 203. Design and Manufacturing
Integrated experience involving need finding, product definition, conceptual design, detail design, prototype manufacture, public presentation of outcomes, archiving and intrepreting the product realization process and its results. Presents an overview of manufacturing processes crucial to the practice of design. Corequisite: 103D or CAD experience. Corequisite for WIM for Mechanical Engineering and Product Design undergraduate majors: ENGR102M. Recommended: 101.
4 units, Aut (Beach, D), Win (Beach, D)

ME 203X. Prototyping and Process Capture
Concepts and methods for low resolution prototyping as an integral activity in engineering design process. Presentations by faculty and design exercises by students. Assignments are blog posts. Designed to work in phase with ME203 and offers greater depth in protoyping strategy, technique, and resultant insights. Enrollment limited to 6. Corequisite: ME 203.
1 unit, not given this year

ME 204. Bicycle Design and Frame-Building
Lecture/lab. The engineering and artistic execution of designing and building a bicycle frame. Fundamentals of bicycle dynamics, handling, and sizing. Manufacturing processes. Films, guest lecturers, field trips. Each student designs and fabricates a custom bicycle frame. Limited enrollment. Prerequisite: 203 or equivalent.
3 units, Spr (Connolly, R)

ME 206A. Entrepreneurial Design for Extreme Affordability
Project course jointly offered by School of Engineering and Graduate School of Business. Students apply engineering and business skills to design product prototypes, distribution systems, and business plans for entrepreneurial ventures in developing countries for a specified challenge faced by the world's poor. Topics include user empathy, appropriate technology design, rapid prototype engineering and testing, social technology entrepreneurship, business modeling, and project management. Weekly design reviews; final course presentation. Industry and adviser interaction. Limited enrollment via application; see http://www.stanford.edu/class/me206.
4 units, Win (Patell, J; Beach, D)

ME 206B. Entrepreneurial Design for Extreme Affordability
Part two of two-quarter project course jointly offered by School of Engineering and Graduate School of Business. Second quarter emphasizes prototyping and implementation of specific projects identified in first quarter. Students work in cross-disciplinary project teams. Industry and adviser interaction, weekly design reviews; final course presentation. Prerequisite: 206A. (Jointly offered as GSB OIT333B)
4 units, Spr (Beach, D; Patell, J)

ME 208. Patent Law and Strategy for Innovators and Entrepreneurs
How to build a patent portfolio and avoid patent infringement. How to conduct a patent search. How to file a provisional patent application.
2-3 units, Aut (Schox, J)

ME 210. Introduction to Mechatronics
Technologies involved in mechatronics (intelligent electromechanical systems), and techniques to apply this technology to mecatronic system design. Topics include: electronics (A/D, D/A converters, op-amps, filters, power devices); software program design, event-driven programming; hardware and DC stepper motors, solenoids, and robust sensing. Large, open-ended team project. Limited enrollment. Prerequisites: ENGR 40, CS 106, or equivalents.
4 units, Win (Ohline, R; Kenny, T)

ME 212. Calibrating the Instrument
For first-year graduate students in the Joint Program in Design. Means for calibrating the designer's mind/body instrument through tools including improvisation, brainstorming, creative imaging, educational kinesiology, and Brain Gym. Current design issues; guest speakers; shared stories; and goal setting.
1 unit, Aut (Edmark, J)

ME 214. Good Products, Bad Products
(Same as ME 314) The characteristics of industrial products that cause them to be successes or failures: the straightforward (performance, economy, reliability), the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user), the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors to produce more successful products. Projects, papers, guest speakers, field trips. GER:DB-EngrAppSci
3-4 units, Win (Beach, D)

ME 216A. Advanced Product Design: Needfinding
Human needs that lead to the conceptualization of future products, environments, systems, and services. Field work in public and private settings; appraisal of personal values; readings on social ethnographic issues; and needfinding for a corporate client. Emphasis is on developing the flexible thinking skills that enable the designer to navigate the future. Prerequisites for undergraduates: 116 and 203, or consent of the instructor. Prerequisites for graduate students: 203 and 313, or consent of the instructor.
3-4 units, Win (Patnaik, D)

ME 216B. Advanced Product Design: Implementation
Summary project using knowledge, methodology, and skills obtained in Product Design major. Students implement an original design concept and present it to a professional jury. Prerequisite: 216A.
3-4 units, Spr (Staff)

ME 218A. Smart Product Design Fundamentals
Lecture/lab. Team design project series on programmable electromechanical systems design. Topics: transistors as switches, digital and analog circuits, operational amplifiers, comparators, software design, programming in C. Lab fee. Limited enrollment.
4-5 units, Aut (Carryer, J)

ME 218B. Smart Product Design Applications
Lecture/lab. Second in team design project series on programmable electromechanical systems design. Topics: user I/O, timer systems, interrupts, signal conditioning, software design for embedded systems, sensors, actuators, noise, and power supplies. Lab fee. Limited enrollment. Prerequisite: 218A or passing the smart product design fundamentals proficiency examination.
4-5 units, Win (Carryer, J)

ME 218C. Smart Product Design Practice
Lecture/lab. Advanced level in series on programmable electromechanical systems design. Topics: inter-processor communication, system design with multiple microprocessors, architecture and assembly language programming for the PIC microcontroller, controlling the embedded software tool chain, A/D and D/A techniques, electronic manufacturing technology. Team project. Lab fee. Limited enrollment. Prerequisite: 218B.
4-5 units, Spr (Carryer, J)

ME 218D. Smart Product Design: Projects
Lecture/lab. Industrially sponsored project is the culmination of the Smart Product Design sequence. Student teams take on an industrial project requiring application and extension of knowledge gained in the prior three quarters, including prototyping of a final solution with hardware, software, and professional documentation and presentation. Lectures on electronic and software design, and electronic manufacturing techniques. Topics: chip level design of microprocessor systems, real time operating systems, alternate microprocessor architectures, and PCB layout and fabrication.
4 units, Aut (Carryer, J)

ME 219. The Magic of Materials and Manufacturing
Lecture/lab. Methods for market-quantity manufacturing of parts and products from a product designer's point of view. Materials including metals, plastics, ceramics, fibers, and foams, and processes that manipulate, exploit, transform, and modify these materials. Visual descriptions of processes, product examples, relevant material details, cost information, and manufacturability rules-of-

thumb. Imagining and creating new products. Manufacturing site visits; laboratory projects. Enrollment limited to 20.

3 units, Spr (Beach, D; Johnson, K)

ME 220. Introduction to Sensors

Sensors are widely used in scientific research and as an integral part of commercial products and automated systems. The basic principles for sensing displacement, force, pressure, acceleration, temperature, optical radiation, nuclear radiation, and other physical parameters. Performance, cost, and operating requirements of available sensors. Elementary electronic circuits which are typically used with sensors. Lecture demonstration of a representative sensor from each category elucidates operating principles and typical performance. Lab experiments with off-the-shelf devices.

3-4 units, Spr (Kenny, T)

ME 221. Green Design Strategies and Metrics

Foundation in sustainable product design principles, reinforced by conceptual design projects. Discuss what aspects of sustainability matter most for different products. Application of dozens of strategies to improve product sustainability. Frameworks, measurements, and decision-making tools to navigate the complexities of designing greener products. Life-cycle analysis, materials, energy use, biomimicry, product-service systems, persuasive design, design for end-of-life, and systems thinking.

2 units, Win (Faludi, J)

ME 222. Design for Sustainability

Lecture/lab. Role of design in building a sustainable world. How to include sustainability in the design process considering environmental, cultural, and social impacts. Focus is on a proactive design approach, and the tools and techniques needed to translate theory into artifact.

2-3 units, Spr (Staff)

ME 227. Vehicle Dynamics and Control

The application of dynamics, kinematics, and control theory to the analysis and design of ground vehicle behavior. Simplified models of ride, handling, and braking, their role in developing intuition, and limitations in engineering design. Suspension design fundamentals. Performance and safety enhancement through automatic control systems. In-car laboratory assignments for model validation and kinesthetic understanding of dynamics. Limited enrollment. Prerequisites: ENGR 105, consent of instructor.

3 units, Spr (Gerdes, C)

ME 233. Making it Big: Crossing the Entrepreneur's Gap

Students take novel designs into entrepreneurial production and prepare for market production. Education, resources, and community to help cross the gap, found ideas and make them real in volume. Topics include entrepreneurial production methods and initiation, vendor selection and engagement, cost, design transfer, quality and testing, and manufacturing planning and execution. Leadership roles in entrepreneurial and large production-oriented companies. Case studies, project reviews, final presentation, industry interaction.

3 units, Aut (Theeuwes, M)

ME 238. Patent Prosecution

(Same as LAW 321.) Stages of the patent application process: identifying, capturing, and evaluating inventions; performing a patentability investigation, analyzing the documents, and the scope of the patent protection; composing claims that broadly cover the invention; creating a specification that supports the claims; filing a patent application with the U.S. Patent and Trademark Office; and analyzing an office action and preparing an appropriate response. Current rules and case law. Strategic decisions within each stage, such as: how does a patent application advance the patent portfolio; and in what countries should a patent application be filed?

2 units, Spr (Schox, J)

ME 239. Mechanics of the Cell

Kinematical description of basic structural elements used to model parts of the cell: rods, ropes, membranes, and shells. Formulation of constitutive equations: nonlinear elasticity and entropic contributions. Elasticity of polymeric networks. Applications to model basic filaments of the cytoskeleton: actin, microtubules, intermediate filaments, and complete networks. Applications to biological membranes.

3 units, Win (Kuhl, E)

ME 257. Turbine and Internal Combustion Engines

(Same as ME 357) Principles of design analysis for aircraft gas turbines and automotive piston engines. Analysis for aircraft engines performed for Airbus A380 type aircraft. Design parameters determined considering aircraft aerodynamics, gas turbine thermodynamics, compressible flow physics, and material limitations. Additional topics include characteristics of main engine components, off-design analysis, and component matching. Performance of automotive piston engines including novel engine concepts in terms of engine thermodynamics, intake and exhaust flows, and in-cylinder flow.

3 units, not given this year

ME 260. Fuel Cell Science and Technology

Emphasis on proton exchange membrane (PEM) and solid oxide fuel cells (SOFC), and principles of electrochemical energy conversion. Topics in materials science, thermodynamics, and fluid mechanics. Prerequisites: MATH 43, PHYSICS 55, and ENGR 30 or ME 140, or equivalents.

3 units, Spr (Fasching, R)

ME 261. Dynamic Systems, Vibrations and Control

(Same as ME 161) (Graduate students only enroll in 261.) Modeling, analysis, and measurement of mechanical and electromechanical systems. Numerical and closed form solutions of ordinary differential equations governing the behavior of single and multiple degree of freedom systems. Stability, resonance, amplification and attenuation, and control system design. Prerequisite: background in dynamics and calculus such as ENGR 15 and MATH 43. Recommended: CME 102, and familiarity with differential equations, linear algebra, and basic electronics.

3-4 units, Aut (Mitiguy, P)

ME 265. Technology Licencing and Commercialization

How to profit from technology; processes and strategies to commercialize functional or artistic inventions and creations (not limited to mechanical engineering). Business and legal aspects of determining what can be owned and licensed, how to determine commercial value, and what agreements are necessary. Contract and intellectual property law; focus is on provisions of license agreements and their negotiation.

3 units, Spr (Hustein, J)

ME 280. Skeletal Development and Evolution

(Same as BIOE 280, BIOE 280) The mechanobiology of skeletal growth, adaptation, regeneration, and aging is considered from developmental and evolutionary perspectives. Emphasis is on the interactions between mechanical and chemical factors in the regulation of connective tissue biology. Prerequisites: BIO 42, and ME 80 or BIOE 42.

3 units, not given this year

ME 281. Biomechanics of Movement

(Same as BIOE 281) Experimental techniques to study human and animal movement including motion capture systems, EMG, force plates, medical imaging, and animation. The mechanical properties of muscle and tendon, and quantitative analysis of musculoskeletal geometry. Projects and demonstrations emphasize applications of mechanics in sports, orthopedics, and rehabilitation. GER:DB-EngrAppSci

3 units, not given this year

ME 284A. Cardiovascular Bioengineering

(Same as BIOE 284A) Bioengineering principles applied to the cardiovascular system. Anatomy of human cardiovascular system, comparative anatomy, and allometric scaling principles. Cardiovascular molecular and cell biology. Overview of continuum mechanics. Form and function of blood, blood vessels, and the heart from an engineering perspective. Normal, diseased, and engineered replacement tissues.

3 units, Aut (Taylor, C)

ME 284B. Cardiovascular Bioengineering

(Same as BIOE 284B) Continuation of ME/BIOE 284A. Integrative cardiovascular physiology, blood fluid mechanics, and transport in the microcirculation. Sensing, feedback, and control of the circulation. Overview of congenital and adult cardiovascular disease, diagnostic methods, and treatment strategies. Engineering principles to evaluate the performance of cardiovascular devices and the efficacy of treatment strategies.

3 units, Win (Taylor, C)

ME 294. Medical Device Design
In collaboration with the School of Medicine. Introduction to medical device design for undergraduate and graduate engineering students. Design and prototyping. Labs; medical device environments may include hands-on device testing; and field trips to operating rooms and local device companies. Limited enrollment. Prerequisite: 203.

3 units, Aut (Milroy, J; Srivastava, S)

ME 297. Forecasting for Innovators:Technology, Tools & Social Change
Technologies from the steam engine to the microprocessor have been mixed gifts, at once benefitting humankind and creating many of the problems facing humanity today. This class will explore how innovators can use forecasting methods to identify new challenges, develop responsive innovations and anticipate unintended consequences. Students will produce a long-range forecast project, applying a variety of methodologies including research, expert interviews and graphical exploration.

3 units, Win (Saffo, P; Benjamin, C)

ME 298. Silversmithing and Design
Skills involved in working with precious metals at a small scale. Investment casting and fabrication techniques such as reticulation, granulations, filigree, and mokume gane.

3-4 units, Win (Shaughnessy, S; Knox Sather, A)

ME 299A. Practical Training
For master's students. Educational opportunities in high technology research and development labs in industry. Students engage in internship work and integrate that work into their academic program. Following internship work, students complete a research report outlining work activity, problems investigated, key results, and follow-up projects they expect to perform. Meets the requirements for curricular practical training for students on F-1 visas. Student is responsible for arranging own internship/employment and faculty sponsorship. Register under faculty sponsor's section number. All paperwork must be completed by student and faculty sponsor, as the Student Services Office does not sponsor CPT. Students are allowed only one quarter of CPT per degree program.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 299B. Practical Training
For Ph.D. students. Educational opportunities in high technology research and development labs in industry. Students engage in internship work and integrate that work into their academic program. Following internship work, students complete a research report outlining work activity, problems investigated, key results, and follow-up projects they expect to perform. Meets the requirements for curricular practical training for students on F-1 visas. Student is responsible for arranging own internship/employment and faculty sponsorship. Register under faculty sponsor's section number. All paperwork must be completed by student and faculty sponsor, as the student services office does not sponsor CPT. Students are allowed only one quarter of CPT per degree program.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 300A. Linear Algebra with Application to Enginering Computations
(Same as CME 200) Computer based solution of systems of algebraic equations obtained from engineering problems and eigensystem analysis, Gaussian elimination, effect of round-off error, operation counts, banded matrices arising from discretization of differential equations, ill-conditioned matrices, matrix theory, least square solution of unsolvable systems, solution of non-linear algebraic equations, eigenvalues and eigenvectors, similar matrices, unitary and Hermitian matrices, positive definiteness, Cayley-Hamilton theory and function of a matrix and iterative methods. Prerequisite: familiarity with computer programming, and MATH103, 130, or equivalent.

3 units, Aut (Gerritsen, M)

ME 300B. Partial Differential Equations in Engineering
(Same as CME 204) Geometric interpretation of partial differential equation (PDE) characteristics; solution of first order PDEs and classification of second-order PDEs; self-similarity; separation of variables as applied to parabolic, hyperbolic, and elliptic PDEs; special functions; eigenfunction expansions; the method of characteristics. If time permits, Fourier integrals and transforms, Laplace transforms. Prerequisite: CME 200/ME 300A, equivalent, or consent of instructor.

3 units, Win (Shaqfeh, E)

ME 300C. Introduction to Numerical Methods for Engineering
(Same as AA 214A, CME 206) Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B.

3 units, Spr (Iaccarino, G)

ME 301. Design and Launch your Product or Service
Apply principles of design thinking to the real-life challenge of imagining, prototyping, testing and iterating, building, marketing, and selling your product or service. Work will be in teams (you apply as an intact team) or alone. You must submit a proposal and team for approval. Proposal can be a physical good or service of any kind. Projects are treated as real start-ups, so the work will be intense. Proposal submitted by Feb 15, 2010 acceptance by March 1.

4 units, Spr (Klebahn, P; Dearing, M)

ME 302. The Future of the Automobile
(Same as CS 523) Guest speakers from academia and industry present their research results, share their visions, explain challenges, and offer solutions regarding individual transportation. Students are requested to draft brief write-ups on selected topics that will be discussed in class to develop an understanding of the interactions of technology, business, and society with a specific automotive focus. No specific technical background is required as it is encouraged that everyone brings in specific expertise regarding the automobile as a student, researcher, and/or consumer.

1 unit, Aut (Beiker, S; Gerdes, C), Win (Beiker, S; Gerdes, C; Thrun, S), Spr (Beiker, S; Gerdes, C; Thrun, S)

ME 304. The Designer's Voice
How to develop a point of view about adesign career to enable students to articulate their design vision, inspire a design studio, or infect a business with a culture of design thinking. Focus on the integration of work and worldview, professional values, design language, and the development of the designer’s voice. Seminar-style discussions, role playing, writing assignments, guest speakers, and individual mentoring and coaching. Participants are required to keep a journal.

1 unit, Win (Evans, D; Burnett, W)

ME 308. Spatial Motion
The geometry of motion in Euclidean space. Fundamentals of theory of screws with applications to robotic mechanisms, constraint analysis, and vehicle dynamics. Methods for representing the positions of spatial systems of rigid bodies with their interrelationships; the formulation of Newton-Euler kinetics applied to serial chain systems such as industrial robotics.

3 units, alternate years, not given this year

ME 309. Finite Element Analysis in Mechanical Design
Basic concepts of finite elements, with applications to problems confronted by mechanical designers. Linear static, modal, and thermal formulations; nonlinear and dynamic formulations. Students implement simple element formulations. Application of a commercial finite element code in analyzing design problems. Issues: solution methods, modeling techniques, features of various commercial codes, basic problem definition. Individual projects focus on the interplay of analysis and testing in product design/development. Prerequisite: MATH 103, or equivalent. Rec-

ommended: 80, or equivalent in structural and/or solid mechanics; some exposure to principles of heat transfer.

3 units, Spr (Sheppard, S)

ME 310A. Project-Based Engineering Design, Innovation, and Development

Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

4 units, Aut (Leifer, L)

ME 310B. Project-Based Engineering Design, Innovation, and Development

(Same as ENGR 310B) Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

4 units, not given this year

ME 310C. Project-Based Engineering Design, Innovation, and Development

Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

4 units, Spr (Leifer, L; Cockayne, W)

ME 311. Design Strategy and Leadership

The business of design, design as strategy, and design research. Students lead brainstorming, needfinding, and design strategy workshops with peers and industry leaders. Prerequisites: ME 312, ME 313.

3 units, Spr (Canada, A)

ME 312. Advanced Product Design: Formgiving

Lecture/lab. Small- and medium-scale design projects carried to a high degree of aesthetic refinement. Emphasis is on form development, design process, and model making. Prerequisites: 203, 313. Corequisite: ARTSTUDI 160.

3-4 units, Win (Burnett, W)

ME 313. Human Values and Innovation in Design

Introduction to the philosophy, spirit, and tradition of the product design program. Hands-on design projects used as vehicles for design thinking, visualization, and methodology. The relationships among technical, human, aesthetic, and business concerns. Drawing, prototyping, and design skills. Focus is on tenets of design philosophy: point of view, user-centered design, design methodology, and iterative design.

3 units, Aut (Banerjee, S)

ME 314. Good Products, Bad Products

(Same as ME 214) The characteristics of industrial products that cause them to be successes or failures: the straightforward (performance, economy, reliability), the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user), the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors to produce more successful products. Projects, papers, guest speakers, field trips.

3-4 units, Win (Beach, D)

ME 315. The Designer in Society

For graduate students. Career objectives and psychological orientation compared with existing social values and conditions. Emphasis is on assisting individuals in assessing their roles in society. Readings on political, social, and humanistic thought are related to technology and design. Experiential, in-class exercises, and term project. Enrollment limited to 24.

3 units, Spr (Roth, B; Klebahn, P)

ME 316A. Product Design Master's Project

For graduate Product Design or Design (Art) majors only. Students create and present two master's theses under the supervision of engineering and art faculty. Theses involve the synthesis of aesthetics and technological concerns in the service of human need and possibility. Product Design students register for 4 units; Art students for 2 units. Prerequisites: ME 216B, ME 365 Corequisite: ARTSTUDI 360.

2-4 units, Aut (Burnett, W; Kelley, D)

ME 316B. Product Design Master's Project

Continuation of 316A.

2-4 units, Win (Burnett, W; Kelley, D)

ME 316C. Product Design Master's Project

Continuation of 316B.

2-4 units, Spr (Burnett, W; Kelley, D)

ME 317A. Structured Methods in Product & Process Development: Product Definition

Systematic methodologies to define, develop, and produce world-class products. Student team projects to identify opportunities for improvement and develop a comprehensive product definition. Topics include value engineering, quality function deployment, design for assembly and producibility, design for variety and supply chain, design for life-cycle quality, and concurrent engineering. Students must take 317B to complete the project and obtain a letter grade. On-campus enrollment limited to 20; SCPD class size limited to 50, and each site must have at least 3 students to form a project team.

4 units, Win (Beiter, K)

ME 317B. Structured Methods in Product and Process Development: Quality by Design

Building on 317A, focus is on the implementation of competitive product design. Student groups apply structured methods to optimize the design of an improved product, and plan for its manufacture, testing, and service. The project deliverable is a comprehensive product and process specification. Topics: concept generation and selection (Pugh's Method), FMEA applied to the manufacturing process, design for robustness, Taguchi Method, SPC and six sigma process, tolerance analysis, flexible manufacturing, product testing, rapid prototyping. Enrollment limited to 40, not including SCPD students. Minimum enrollment of two per SCPD viewing site; single student site by prior consent of instructor. On-campus class limited to 20. For SCPD students, limit is 50 and each site must have a minimum of three students to form a project team and define a project on their own. Prerequisite: 317A.

4 units, Spr (Beiter, K)

ME 318. Computer-Aided Product Creation

Design course focusing on an integrated suite of computer tools: rapid prototyping, solid modeling, computer-aided machining, and computer numerical control manufacturing. Students choose, design, and manufacture individual products, emphasizing individual design process and computer design tools. Field trips demonstrate Stanford Product Realization Lab's relationship to the outside world. Structured lab experiences build a basic CAD/CAM/CNC proficiency. Limited enrollment. Prerequisite: consent of instructor.

4 units, Aut (Milroy, J), Win (Milroy, J), Spr (Milroy, J)

ME 322. Kinematic Synthesis of Mechanisms

The rational design of linkages. Techniques to determine linkage proportions to fulfill design requirements using analytical, graphical, and computer based methods.

3 units, not given this year

ME 323. Modeling and Identification of Mechanical Systems for Control

Lecture/Lab. The art and science behind developing mathematical models for control system design. Theoretical and practical system modeling and parameter identification. Frequency domain identification, parametric modeling, and black-box identification. Analyti-

cal work and laboratory experience with identification, controller implementation, and the implications of unmodeled dynamics and non-linearities. Prerequisites: linear algebra and system simulation with MATLAB/SIMULINK; ENGR 105.

3 units, not given this year

ME 324. Precision Engineering

Advances in engineering are often enabled by more accurate control of manufacturing and measuring tolerances. Concepts and technology enable precision such that the ratio of overall dimensions to uncertainty of measurement is large relative to normal engineering practice. Typical application areas: non-spherical optics, computer information storage devices, and manufacturing metrology systems. Application experience through design and manufacture of a precision engineering project, emphasizing the principles of precision engineering. Structured labs; field trips. Prerequisite: consent of instructors.

4 units, Spr (Beach, D; DeBra, D)

ME 325. Introduction to High Performance Computing

An introduction to the use of advanced computing resources with real-world examples of large-scale, multidisciplinary, simulation-based science as related to academic and applied research.

1 unit, Sum (Staff)

ME 326. Telerobotics and Human-Robot Interactions

Focus is on dynamics and controls. Evaluation and implementation of required control systems. Topics include master-slave systems, kinematic and dynamic similarity; control architecture, force feedback, haptics, sensory substitutions; stability, passivity, sensor resolution, servo rates; time delays, prediction, wave variables. Hardware-based projects encouraged, which may complement ongoing research or inspire new developments. Limited enrollment. Prerequisites: ENGR 205, 320 or CS 223A, or consent of instructor. (Niemeyer)

3 units, not given this year

ME 330. Advanced Kinematics

Kinematics from mathematical viewpoints. Introduction to algebraic geometry of point, line, and plane elements. Emphasis is on basic theories which have potential application to mechanical linkages, computational geometry, and robotics.

3 units, not given this year

ME 331A. Classical Dynamics

(Same as AA 242A) Accelerating and rotating reference frames. Kinematics of rigid body motion; Euler angles, direction cosines. D'Alembert's principle, equations of motion. Inertia properties of rigid bodies. Dynamics of coupled rigid bodies. Lagrange's equations and their use. Dynamic behavior, stability, and small departures from equilibrium. Prerequisite: ENGR 15 or equivalent.

3 units, Aut (Close, S)

ME 331B. Advanced Dynamics and Simulation

Advanced methods and computational tools for the efficient formulation of equations of motion for multibody systems. D'Alembert principle. Power, work, and energy. Kane's method. Lagrange's method. Computed torque control. Systems with constraints. Quaternions Numerical solutions of nonlinear algebraic and differential equations governing the behavior of multiple degree of freedom systems.

3 units, Spr (Mitiguy, P)

ME 333. Mechanics

Goal is a common basis for advanced mechanics courses. Formulation of the governing equations from a Lagrangian perspective. Examples include systems of particles and linear elastic solids. Waves in discrete and continuous media. Linear elasticity formulation in the static and dynamic cases, and elementary measures of stress and strain. Tensor and variational calculus.

3 units, Aut (Lew, A)

ME 335A. Finite Element Analysis

Fundamental concepts and techniques of primal finite element methods. Method of weighted residuals, Galerkin's method and variational equations. Linear eliptic boundary value problems in one, two and three space dimensions; applications in structural, solid and fluid mechanics and heat transfer. Properties of standard element families and numerically integrated elements. Implementation of the finite element method using Matlab, assembly of equations, and element routines. Legrange multiplier and penalty methods for treatment of constraints. The mathematical theory of finite elements.

3 units, Aut (Pinsky, P)

ME 335B. Finite Element Analysis

Finite element methods for linear dynamic analysis. Eigenvalue, parabolic, and hyperbolic problems. Mathematical properties of semi-discrete (t-continuous) Galerkin approximations. Modal decomposition and direct spectral truncation techniques. Stability, consistency, convergence, and accuracy of ordinary differential equation solvers. Asymptotic stability, over-shoot, and conservation laws for discrete algorithms. Mass reduction. Applications in heat conduction, structural vibrations, and elastic wave propagation. Computer implementation of finite element methods in linear dynamics. Implicit, explicit, and implicit-explicit algorithms and code architectures.

3 units, Win (Pinsky, P)

ME 335C. Finite Element Analysis

Variational formulation of nonlinear elliptic, parabolic and hyperbolic problems. Newton's method for solving nonlinear algebraic systems; load-stepping, convergence, divergence and bifurcation. Enhancement of Newton's method including line-search, quasi-Newton and arc-length methods. Finite element approximation and consistent linearization; definition of the tangent operator and residual vector. Data structures for nonlinear finite element analysis. Examples drawn from nonlinear (rigid) heat conduction, nonlinear elasticity and contact mechanics.

3 units, alternate years, not given this year

ME 336. Crystalline Anisotropy

(Same as MATSCI 359) Matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetism, thermodynamics, and optical properties of solids, on the level of J. F. Nye's Physical Properties of Crystals. Homework sets use Mathematica.

3 units, Win (Barnett, D)

ME 337. Mechanics of Growth

Introdution to continuum theory and numerical solutions or biomechanical problems. Kinematics of finite growth. Balance equations in open system thermodynamics. Constitutive equations for biological tissues. Enhanced finite element models in biomechanics. Analytical solutions for simple model problems. Numerical solutions for more advanced problems such as: bone remodeling; wound healing; muscle regeneration; tumor growth; atherosclerosis; in-stent restenosis; and tissue engineering.

3 units, Aut (Kuhl, E)

ME 338A. Continuum Mechanics

Nonlinear continuum mechanics for solids and fluids. Kinematics of finite deformations. Measures of strain and stress. Finite rotations. Linearized kinematics and infinitesimal measures of deformations. Rates. Conservation laws for mass, momenta, and energy. Boundary value problem in continuum mechanics. Prerequisites: 333 and 300, or equivalent background with consent of instructor.

3 units, Win (Lew, A)

ME 338B. Continuum Mechanics

Constitutive theory; equilibrium constitutive relations; material frame indifference and material symmetry; finite elasticity; formulation of the boundary value problem; linearization and well-posedness; symmetries and configurational forces; numerical considerations.

3 units, alternate years, not given this year

ME 340A. Theory and Applications of Elasticity

Elasticity theory and application to material structures at microscale. Theories: stress, strain, and energy; equilibrium and compatibility conditions; boundary value problem. Solution methods: stress function, Green's function, Fourier transformation. Nu-

merical exercises using Matlab. Applications to defects in solids, thin films, and biomembranes.

3 units, not given this year

ME 340B. Elasticity in Microscopic Structures

This course provides analytic tools, notably the Green's function method, to solve elasticity problems (stress, strain, energy) of microscopic structures under deformation. Students shall be able to apply the theory of elasticity to study the interaction of defects in solids, such as inclusions, inhomogeneities, cracks, dislocations and interfaces.

3 units, Aut (Cai, W)

ME 341. Biomechanics of Hearing and Balance

Theory and practice of building mathematical models to understand physical phenomena; integration of imaging, physiology, and biomechanics. Journal club style discussions of research literature, examples from hearing science, speech production, and the vestibular system. Dualisms in modeling include: general principles versus detailed models; analytic versus computational models; forward versus inverse approaches; and the interplay between theory and experiments.

3 units, alternate years, not given this year

ME 342A. MEMS Laboratory

Practice and theory of MEMS device design and fabrication, orientation to fabrication facilities, and introduction to techniques for design and evaluation of MEMS devices in the context of designed projects. Emphasis on MEMS design (need finding, brainstorming, evaluation, and design methodology), characterization, and fabrication, including photolithography, etching, oxidation, diffusion, and ion implanation. Limited enrollment. Prerequisite: engineering or science background and consent of instructor.

3-4 units, not given this year

ME 342D. MEMS Laboratory Assignments

Prerequisite: consent of instructor.

1-3 units, Sum (Staff)

ME 343. An Introduction to Waves in Elastic Solids

One-dimensional motion of an elastic continuum, the linearized theory of elasticity and elastodynamic theory, elastic waves in an unbounded medium, plane harmonic waves in elastic half-spaces including reflection and refraction, slowness, energy velocity and anisotropic effects. Text is first five chapters of Achenbach's Wave Propagation in Elastic Solids. (Barnett)

3 units, not given this year

ME 345. Fatigue Design and Analysis

The mechanism and occurrences of fatigue in service. Methods for predicting fatigue life and for protecting against premature fatigue failure. Use of elastic stress and inelastic strain analyses to predict crack initiation life. Use of linear elastic fracture mechanics to predict crack propagation life. Effects of stress concentrations, manufacturing processes, load sequence, irregular loading, multiaxial loading. Subject is treated from the viewpoints of the engineer seeking up-to-date methods of life prediction and the researcher interested in improving understanding of fatigue behavior. Prerequisite: undergraduate mechanics of materials.

3 units, Win (Nelson, D)

ME 346A. Introduction to Statistical Mechanics

The main purpose of this course is to provide students with enough statistical mechanics background to the Molecular Simulations classes (ME 346B,C), including the fundamental concepts such as ensemble, entropy, and free energy, etc. The main theme of this course is how the laws at the macroscale (thermodynamics) can be obtained by analyzing the spontaneous fluctuations at the microscale (dynamics of molecules). Topics include thermodynamics, probability theory, information entropy, statistical ensembles, phase transition and phase equilibrium. Recommended: PHYSICS 110 or equivalent.

3 units, Win (Cai, W)

ME 346B. Introduction to Molecular Simulations

Algorithms of molecular simulations and underlying theories. Molecular dynamics, time integrators, modeling thermodynamic ensembles (NPT, NVT), free energy, constraints. Monte Carlo simulations, parallel tempering. Stochastic equations, Langevin and Brownian dynamics. Applications in solids, liquids, and biomolecules (proteins). Programming in Matlab and C++. Prerequisites: ME 346A or equivalent, Matlab, and C++.

3 units, Spr (Darve, E)

ME 346C. Advanced Techniques for Molecular Simulations

Advanced methods for computer simulation of proteins. Symplectic time integrators, multiple-time stepping, energy conservation. Long-range force calculation, particle mesh Ewald, fast multipole method, multigrid. Free energy methods, umbrella sampling, acceptance ratio, thermodynamic integration, non equilibrium methods, adaptive biasing force. Prerequisites: ME 346A,B or equivalent, Matlab, and C++.

3 units, alternate years, not given this year

ME 347. Mathematical Theory of Dislocations

The mathematical theory of straight and curvilinear dislocations in linear elastic solids. Stress fields, energies, and Peach-Koehler forces associated with these line imperfections. Anisotropic effects, Green's function methods, and the geometrical techniques of Brown and Indenborn-Orlov for computing dislocation fields and for studying dislocation interactions. Continuously distributed dislocations and cracks and inclusions.

3 units, Spr (Barnett, D)

ME 348. Experimental Stress Analysis

Theory and applications of photoelasticity, strain gages, and holographic interferometry. Comparison of test results with theoretical predictions of stress and strain. Discussion of other methods of stress and strain determination (optical fiber strain sensors, acoustoelasticity, thermoelasticity, brittle coating, Moire interferometry, residual stress determination). Six labs plus mini-project. Limited enrollment. Lab fee.

3 units, Spr (Nelson, D)

ME 349. Variational Methods in Elasticity and Plate Theory

An introduction to variational calculus methods and their applications to the theories of elasticity and plates.

3 units, not given this year

ME 351A. Fluid Mechanics

Exact and approximate analysis of fluid flow covering kinematics, global and differential equations of mass, momentum, and energy conservation. Forces and stresses in fluids. Euler¿s equations and the Bernoulli theorem applied to inviscid flows. Vorticity dynamics. Topics in irrotational flow: stream function and velocity potential for exact and approximate solutions; superposition of solutions; complex potential function; circulation and lift. Some boundary layer concepts.

3 units, Aut (Iaccarino, G)

ME 351B. Fluid Mechanics

Laminar viscous fluid flow. Governing equations, boundary conditions, and constitutive laws. Exact solutions for parallel flows. Creeping flow limit, lubrication theory, and boundary layer theory including free-shear layers and approximate methods of solution; boundary layer separation. Introduction to stability theory and transition to turbulence, and turbulent boundary layers. Prerequisite: 351A.

3 units, Win (Eaton, J)

ME 352A. Radiative Heat Transfer

The fundamentals of thermal radiation heat transfer; blackbody radiation laws; radiative properties of non-black surfaces; analysis of radiative exchange between surfaces and in enclosures; combined radiation, conduction, and convection; radiative transfer in absorbing, emitting, and scattering media. Advanced material for students with interests in heat transfer, as applied in high-temperature energy conversion systems. Take 352B,C for depth in heat transfer. Prerequisites: graduate standing and undergraduate course in heat transfer. Recommended: computer skills.

3 units, Aut (Mitchell, R)

ME 352B. Fundamentals of Heat Conduction

Physical description of heat conduction in solids, liquids, and gases. The heat diffusion equation and its solution using analytical and numerical techniques. Data and microscopic models for the thermal conductivity of solids, liquids, and gases, and for the thermal resistance at solid-solid and solid-liquid boundaries. Introduction to the kinetic theory of heat transport, focusing on applications for composite materials, semiconductor devices, micromachined sensors and actuators, and rarefied gases. Prerequisite: consent of instructor.

3 units, Win (Goodson, K)

ME 352C. Convective Heat Transfer

Prediction of heat and mass transfer rates based on analytical and numerical solutions of the governing partial differential equations.

Heat transfer in fully developed pipe and channel flow, pipe entrance flow, laminar boundary layers, and turbulent boundary layers. Superposition methods for handling non-uniform wall boundary conditions. Approximate models for turbulent flows. Comparison of exact and approximate analyses to modern experimental results. General introduction to heat transfer in complex flows. Prerequisite: 351B or equivalent.

3 units, Spr (Eaton, J)

ME 354. Experimental Methods in Fluid Mechanics

Experimental methods associated with the interfacing of laboratory instruments, experimental control, sampling strategies, data analysis, and introductory image processing. Instrumentation including point-wise anemometers and particle image tracking systems. Lab. Prerequisites: previous experience with computer programming and consent of instructor. Limited enrollment.

4 units, Aut (Santiago, J)

ME 355. Compressible Flow

Topics include quasi-one-dimensional isentropic flow in variable area ducts, normal shock waves, oblique shock and expansion waves, flow in ducts with friction and heat transfer, unsteady one-dimensional flow, and steady two-dimensional supersonic flow.

3 units, Spr (Bowman, C)

ME 357. Turbine and Internal Combustion Engines

(Same as ME 257) Principles of design analysis for aircraft gas turbines and automotive piston engines. Analysis for aircraft engines performed for Airbus A380 type aircraft. Design parameters determined considering aircraft aerodynamics, gas turbine thermodynamics, compressible flow physics, and material limitations. Additional topics include characteristics of main engine components, off-design analysis, and component matching. Performance of automotive piston engines including novel engine concepts in terms of engine thermodynamics, intake and exhaust flows, and in-cylinder flow.

3 units, not given this year

ME 358. Heat Transfer in Microdevices

Application-driven introduction to the thermal design of electronic circuits, sensors, and actuators that have dimensions comparable to or smaller than one micrometer. The impact of thin-layer boundaries on thermal conduction and radiation. Convection in microchannels and microscopic heat pipes. Thermal property measurements for microdevices. Emphasis is on Si and GaAs semiconductor devices and layers of unusual, technically-promising materials such as chemical-vapor-deposited (CVD) diamond. Final project based on student research interests. Prerequisite: consent of instructor.

3 units, Spr (Asheghi, M)

ME 359A. Advanced Design and Engineering of Space Systems I

The application of advanced theory and concepts to the development of spacecraft and missile subsystems; taught by experts in their fields. Practical aspects of design and integration. Mission analysis, systems design and verification, radiation and space environments, orbital mechanics, space propulsion, electrical power and avionics subsystems, payload communications, and attitude control. Subsystem-oriented design problems focused around a mission to be completed in groups. Tours of Lockheed Martin facilities. Limited enrollment. Prerequisites: undergraduate degree in related engineering field or consent of instructor.

4 units, not given this year

ME 359B. Advanced Design and Engineering of Space Systems II

Continuation of 359A. Topics include aerospace materials, mechanical environments, structural analysis and design, finite element analysis, mechanisms, thermal control, probability and statistics. Tours of Lockheed Martin facilities. Limited enrollment. Prerequisites: undergraduate degree in related field, or consent of instructor.

4 units, not given this year

ME 361. Turbulence

The nature of turbulent flows, statistical and spectral description of turbulence, coherent structures, spatial and temporal scales of turbulent flows. Averaging, two-point correlations and governing equations. Reynolds averaged equations and stresses. Free shear flows, turbulent jet, turbulent kinetic energy and kinetic energy dissipation, and kinetic energy budget. Kolmogorov's hypothesis and energy spectrum. Wall bounded flows, viscous scales, and law of the wall. Turbulence closure modeling for Reynolds averaged Navier Stokes equations. Direct and large eddy simulation of turbulent flows. Subgrid scale modeling.

3 units, Spr (Moin, P)

ME 362A. Physical Gas Dynamics

Concepts and techniques for description of high-temperature and chemically reacting gases from a molecular point of view. Introductory kinetic theory, chemical thermodynamics, and statistical mechanics as applied to properties of gases and gas mixtures. Transport and thermodynamic properties, law of mass action, and equilibrium chemical composition. Maxwellian and Boltzmann distributions of velocity and molecular energy. Examples and applications from areas of current interest such as combustion and materials processing.

3 units, Aut (Cappelli, M)

ME 362B. Nonequilibrium Processes in High-Temperature Gases

Chemical kinetics and energy transfer in high-temperature gases. Collision theory, transition state theory, and unimolecular reaction theory. Prerequisie: 362A or consent of instructor.

3 units, Win (Hanson, R)

ME 363. Partially Ionized Plasmas and Gas Discharges

Introduction to partially ionized gases and the nature of gas discharges. Topics: the fundamentals of plasma physics emphasizing collisional and radiative processes, electron and ion transport, ohmic dissipation, oscillations and waves, interaction of electromagnetic waves with plasmas. Applications: plasma diagnostics, plasma propulsion and materials processing. Prerequisite: 362A or consent of instructor.

3 units, not given this year

ME 364. Optical Diagnostics and Spectroscopy

The spectroscopy of gases and laser-based diagnostic techniques for measurements of species concentrations, temperature, density, and other flow field properties. Topics: electronic, vibrational, and rotational transitions; spectral lineshapes and broadening mechanisms; absorption, fluorescence, Rayleigh and Raman scattering methods; collisional quenching. Prerequisite: 362A or equivalent.

3 units, not given this year

ME 365. The Structure of Design Research

Restricted to second-year Joint Program in Design graduate students; prerequisite for ME 316A,B,C. How to shape individual research plans, identify tools for design research, and develop a vocabulary for research through design. Students present proposals for master's theses. Case studies.

1-3 units, Spr (Banerjee, S)

ME 366. Creative Gym: A Design Thinking Skills Studio

Build your creative confidence and sharpen your design thinking skills. Train your intuition and expand the design context from which you operate every day. This experimental studio will introduce the d.school to fast-paced experimental exercises that lay the mental and physical foundation for a potent bias toward action, and a deeper knowledge of the personal skills that expert design thinkers utilize in all phases of their process. Exercises will be offered by a number of the d.school's most creatively confident design thinkers.

1 unit, Win (Burgess-Auburn, C; Hawthorne, G)

ME 367. Optical Diagnostics and Spectroscopy Laboratory

Principles, procedures, and instrumentation associated with optical measurements in gases and plasmas. Absorption, fluorescence and emission, and light-scattering methods. Measurements of temperature, species concentration, and molecular properties. Lab. Enrollment limited to 16. Prerequisite: 362A or 364.

4 units, Spr (Hanson, R)

ME 368A. Biodesign Innovation: Needs Finding and Concept Creation

(Same as BIOE 374A, MED 272A) (Same as OIT 384.) First of a two quarter series. How to develop comprehensive solutions (most commonly medical devices) to significant medical problems. Needs-finding methods, brainstorming, and concept creation. Strategies for understanding and interpreting clinical needs, researching literature, and searching patents. Clinical and scientific literature review, techniques of intellectual property analysis and feasibility, basic prototyping and market assessment. Students work in small entrepreneurial multidisciplinary teams to create,

analyze, and screen medical technology ideas, and select projects for future development. Final presentations to a panel of prominent inventors and investors in medical Expert guest lecturers, faculty-led practical demonstrations and coaching sessions, and interactive team meetings under the mentorship of Biodesign. Projects from previous years include: prevention of hip fractures in the elderly; methods to accelerate healing after surgery; less invasive techniques for bariatric surgery; point of care diagnostics to improve emergency room efficiency; novel devices to bring specialty-type of care to primary care community doctors. More than 40,00 patients have been treated to date with technologies developed as part of this program and more than ten venture-backed companies were started by alums of the program. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: application; see http://www.stanford.edu/group/biodesign/courseapplication.html; deadline is November 20, 2010.

2-4 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)

ME 368B. Biodesign Innovation: Concept Development and Implementation

(Same as BIOE 374B, MED 272B) (Same as OIT 385.) Second of a two quarter series. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: MED 272A, ME368A, or BIOE 374A.

2-4 units, Spr (Brinton, T; Milroy, J; Yock, P; Zenios, S)

ME 370A. Energy Systems I: Thermodynamics

Thermodynamic analysis of energy systems emphasizing systematic methodology for and application of basic principles to generate quantitative understanding. Availability, mixtures, reacting systems, phase equilibrium, chemical availability, and modern computational methods for analysis. Prerequisites: undergraduate engineering thermodynamics and computer skills such as Matlab.

3 units, Aut (Bowman, C)

ME 370B. Energy Systems II: Modeling and Advanced Concepts

Development of quantitative device models for complex energy systems, including fuel cells, reformers, combustion engines, and electrolyzers, using thermodynamic and transport analysis. Student groups work on energy systems to develop conceptual understanding, and high-level, quantitative and refined models. Advanced topics in thermodynamics and special topics associated with devices under study. Prerequisite: 370A.

4 units, Win (Edwards, C)

ME 370C. Energy Systems III: Projects

Refinement and calibration of energy system models generated in ME 370B carrying the models to maturity and completion. Integration of device models into a larger model of energy systems. Prerequisites: 370A,B, consent of instructor.

3-5 units, Spr (Edwards, C)

ME 371. Combustion Fundamentals

Heat of reaction, adiabatic flame temperature, and chemical composition of products of combustion; kinetics of combustion and pollutant formation reactions; conservation equations for multicomponent reacting flows; propagation of laminar premixed flames and detonations. Prerequisite: 362A or 370A, or consent of instructor.

3 units, Win (Zheng, X)

ME 372. Combustion Applications

The role of chemical and physical processes in combustion; ignition, flammability, and quenching of combustible gas mixtures; premixed turbulent flames; laminar and turbulent diffusion flames; combustion of fuel droplets and sprays. Prerequisite: 371.

3 units, Spr (Zheng, X)

ME 377. Design Thinking Bootcamp: Experiences in Innovation and Design

Lecture/lab. Immersive experiences in innovation and design thinking, blurring the boundaries among technology, business, and human values. Tenets of design thinking including being human-centered, prototype-driven, and mindful of process. Topics include design processes, innovation methodologies, need finding, human factors, visualization, rapid prototyping, team dynamics, storytelling, and project leadership. Hands-on projects, in-class exercises, and guest lectures. Students and faculty from areas including business, earth sciences, education, engineering, humanities and sciences, law, and medicine. Preparation for advanced d.school courses. Limited enrollment. Application required. See http://dschool.stanford.edu/projects/classes/me377.html.

3-4 units, Aut (Staff, 1)

ME 378. Tell, Make, Engage: Action Stories for Entrepreneuring

Guest discussion leaders with entrepreneuring experience give the course an evolving framework of evaluative methods, formed and reformed by collaborative development within the class. Stories attached to an idea or a discovery, are considered through practice exercises, artifacts, design challenges, short papers, and presentations.

1-3 units, not given this year

ME 381. Orthopaedic Bioengineering

(Same as BIOE 381) Engineering approaches applied to the musculoskeletal system in the context of surgical and medical care. Fundamental anatomy and physiology. Material and structural characteristics of hard and soft connective tissues and organ systems, and the role of mechanics in normal development and pathogenesis. Engineering methods used in the evaluation and planning of orthopaedic procedures, surgery, and devices.

3 units, Spr (Levenston, M)

ME 382A. Biomedical Engineering in Research and Development

Project based class studying real world biomedical problems ranging from translational biomedical research to medical device design. Topics include preventative strategies and biomedical challenges of an aging population. Identifying underlying scientific principles (computational and/or experimental) for solving biomedical problems is a key element. Students will form project teams and develop interdisciplinary communication skills; form testable hypotheses with biological, anatomical and physiological considerations; test standards for medical devices and learn about regulatory issues and intellectual property.

4 units, Spr (Andriacchi, T)

ME 382B. Medical Device Design

Continuation of industry sponsored projects from 382A. With the assistance of faculty and expert consultants, students finalize product designs or complete detailed design evaluations of new medical products. Bioethics issues and strtegies for funding new medical ventures.

4 units, alternate years, not given this year

ME 385. Tissue Engineering Lab

Hands-on experience in the fabrication of living engineered tissues. Techniques include sterile technique, culture of mammalian cells, creation of cell-seeded scaffolds, and the effects of mechanical loading on the metabolism of living engineered tissues. Theory, background, and practical demonstration for each technique. Lab.

1-2 units, not given this year

ME 386. Neuromuscular Biomechanics

(Same as BIOE 386) The interplay between mechanics and neural control of movement. State of the art assessment through a review of classic and recent journal articles. Emphasis is on the application of dynamics and control to the design of assistive technology for persons with movement disorders.

3 units, not given this year

ME 387. Soft Tissue Mechanics

Structure/function relationships and mechanical properties of soft tissues, including nonlinear elasticity, viscoelasticity, and poroelasticity.

3 units, Win (Levenston, M)

ME 388. Transport Modeling for Biological Systems

Introduction to electric fields, fluid flows, transport phenomena and their application to biological systems. Maxwell's equations, electrostatics, electro-chemical-mechanical driving forces in physiological systems. Ionic diffusion in electrolytes and membrane transport. Fluid and solid continua theory for porous, hydrated biological tissues. Applications include ionic and molecular transport in tissues and cells, electrophoresis, electromechanical

and physicochemical interactions in cells and the extracellular matrix of connective tissue.

3 units, Spr (Levenston, M; Pinsky, P)

ME 389. Biomechanical Research Symposium

Guest speakers present contemporary research on experimental and theoretical aspects of biomechanical engineering and bioengineering. May be repeated for credit.

1 unit, Aut (Carter, D), Spr (Carter, D)

ME 390. Thermosciences Research Project Seminar

Review of work in a particular research program and presentations of other related work.

1 unit, not given this year

ME 391. Engineering Problems

Directed study for graduate engineering students on subjects of mutual interest to student and staff member. May be used to prepare for experimental research during a later quarter under 392. Faculty sponsor required.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 392. Experimental Investigation of Engineering Problems

Graduate engineering students undertake experimental investigation under guidance of staff member. Previous work under 391 may be required to provide background for experimental program. Faculty sponsor required.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 393. Topics in Biologically Inspired or Human Interactive Robotics

Application of observations from human and animal physiology to robotic systems. Force control of motion including manipulation, haptics, and locomotion. Weekly literature review forum led by student. May be repeated for credit. (Cutkosky, Waldron, Niemeyer)

1 unit, Aut (Cutkosky, M)

ME 395. Seminar in Solid Mechanics

Required of Ph.D. candidates in solid mechanics. Guest speakers present research topics related to mechanics theory, computational methods, and applications in science and engineering. May be repeated for credit. See http://mc.stanford.edu.

1 unit, Aut (Pinsky, P), Win (Pinsky, P), Spr (Pinsky, P)

ME 396. Design and Manufacturing Forum

(Same as ME 196) Invited speakers address issues of interest to design and manufacturing engineering and business students. Sponsored by the Product Realization Network at Stanford.

1 unit, Win (Reis, R), Spr (Reis, R)

ME 397. Design Theory and Methodology Seminar

What do designers do when they do design? How can their performance be improved? Topics change each quarter. May be repeated for credit.

1-3 units, Aut (Leifer, L), Win (Leifer, L), Spr (Leifer, L)

ME 399. Fuel Cell Seminar

Interdisciplinary research in engineering, chemistry, and physics. Talks on fundamentals of fuel cells by speakers from Stanford, other academic and research institutions, and industry. The potential to provide high efficiency and zero emissions energy conversion for transportation and electrical power generation.

1 unit, not given this year

ME 400. Thesis (Engineer Degree)

Investigation of some engineering problems. Required of Engineer degree candidates

2-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 405. Asymptotic Methods and Applications

Asymptotic versus convergent expansions, approximation of integrals, method of matched asymptotics, WKB method and turning points, method of multiple scales. Applications: viscous and potential flow, wave propagation, combustion, and electrostatics. Prerequisites: ME 300B, graduate-level fluid mechanics.

3 units, not given this year

ME 406. Turbulence Physics and Modeling Using Numerical Simulation Data

Prerequisite: consent of instructor.

2 units, Sum (Moin, P)

ME 408. Spectral Methods in Computational Physics

Data analysis, spectra and correlations, sampling theorem, nonperiodic data, and windowing; spectral methods for numerical solution of partial differential equations; accuracy and computational cost; fast Fourier transform, Galerkin, collocation, and Tau methods; spectral and pseudospectral methods based on Fourier series and eigenfunctions of singular Sturm-Liouville problems; Chebyshev, Legendre, and Laguerre representations; convergence of eigenfunction expansions; discontinuities and Gibbs phenomenon; aliasing errors and control; efficient implementation of spectral methods; spectral methods for complicated domains; time differencing and numerical stability.

3 units, Win (Moin, P)

ME 410A. Foresight and Innovation

Learn what makes technical innovations succeed long-term. This course provides an intensive and hands-on overview to multiple foresight methods and anticipatory design techniques that teach you how to find and plan for future opportunities. Students build a portfolio of innovation ideas and prototypes. Prerequisite: consent of instructor.

3-5 units, Aut (Leifer, L; Cockayne, W)

ME 410B. Foresight and Innovation

The art, science, and practice of design innovation. Tools such as critical foresight and anticipatory research that assist organizations in improving the quality and speed of research and design innovation programs. The path from idea to market. How to communicate a developing idea through scenarios, business pitches, and product prototypes.

1-5 units, Win (Leifer, L; Cockayne, W)

ME 410C. Foresight and Innovation

The art, science, and practice of design innovation. Tools such as critical foresight and anticipatory research that assist organizations in improving the quality and speed of research and design innovation programs. The path from idea to market. How to communicate a developing idea through scenarios, business pitches, and product prototypes.

1-5 units, Spr (Leifer, L; Cockayne, W)

ME 411. Advanced Topics in Computational Solid Mechanics

Discussion of the use of computational simulation methods for analyzing and optimizing production processes and for developing new products, based on real industrial applications in the metal forming industry. Brief review of linear and nonlinear continuum mechanics and the use of finite element methods to model solid mechanics problems, constitutive relations for metals, coupled thermo-elasto-plastic (viscoplastic) problems, modeling metal productions processes: bulk metal forming processes using rigid/viscoplastic material models, application examples: hot rolling of plates and the Mannesmann piercing processes and modeling the service behavior of steel pipes. Prerequisites: ME 338A, ME 335A,B,C, or consent of instructor.

3 units, not given this year

ME 412. Engineering Functional Analysis and Finite Elements

(Same as CME 356) Concepts in functional analysis to understand models and methods used in simulation and design. Topology, measure, and integration theory to introduce Sobolev spaces. Convergence analysis of finite elements for the generalized Poisson problem. Extensions to convection-diffusion-reaction equations and elasticity. Upwinding. Mixed methods and LBB conditions. Analysis of nonlinear and evolution problems. Prerequisites: 335A,B, CME 200, CME 204, or consent of instructor. Recommended: 333, MATH 171.

3 units, not given this year

ME 413. Quantum Confinement Structures: Physics and Fabrication

Quantum mechanics principles and the thermodynamics of confinement structures. Focus is on potential applications such as solar cells and catalysis. Student presentations. Lab demonstrations. Prerequisite: background in quantum mechanics and statistical thermodynamics.

3 units, not given this year

ME 414. Solid State Physics Issues for Mechanical Engineering Experiments

Concepts and issues in the area of solid state physics which underlie standard mechanical properties. Quantum mechanics and statistical thermodynamics, and the first 50% of a standard overview of solid state physics. The goal is to provide the background necessary to participate in interdisciplinary research.

3 units, not given this year

ME 417. Total Product Integration Engineering
For students aspiring to be product development executives and leaders in research and education. Advanced methods and tools beyond the material covered in 217: quality design across global supply chain, robust product architecture for market variety and technology advances, product development risk management. Small teams or individuals conduct a practical project that produces a case study or enhancement to produce development methods and tools. Enrollment limited to 12. Prerequisites: 317A,B.
4 units, Aut (Beiter, K)

ME 420. Applied Electrochemistry at Micro- and Nanoscale
Applied electrochemistry with focus on micro- and nanoscale applications. Concepts of physical chemistry upon which the fundamentals of electrochemistry are built. Theory of electrochemical methods for material analyses and material modifications with emphasis on the scaling behaviors. Electrochemical energy generation/storage devices with focus on batteries. Journals articles are reviewed within the framework of the course with focus on current problems and needs in and energy conversion and storage.
3 units, Sum (Fasching, R)

ME 421. Thought Leaders Seminar for European Entrepreneurship and Innovation
Lessons from real-world experiences and challenges in European startups, corporations, universities, non-profit research institutes and venture finance organizations. Speakers include entrepreneurs, leaders from global technology companies, university researchers, venture capitalists, legal experts, senior policy makers and other guests from selected European countries and regions. Geographic scope encompasses Ireland to Russia, and Scandinavia to the Mediterranean region. Enrollment open to undergraduates and graduates in any school or department at Stanford.
1 unit, Win (Leifer, L; Pate-Cornell, E; Lee, B)

ME 440. Electronic States and Transitions In Quantum Confined Structures
Summary of selected quantum mechanical concepts with focus on phenomena related to charge separation and transfer. The physics and thermodynamics of excitons described and related to experimental observations. The energy state of electrons as function of confinement size and strength. Presentations include on electron tunneling, measuring the density of electronic states, dielectric behavior of materials, Bose Einstein condensation of quasi particles, and excitons in quantum wells and dots.
3 units, Spr (Prinz, F)

ME 450. Advances in Biotechnology
Guest academic and industrial speakers. Latest developments in fields such as bioenergy, green process technology, production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.
3 units, not given next year

ME 451A. Advanced Fluid Mechanics Multiphase Flows
Single particle and multi-particle fluid flow phenomena, mass, momentum and heat transfer, characteristic time and length scales, non-dimensional groups; collection of dispersed-phase elements: instantaneous and averaged descriptions for multiphase flow, Eulerian-Eulerian and Lagrangian-Eulerian statistical representations, mixture theories; models for drag, heat and mass transfer; dilute to dense two-phase flow, granular flows; computer simulation approaches for multiphase flows, emerging research topics. Prerequisites: graduate level fluid mechanics and engineering mathematics, and undergraduate engineering mechanics and thermodynamics.
3 units, alternate years, not given this year

ME 451B. Advanced Fluid Mechanics
Waves in fluids: surface waves, internal waves, inertial and acoustic waves, dispersion and group velocity, wave trains, transport due to waves, propagation in slowly varying medium, wave steepening, solitons and solitary waves, shock waves. Instability of fluid motion: dynamical systems, bifurcations, Kelvin-Helmholtz instability, Rayleigh-Benard convection, energy method, global stability, linear stability of parallel flows, necessary and sufficient conditions for stability, viscosity as a destabilizing factor, convective and absolute instability. Focus is on flow instabilities. Prerequisites: graduate courses in compressible and viscous flow.
3 units, alternate years, not given this year

ME 451C. Advanced Fluid Mechanics
Compressible flow: governing equations, Crocco-Vazsonyi¿s equations, creation and destruction of vorticity by compressibility effects, shock waves. Modal decomposition of compressible flow, linear and nonlinear modal interactions, interaction of turbulence with shock waves. Energetics of compressible turbulence, effects of compressibility on free-shear flows, turbulent boundary layers, Van Direst transformation, recovery temperature, and shock/boundary layer interaction. Strong Reynolds analogy, modeling compressible turbulent flows. Prerequisites: 355, 361A, or equivalents.
3 units, Aut (Lele, S)

ME 451D. Microhydrodynamics
(Same as CHEMENG 310) Transport phenomena on small-length scales appropriate to applications in microfluidics, complex fluids, and biology. The basic equations of mass, momentum, and energy, derived for incompressible fluids and simplified to the slow-flow limit. Topics: solution techniques utilizing expansions of harmonic and Green's functions; singularity solutions; flows involving rigid particles and fluid droplets; applications to suspensions; lubrication theory for flows in confined geometries; slender body theory; and capillarity and wetting. Prerequisites: 120A,B, 300, or equivalents.
3 units, Aut (Shaqfeh, E)

ME 453A. Finite Element-Based Modeling and Simulation of Linear Fluid/Structure Interaction Problems
Basic physics behind many fluid/structure interaction phenomena. Finite element-based computational approaches for linear modeling and simulation in the frequency domain. Vibrations of elastic structures. Linearized equations of small movements of inviscid fluids. Sloshing modes. Hydroelastic vibrations. Acoustic cavity modes. Structural-acoustic vibrations. Applications to liquid containers and underwater signatures. Prerequisite: graduate course in the finite element method or consent of instructor.
3 units, not given this year

ME 453B. Computational Fluid Dynamics Based Modeling of Nonlinear Fluid/Structure Interaction Problems
Basic physics behind many high-speed flow/structure interaction phenomena. Modern computational approaches for nonlinear modeling and simulation in the time domain. Dynamic equilibrium of restrained and unrestrained elastic structures. Corotational formulation for large structural displacements and rotations. Arbitrary Lagrangian-Eulerian description of inviscid and viscous flows. Time-accurate CFD on moving and deforming grids. Discrete geometric conservation laws. Discretization of transmission conditions on non-matching discrete fluid/structure interfaces. Coupled fluid/mesh-motion/structure time integration schemes. Application to divergence, flutter, and buffeting. Prerequisites: graduate course in the finite element method, and in computational fluid dynamics.
3 units, not given this year

ME 455. Complex Fluids and Non-Newtonian Flows
Definition of a complex liquid and microrheology. Division of complex fluids into suspensions, solutions, and melts. Suspensions as colloidal and non-colloidal. Extra stress and relation to the stresslet. Suspension rheology including Brownian and non-Brownian fibers. Microhydrodynamics and the Fokker-Planck equation. Linear viscoelasticity and the weak flow limit. Polymer solutions including single mode (dumbbell) and multimode models. Nonlinear viscoelasticity. Intermolecular effects in nondilute solutions and melts and the concept of reptation. Prerequisites: low Reynolds number hydrodynamics or consent of instructor.
3 units, Spr (Shaqfeh, E)

ME 457. Fluid Flow in Microdevices
Physico-chemical hydrodynamics. Creeping flow, electric double layers, and electrochemical transport such as Nernst-Planck equation; hydrodynamics of solutions of charged and uncharged particles. Device applications include microsystems that perform capillary electrophoresis, drug dispension, and hybridization assays. Emphasis is on bioanalytical applications where electrophoresis, electro-osmosis, and diffusion are important. Prerequisite: consent of instructor.

3 units, Spr (Santiago, J)

ME 458. Advanced Topics in Electrokinetics
Electrokinetic theory and electrokinetic separation assays. Electroneutrality approximation and weak electrolyte electrophoresis theory. Capillary zone electrophoresis, field amplified sample stacking, isoelectric focusing, and isotachophoresis. Introduction to general electrohydrodynamics (EHD) theory including the leaky dielectric concept, the Ohmic model formulation, and electrokinetic flow instabilities. Prerequisite: ME 457.

3-5 units, Spr (Santiago, J)

ME 461. Advanced Topics in Turbulence
Turbulence phenomenology; statistical description and the equations governing the mean flow; fluctuations and their energetics; turbulence closure problem, two-equation turbulence models, and second moment closures; non-local effect of pressure; rapid distortion analysis and effect of shear and compression on turbulence; effect of body forces on turbulent flows; buoyancy-generated turbulence; suppression of turbulence by stratification; turbulent flows of variable density; effect of rotation on homogeneous turbulence; turbulent flows with strong vortices. Prerequisites: 351B and 361A, or consent of instructor.

3 units, not given this year

ME 463. Advanced Topics in Plasma Science and Engineering
Research areas such as plasma diagnostics, plasma transport, waves and instabilities, and engineering applications.

3 units, not given this year

ME 468. Experimental Research in Advanced User Interfaces
(Same as COMM 168, COMM 268, COMM 368) Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

1-5 units, Aut (Nass, C), Win (Nass, C), Spr (Nass, C)

ME 469. Computational Methods in Fluid Mechanics
The last two decades have seen the widespread use of Computational Fluid Dynamics (CFD) for analysis and design of thermal-fluids systems in a wide variety of engineering fields. Numerical methods used in CFD have reached a high degree of sophistication and accuracy. The objective of this course is to introduce ¿classical¿ approaches and algorithms used for the numerical simulations of incompressible flows. In addition, some of the more recent developments are described, in particular as they pertain to unstructured meshes and parallel computers. An in-depth analysis of the procedures required to certify numerical codes and results will conclude the course.

3 units, Win (Iaccarino, G)

ME 469B. Computational Methods in Fluid Mechanics
Advanced CFD codes. Geometry modeling, CAD-CFD conversion. Structured and unstructured mesh generation. Solution methods for steady and unsteady incompressible Navier-Stokes equations. Turbulence modeling. Conjugate (solid/fluid) heat transfer problems. Development of customized physical models. Batch execution for parametric studies. Final project involving solution of a problem of student¿s choosing. Prerequisite: ME 300C/CME 206.

3 units, not given this year

ME 470. Uncertainty Quantification
Uncertainty analysis in computational science. Probabilistic data representation, propagation techniques and validation under uncertainty. Mathematical and statistical foundations of random variables and processes for uncertainty modeling. Focus is on state-of-the-art propagation schemes, sampling techniques, and stochastic Galerkin methods. The concept of model validation under uncertainty and the determination of confidence bounds estimates. Prerequisite: basic probability and statistics at the level of CME 106 or equivalent.

3 units, Spr (Staff, 1)

ME 471. Turbulent Combustion
Basis of turbulent combustion models. Assumption of scale separation between turbulence and combustion, resulting in Reynolds number independence of combustion models. Level-set approach for premixed combustion. Different regimes of premixed turbulent combustion with either kinematic or diffusive flow/chemistry interaction leading to different scaling laws and unified expression for turbulent velocity in both regimes. Models for non-premixed turbulent combustion based on mixture fraction concept. Analytical predictions for flame length of turbulent jets and NOx formation. Partially premixed combustion. Analytical scaling for lift-off heights of lifted diffusion.

3 units, not given this year

ME 484. Computational Methods in Cardiovascular Bioengineering
(Same as BIOE 484) Lumped parameter, one-dimensional nonlinear and linear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system and evaluate the performance of cardiovascular devices. Construction of anatomic models and extraction of physiologic quantities from medical imaging data. Problems in blood flow within the context of disease research, device design, and surgical planning.

3 units, not given this year

ME 485. Modeling and Simulation of Human Movement
(Same as BIOE 485) Direct experience with the computational tools used to create simulations of human movement. Lecture/labs on animation of movement; kinematic models of joints; forward dynamic simulation; computational models of muscles, tendons, and ligaments; creation of models from medical images; control of dynamic simulations; collision detection and contact models. Prerequisite: 281, 331A,B, or equivalent.

3 units, not given this year

ME 491. Ph.D. Teaching Experience
Required of Ph.D. students. May be repeated for credit.

3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 495. Mechanical Engineering Lecture Series
This seminar will feature a series of early career mechanical engineers working on leading edge problems in controls, dynamics, fluid mechanics, biomechanics, combustion, and related disciplines. The visitors will come from top universities both within the US and internationally, and will be discussing both their past research and plans for building a research program in the future.

1 unit, Spr (Goodson, K)

ME 500. Thesis (Ph.D.)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MEDICINE (MED) COURSES

UNDERGRADUATE COURSES IN MEDICINE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MED 1A. Leadership in Multicultural Health
Year-long course. Models of instruction for undergraduates serving as Stanford Medical Youth Science Summer Residential Program (SMYSP) staff. Observation, participation, and evaluation of leadership development and multicultural health theories and practices; school and community engagement and advocacy. 1 unit: class attendance and oral presentation; 2 units: class attendance and project portfolio; 3 units: class attendance, poster and oral presentation; 4 units: class attendance and reflective term paper. Applications for this year-long course must be submitted during Autumn Quarter. Contact Judith Ned: jned@stanford.edu, 650-

498-4514. Current or past SMYSP Summer Residential Program staff.

1-4 units, Win (Winkleby, M; Ned, J)

MED 1B. Leadership in Multicultural Health

Models of instruction for undergraduates serving as Stanford Medical Youth Science Summer Residential Program (SMYSP) staff. Application of leadership development skills, multicultural health theories and practices, and school and community engagement and advocacy to creating and implementing activities for low-income high school students participating in the Summer Residential Program. 1 unit: class attendance and oral presentation; 2 units: class attendance and project portfolio; 3 units: class attendance, poster, and oral presentation; 4 units: class attendance and reflective term paper. Service Learning Course (certified by Haas Center). Prerequisite: MED 1A.

1-4 units, Spr (Winkleby, M; Ned, J)

MED 1C. Leadership in Multicultural Health

Students submit a written reflective term paper based on their experience as staff for the SMYSP Summer Residential Program. Service Learning Course (certified by Haas Center). Prerequisite: MED 1A,B.

1 unit, Aut (Winkleby, M; Ned, J)

MED 24SI. Alternative Spring Break: A Veteran's Affair, Issues and Policies Affecting American Veterans

One of every three homeless persons has served our country in uniform; half of all veterans are mentally ill. A combination of academic and service learning, this course addresses the public health and socioeconomic status of veterans and evaluates how current governmant actions are shaping veterans' rights. Weekly forums with clinicians, policy makers, and economists complement direct discussions with veterans and current Iraqi service men and women. Optional field trips to homeless shelters in the San Francisco area. Prerequisite: acceptance into the Alternative Spring Break Program.

1-2 units, Win (Frayne, S)

MED 70Q. Cancer and the Immune System

(Stanford Introductory Seminar) Preference to sophomores. Myths and facts surrounding the idea that the immune system is capable of recognizing malignant cells. The biological basis and function of effector arms of the immune system; how these mechanisms may be used to investigate the biological basis and potential therapy of cancer. How the immune system functions.

3 units, Win (Negrin, R)

MED 83Q. Ethical, Legal, and Social Dimensions of Stem Cell Research

(Stanford Introductory Seminar) Preference to sophomores. Ethical, legal, social, and economic dimensions of stem cell research such as the discovery of human embryonic stem cells and the international landscape of public policy. How stem cells work, their role in the upkeep of the human body, and current and future uses in medicine. Issues at the intersection of science and society such as human-animal hybrids, notions of justice in intellectual property law, distribution of health care, and the major ethical frameworks defining the debate.

3 units, Spr (Scott, C)

MED 86Q. Seeing the Heart

Introduction to biomedical technology, science, clinical medicine, and public policy through cardiovascular imaging. Invasive and noninvasive techniques to detect early stage heart disease and to see inside the heart and blood vessels. Topics include: common forms of heart disease, how they develop, and why they affect so many people; imaging technologies such as ultrasound, CT, MRI, PET, and optical; a cost-effective public screening program. Field trips to Stanford Medical Center imaging centers.

2 units, Spr (Staff)

MED 88Q. Dilemmas in Current Medical Practice

(Stanford Introductory Seminar) Preference to sophomores. Social, political, scientific, and economic forces influencing medical practice. Spiraling costs, impaired access to health care, and disillusionment toward the health care system. Attempts by government and medical insurers to control costs through managed care and health maintenance organizations. Medical education and how it has affected the practice of medicine. Alternative health care, preventive medicine, and the doctor-patient relationship. The paradox of health in America: why do so many people who are healthy feel unhealthy? Mandatory observation of instructors in their medical practices.

3 units, Aut (Croke, J; Jones, H)

MED 108Q. Human Rights and Health

(Stanford Introductory Seminar) Preference to sophomores. History of human-rights law. International conventions and treaties on human rights as background for social and political changes that could improve the health of groups and individuals. Topics such as: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Possible optional opportunities to observe at community sites where human rights and health are issues. Guest speakers from national and international NGOs including Doctors Without Borders; McMaster University Institute for Peace Studies; UC Berkeley Human Rights Center; Kiva. PowerPoint presentation on topic of choice required.

3 units, Win (Laws, A)

MED 143. Patient Health Education in Community Clinics

(Same as MED 243) Open to undergraduate, graduate, and medical students. Principles of health education, theories of behavior change, methods for risk reduction. Presentations of health education modules, focusing on topics prevalent among underserved populations. Students apply theoretical frameworks to health education activities in the Cardinal Free Clinics.

2 units, Aut (Kao, P; Ho, E)

MED 147. Methods in Community Assessment, Evaluation, and Research

(Same as MED 247) Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.

3 units, Spr (Kiernan, M; Stefanick, M)

MED 149. Medical Interpreting: Skills and Etiquette

(Same as MED 249) Open to medical students, graduate students, and undergraduates. The skills and etiquette of medical interpreting from a crosscultural perspective. Overview of the U.S. healthcare system and guest lectures on humanistic medicine. Requires two volunteer shifts at the Arbor Free Clinic. Completion qualifies students to become volunteer interpreters at the Stanford University Medical Center and the Arbor Free Clinic. Service Learning Course (certified by Haas Center). Prerequisite: fluency in a language other than English.

2 units, Win (Osterberg, L; Chen, Y; Pompei, P)

MED 160. Physician Shadowing: Stanford Immersion in Medicine Series (SIMS)

Undergraduates are paired with a physician mentor at Stanford Hospital and Clinics, Lucile Packard Children's Hospital, or the Veteran's Administration Hospital. May be repeated for credit. Prerequisite: Application and acceptance to the SIMS program.

1 unit, Aut (Gesundheit, N; Lewis, P; Williams, R), Win (Gesundheit, N; Lewis, P; Williams, R), Spr (Gesundheit, N; Lewis, P; Williams, R)

MED 199. Undergraduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN MEDICINE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MED 201. Introduction to Internal Medicine

Introduction to the different roles internists play in health care. Weekly lectures augmented with opportunities for monitorship, shadowing, and clinical skills-building. Lecture topics include primary care, subspecialties, and non-clinical careers.

1 unit, Aut (Verghese, A; Chin, J; Ulloa, E)

MED 202. Alternative Spring Break: Rural and Native American Health Disparities
Open to MD, graduate, and undergraduate students. Classroom preparation followed by a one week spring break service learning experience on a reservation in South Dakota. Introduces students to the challenges and promise of Native American and rural health care, and the role of communities as leaders and problem solvers. Includes lectures, discussion and readings pertaining to Native American culture, current research in Native American health, and the methods and practice of community based participatory research. Culminates in formulation of a plan for communicating with and engaging community partners in South Dakota: Indian Health Services, Habitat for Humanity, Porcupine Clinic, Teach for America, and Sinte Gleska University.

3 units, Win (Subrahmanian, K; Morrison, S; Garcia, G)

MED 207. History of Medicine
Weekly lectures that trace the development of Western medical tradition from Babylonian, Egyptian, and Greek ancient cultures to the present.

1 unit, Win (Camargo, C)

MED 217. Technological Frontiers in Digestive Diseases
Focused on introducing engineering, bioengineering, and physical sciences students to technologies used in the clinical setting. Topics include: endoscopes to detect and remove cancer; minimally invasive surgery to treat obesity; measurements of propulsion through the intestine; and technologies to detect and stop internal bleeding. Observations in the clinical setting; visits to laboratories engaged in the development of new technologies.

2 units, Spr (Friedland, S)

MED 223. Cardiovascular and Pulmonary Sciences Seminar
Weekly modified journal club primarily for CVP Scholarly Concentration students, fellows, postdocs, and faculty. Open to other graduate students. (Advanced undergraduate students with permission of instructor). Each meeting begins with an overview of a particular area by a faculty member, followed by presentation of a seminal paper in that area by a postdoctoral fellow or a medical student. Discussion follows the presentation, after which the faculty moderator meets separately with the medical students for further questions and discussion.

2 units, Aut (Cooke, J; Rabinovitch, M; Rockson, S; Tsao, P), Win (Cooke, J; Rabinovitch, M; Rockson, S; Tsao, P), Spr (Cooke, J; Rabinovitch, M; Rockson, S; Tsao, P)

MED 227. Bedside Ultrasound
For pre-clinical or clinical medical students, and others with permission. Introduces students to diagnostic ultrasound at the bedside. The normal anatomy of the heart, abdomen, and pelvis pertinent to ultrasound is taught. Some pathology involving these areas is also introduced. As the students' proficiency increases, those electing to can visit the Pacific Free Clinic to be introduced to scanning patients. 1 unit for class attendance only; 2 units for class attendance and participation in the Pacific Free Clinic.

1-2 units, Aut (Liang, D; Thompson, N), Win (Liang, D; Thompson, N), Spr (Liang, D; Thompson, N)

MED 228. Physicians and Social Responsibility
Social and political context of the roles of physicians and health professionals in social change; policy, advocacy, and shaping public attitudes. How physicians have influenced governmental policy on nuclear arms proliferation; environmental health concerns; physicians in government; activism through research; the effects of poverty on health; homelessness; and gun violence. Guest speakers from national and international NGOs.

1 unit, Aut (Laws, A; Ali, S)

MED 230. Rethinking Global Health
(Same as HRP 240) Issues and players that shape global health today. How to develop a road map for thoughtful, responsible action. Topics include: the role of the physician and health care worker; health as a human right; successful interventions; children's and women's health; issues in immunization; economic development; and NGOs. Online interviews with influential global health leaders.

2-3 units, Spr (Goldhaber-Fiebert, J)

MED 240. Sex Differences in Human Physiology and Disease
(Same as OBGYN 240, HUMBIO 140) Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Consequences of sex hormones and environmental factors that differ between men and women in systems including the musculoskeletal, neurological, cardiovascular, and immunological. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor.

2-3 units, Win (Stefanick, M)

MED 241. Context and Practice of Health Care in Free Clinics
Preparation for working in free clinics, awareness of health care context and health disparities among underinsured patients, and introduction to key skills for patient care. Topics include: patient history, screening tests, health insurance, cultural sensitivity, role of interpreters, and tuberculosis testing. Meets at either Arbor or Pacific free clinic to increase familiarity with free clinic operations and environment. Integrates with concurrent Practice of Medicine course.

1 unit, not given this year

MED 242. Physicians and Human Rights
Weekly lectures on how human rights violations affect health. Topics include: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Guest speakers from national and international NGOs including Doctors Without Borders; McMaster University Institute for Peace Studies; UC Berkeley Human Rights Center; Kiva.

1 unit, Win (Laws, A; Chien, A)

MED 243. Patient Health Education in Community Clinics
(Same as MED 143) Open to undergraduate, graduate, and medical students. Principles of health education, theories of behavior change, methods for risk reduction. Presentations of health education modules, focusing on topics prevalent among underserved populations. Students apply theoretical frameworks to health education activities in the Cardinal Free Clinics.

2 units, Aut (Kao, P; Ho, E)

MED 246. The Medical Interview for Spanish Speakers
Student led forum for practicing and learning medical Spanish related specifically to the medical interview. Prepares clinical students to interact more effectively with Spanish speaking patients in clinics. Classes are topical; each class includes a demonstration, medical vocabulary practice, and conversational practice on the topic of the day.

1 unit, Aut (Garcia, G; Anavitarte, A; Pauerstein, P), Win (Anavitarte, A; Garcia, G; Pauerstein, P), Spr (Liu, A; Rosenberg, J; Garcia, G)

MED 247. Methods in Community Assessment, Evaluation, and Research
(Same as MED 147) Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.

3 units, Spr (Kiernan, M; Stefanick, M)

MED 248. Student Rounds
Teams of preclinical students meet weekly with a clinical student to hear the history and physical of a recent case the clinical student encountered on the wards. Following the presentation, the preclinical students work together under the guidance of the clinical student to develop a problem list and plan, which are then compared with the problem list, plan, and orders made by the actual admitting team. In the course of presenting the cases, the clinical student describes personal experiences and practical components of ward work and daily clinical routine.

1 unit, Aut (Kenny, K), Win (Kenny, K), Spr (Kenny, K), Sum (Kenny, K)

MED 249. Medical Interpreting: Skills and Etiquette
(Same as MED 149) Open to medical students, graduate students, and undergraduates. The skills and etiquette of medical interpreting from a crosscultural perspective. Overview of the U.S. healthcare system and guest lectures on humanistic medicine. Re-

quires two volunteer shifts at the Arbor Free Clinic. Completion qualifies students to become volunteer interpreters at the Stanford University Medical Center and the Arbor Free Clinic. Service Learning Course (certified by Haas Center). Prerequisite: fluency in a language other than English.

2 units, Win (Osterberg, L; Chen, Y; Pompei, P)

MED 250A. Medical Ethics I

Required for Scholarly Concentration in Biomedical Ethics and Medical Humanities. The field of bioethics, including theoretical approaches to bioethical problems. Contemporary controversies and clinical cases. Values that arise in different situations and clinical encounters. Issues include: genetics and stem cell research, rationing, ethical issues in care at the end of life, organ transplantation issues.

2 units, Win (Magnus, D)

MED 250B. Medical Ethics II

The integration of ethical theory with applications of theory or conceptual issues in medicine, health care, and the life and social sciences. Topic varies by year. Possible topics include: ethical issues in stem cell research; death and dying; genetics and ethics; concepts of health and disease; the ethics of international research; and ethical implications of new reproductive technology.

2 units, Spr (Magnus, D)

MED 255. The Responsible Conduct of Research

Forum. How to identify and approach ethical dilemmas that commonly arise in biomedical research. Issues in the practice of research such as in publication and interpretation of data, and issues raised by academic/industry ties. Contemporary debates at the interface of biomedical science and society regarding research on stem cells, bioweapons, genetic testing, human subjects, and vertebrate animals. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research. Prerequisite: research experience recommended.

1 unit, Aut (Karkazis, K), Win (Karkazis, K), Spr (Karkazis, K)

MED 255C. The Responsible Conduct of Research for Clinical Researchers

Engages clinical researchers in discussions about ethical issues commonly encountered during their clinical research careers and addresses contemporary debates at the interface of biomedical science and society. Graduate students required to take RCR who are or will be conducting clinical research are encouraged to enroll in this version of the course. Prequisite: research experience recommended.

1 unit, Aut (Karkazis, K), Spr (Karkazis, K)

MED 256. Global HIV/AIDS

(Same as HUMBIO 156) Public health, policy, and research issues. Resources at Stanford and institutions such as government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Student projects. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, Aut (Katzenstein, D)

MED 257A. Patient Advocacy in Community Clinics

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at one of the course-affiliated clinic sites throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Service Learning Course (certified by Haas Center). Prerequisite: application.

1-4 units, Aut (Garcia, G; Banchoff, A)

MED 257B. Patient Advocacy in Community Clinics

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at one of the course-affiliated clinic sites throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Service Learning Course (certified by Haas Center). Prerequisite: MED 257A

1-4 units, Win (Garcia, G; Banchoff, A)

MED 257C. Patient Advocacy in Community Clinics

Early clinical experience for pre-medical and medical students. Structured training and shadowing in preparation for a clinical role working with patients in community health clinics; the context of the work, populations served, and social role of physicians. Regular shifts at one of the course-affiliated clinic sites throughout the academic year. 1-2 units for students attending class meetings and performing clinic shifts. 3-4 units for a year-long, clinic-based project. Service Learning Course (certified by Haas Center). Prerequisite: 257A,B

1-4 units, Spr (Garcia, G; Banchoff, A)

MED 258A. Advanced Patient Advocacy in Community Clinics

A three quarter course for students who have completed at least one full year in the Patient Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for continued growth in the clinic-based patient advocate role. Throughout the year, tasks required of Clinic Coordinators and Health Education Coordinators are incorporated into the course responsibilities. Equal dedication to advocacy skills development and program leadership role fulfillment is expected. Guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Prerequisite: MED 257A,B,C.

1-3 units, Aut (Garcia, G; Banchoff, A)

MED 258B. Advanced Patient Advocacy in Community Clinics

A three quarter course for students who have completed at least one full year in the Patient Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for continued growth in the clinic-based patient advocate role. Throughout the year, tasks required of Clinic Coordinators and Health Education Coordinators are incorporated into the course responsibilities. Equal dedication to advocacy skills development and program leadership role fulfillment is expected. Guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Prerequisite: MED 257A,B,C and MED 258A.

1-3 units, Win (Garcia, G; Banchoff, A)

MED 258C. Advanced Patient Advocacy in Community Clinics

A three quarter course for students who have completed at least one full year in the Patient Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for continued growth in the clinic-based patient advocate role. Throughout the year, tasks required of Clinic Coordinators and Health Education Coordinators are incorporated into the course responsibilities. Equal dedication to advocacy skills development and program leadership role fulfillment is expected. Guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Prerequisite: MED 257A,B,C and MED 258A and MED 258B.

1-3 units, Spr (Garcia, G; Banchoff, A)

MED 259. Oaxacan Health on Both Sides of the Border

Required for students participating in the Community Health in Oaxaca summer program. Introduction to the health literacy and health-seeking behaviors of Oaxacan and other Mexican migrants; the health challenges these groups face. Through discussion and reflection, students prepare for clinical work and community engagement in Oaxaca, while also gaining knowledge and insight to make connections between their experiences in Mexico and their health-related work with Mexican immigrants in the Bay Area. Service Learning Course (certified by Haas Center). Prerequisite: application and acceptance into the Community Health in Oaxaca Summer Program (http://och.stanford.edu/oaxaca.html).

2 units, Spr (Garcia, G; Banchoff, A)

MED 262. Economics of Health Improvement in Developing Countries

(Same as ECON 127) Application of economic paradigms and empirical methods to health improvement in developing countries.

Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and 102B, and consent of instructor.

5 units, Win (Miller, N)

MED 263. Advanced Decision Science Methods and Modeling in Health

(Same as HRP 263) Advanced methods currently used in published model-based cost-effectiveness analyses in medicine and public health, both theory and technical applications. Topics include: Markov and microsimulation models, model calibration and evaluation, and probabilistic sensitivity analyses. Prerequisites: a course in probability, a course in statistics or biostatistics, a course on cost-effectiveness such as HRP 392, a course in economics, and familiarity with decision modeling software such as TreeAge.

3 units, Spr (Goldhaber-Fiebert, J)

MED 271. Global Biodesign: Medical Technology in an International Context

(Same as BIOE 371) Seminar examines the development and commercialization of medical technologies in the global setting focusing primarily on Europe, India and China. Faculty and guest speakers from industry and government discuss the status of the industry, as well as opportunities in and challenges to medical technology innovation unique to each geography. Topics related to development of technologies for bottom of the pyramid markets are also addressed. Students enrolling for 2 units are required to write/deliver a final paper.

1-2 units, Spr (Doshi, R; Yock, P; Shen, C)

MED 272A. Biodesign Innovation: Needs Finding and Concept Creation

(Same as BIOE 374A, ME 368A) (Same as OIT 384.) First of a two quarter series. How to develop comprehensive solutions (most commonly medical devices) to significant medical problems. Needs-finding methods, brainstorming, and concept creation. Strategies for understanding and interpreting clinical needs, researching literature, and searching patents. Clinical and scientific literature review, techniques of intellectual property analysis and feasibility, basic prototyping and market assessment. Students work in small entrepreneurial multidisciplinary teams to create, analyze, and screen medical technology ideas, and select projects for future development. Final presentations to a panel of prominent inventors and investors in medical Expert guest lecturers, faculty-led practical demonstrations and coaching sessions, and interactive team meetings under the mentorship of Biodesign. Projects from previous years include: prevention of hip fractures in the elderly; methods to accelerate healing after surgery; less invasive techniques for bariatric surgery; point of care diagnostics to improve emergency room efficiency; novel devices to bring specialty-type of care to primary care community doctors. More than 40,00 patients have been treated to date with technologies developed as part of this program and more than ten venture-backed companies were started by alums of the program. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: application; see http://www.stanford.edu/group/biodesign/courseapplication.html; deadline is November 20, 2010.

2-4 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)

MED 272B. Biodesign Innovation: Concept Development and Implementation

(Same as BIOE 374B, ME 368B) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. May be taken alone (2 units) or in combination with the project component (4 units). Prerequisite: MED 272A, ME368A, or BIOE 374A.

2-4 units, Spr (Brinton, T; Milroy, J; Yock, P; Zenios, S)

MED 275. Introduction Biopharmaceutical Innovation

Open to all students. Biotechnology and the pharmaceutical industry. Topics include the biopharmaceutical industry, historical trends and experiences; research and development; intellectual property; drug approval: regulatory issues and agencies; business development; marketing; manufacturing; capital structure and financing; careers in biopharmaceutical industry. 2-unit option, lectures and weekly assignments, MED or S/NC grading only. 3-unit option, including a group project and final presentation, may be taken for a letter grade. May be repeated for credit.

2-3 units, Win (Gardner, P; Rumma, R; Patro, A)

MED 276. Careers in Medical Technology

Career tracks in biomedical technology for medical, life science, engineering, business, and law students of all levels. Industry professionals describe career tracks, current roles, and industry perspectives. 2-unit option, lectures and weekly assignments, MED or S/NC grading only. 3-unit option, including a group project and final presentation, may be taken for a letter grade. May be repeated for credit.

2-3 units, Spr (Gardner, P; Rumma, R; Patro, A)

MED 282. Early Clinical Experience at the Arbor Free Clinic

Students provide health care in a student-run clinic for the homeless and uninsured. Student volunteers are guided in the practice of medical interviews, history-taking and physical examinations as appropriate. Clinical students and attending physicians provide support and guidance as the team arrives at a diagnosis and management plan. Two units of credit is intended for Steering Committee members or for students who work at the clinic every other Sunday.

1-2 units, Aut (Osterberg, L), Win (Staff), Spr (Staff), Sum (Staff)

MED 283. Early Clinical Experience at Pacific Free Clinic

Hands-on experience at a student-run free clinic targeting immigrants in the San Jose area. Opportunity to work with an interpreter and learn about unique health care issues faced by immigrants. Students are expected to conduct history and physicals, present to the attending physician, help arrive at a diagnosis and plan and participate in basic procedures. 1 unit for limited commitment; 2 units for volunteers in training and students who volunteer a minimum of once a month; 3 units for Steering Committee members and students who volunteer a minimum of twice a month.

1-3 units, Aut (Kao, P), Win (Kao, P), Spr (Kao, P)

MED 289. Introduction to Bioengineering Research

(Same as BIOE 390) Preference to medical and bioengineering graduate students. Bioengineering is an interdisciplinary field that leverages the disciplines of biology, medicine, and engineering to understand living systems, and engineer biological systems and improve engineering designs and human and environmental health. Topics include: imaging; molecular, cell, and tissue engineering; biomechanics; biomedical computation; biochemical engineering; biosensors; and medical devices. Limited enrollment.

1 unit, Aut (Wang, P; Gold, G)

MED 295. Advanced Cardiac Life Support

For clinical M.D. students only. Prepares students to manage the victim of a cardiac arrest. Knowledge and skills necessary for resuscitation of critically-ill patients. Clinical scenarios and small group discussions address cardiovascular pharmacology, arrhythmia recognition and therapy, acute coronary syndrome including myocardial infarction, ventricular dysrhythmias and defibrillation, and acute ischemic stroke. Requires pre-course preparation and an intensive two-day session on a Friday and Saturday. Students should get the approval of their clerkship coordinator before registering for the course. Recommended: MED 300A, PED 300A, or SURG 300A.

2 units, Aut (Staff), Win (Giacomini, J), Spr (Staff)

MED 299. Directed Reading in Medicine

Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MED 370. Medical Scholars Research

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MED 399. Graduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MEDICINE INTERDISCIPLINARY (INDE) COURSES

GRADUATE COURSES IN MEDICINE INTERDISCIPLINARY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

INDE 200. The Future of Academic Medicine
Required for first-year MSTP students; limited to MSTP. Presentations of research directions and opportunities by chairs of basic science, clinical departments, and PhD programs. Prerequisite: instructor consent.

1 unit, Aut (Kim, S; Utz, P), Win (Kim, S; Utz, P)

INDE 201. Practice of Medicine I
Six quarter series extending throughout the first two years of the MD program, interweaving core skills training in medical interviewing and the physical examination with other major threads addressing the context of medical practice: information literacy, nutrition principles, clinical epidemiology and biostatistics, evidence-based practice, psychiatry, biomedical ethics, health policy, population health. Core clinical skills are acquired through hands-on practice, and evaluated through an extensive program of simulated medical encounters, in which students interview, examine, and manage patients in a mock clinic. The information literacy thread introduces students to informatics and knowledge management, biomedical informatics, and evidence-based medicine searching. Nutrition principles are acquired through interactive, web-based instruction, and reinforced through problem-based learning cases, which run in parallel to the basic science components over the first year. In epdemiology

11 units, Aut (Basaviah, P)

INDE 202. Practice of Medicine II
Medical interview and physical examination skills, information literacy, nutrition principles, evidence-based practice, health policy, and population health are covered. At the end of this quarter, students participate in a performance-based assessment of their medical interview and physical examination skills. See INDE 201 for a complete description of the Practice of Medicine course series.

8 units, Win (Basaviah, P)

INDE 203. Practice of Medicine III
Medical interview and physical examination skills, biomedical literature retrieval and appraisal, nutrition principles, evidence-based practice, biomedical ethics, and population health are covered. Students begin clinical problem-solving sessions to learn the approach to common and important clinical problems. Cases integrate other course themes of population health, evidence-based practice, clinical ethics, nutrition, health policy, and behavioral medicine. Students begin transition from comprehensive to problem-focused patient encounters. Students also gain exposure to geriatrics, initial exposure to pediatrics, and practice mental health interview skills. At the end of this quarter, students participate in a performance-based assessment of their medical interview and physical examination skills. See INDE 201 for a complete description of the Practice of Medicine course series.

8 units, Spr (Basaviah, P)

INDE 204. Practice of Medicine IV
POM is a six-quarter preclinical course providing clinical preparation for first- and second-year medical students. Participation in this course gives students a foundation in health policy, medical ethics, clinical epidemiology and biostatistics, behavioral medicine, nutrition and quantitative medicine. Additionally, students learn the basics of the medical interview, physical examination, clinical reasoning, and procedural skills. This longitudinal preparation is designed to prepare students for clerkships. In second-year POM, there are two major educational categories: clinical reasoning and clinical exam skills. These two components are taught within five curricular components that include clinical reasoning teaching rounds and small group, clinical practicum, clinical procedures / Introduction to the Management of the Ill Patient simulation (IMIP), advanced clinical skills, and psychiatry. Within Clinical Reasoning Sessions, students work in a problem-based learning format, analyz

10 units, Aut (Basaviah, P)

INDE 205. Practice of Medicine V
POM is a six-quarter preclinical course providing clinical preparation for first- and second-year medical students. Participation in this course gives students a foundation in health policy, medical ethics, clinical epidemiology and biostatistics, behavioral medicine, nutrition and quantitative medicine. Additionally, students learn the basics of the medical interview, physical examination, clinical reasoning, and procedural skills. This longitudinal preparation is designed to prepare students for clerkships. In second-year POM, there are two major educational categories: clinical reasoning and clinical exam skills. These two components are taught within five curricular components that include clinical reasoning teaching rounds and small group, clinical practicum, clinical procedures / Introduction to the Management of the Ill Patient simulation (IMIP), advanced clinical skills, and psychiatry.

8 units, Win (Basaviah, P)

INDE 206. Practice of Medicine VI
Prep for the Clerkships is a month-long curriculum focused on preparing students with skills, knowledge, and approaches directly applicable to their upcoming clinical rotations. The experience provides hands-on workshops, simulated sessions, patient encounters, small group sessions, and a few large group sessions comprising a capstone for the two- year longitudinal curriculum in POM. In general, the individual sessions are tied to clinically relevant themes, including: procedural skills(cadaver lab, EMED, IMIP); clinical skills (Mini-CPX, bedside rounds, advanced presentations, SOAP notes, patient safety); clinical specialty sessions (dermatology, palliative medicine, ophthalmology); clinical essentials (EKG, general radiology, interventional radiology, fluid and electrolytes, order writing); and professionalism.

9 units, Spr (Basaviah, P)

INDE 207A. Medical Mandarin I: Beginning
Develops essential medical vocabularies and conversational communication skills. Teaches the pinyin pronunciation system, which provides an accessible method of learning basic phrases. The foundations of taking a comprehensive patient history in Mandarin and doing medical interviews at individual hospital divisions, including making introductions, soliciting symptoms, explaining health concepts (e.g. diseases and prescriptions). Main goals are to improve rapport with Chinese patients through Mandarin fluency in the medical setting and to promote understanding of Chinese culture in the context of health care. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

2-3 units, Aut (Wang, X; So, S)

INDE 207B. Medical Mandarin II: Intermediate
For students who already have a basic command of spoken Chinese. Conversational communication skills practiced in a more advanced setting, including more sophisticated assessment of patient history and cultural components that influence diseases found in Chinese-speaking patients. Builds working vocabulary for organ system disease processes to conduct a full physical exam, and to describe treatment modalities for Chinese-speaking patients (diagnostic and therapeutic). Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well. Prerequisite: one semester of college-level Chinese or instructor assessment of fluency.

2-3 units, Aut (Wang, X; So, S)

INDE 207C. Medical Mandarin III: Advanced
Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Includes clinic visits and field activities. Prerequisite: completion of Medical Mandarin II, or advanced Chinese proficiency.

2 units, Aut (Wang, X; So, S)

INDE 208A. Medical Mandarin I: Beginning
Continuation of 207A. See description for 207A. Students participating in classroom and online instruction only register for 2 units.

Students registering for 3 units participate in clinic visits and field activities as well.

2-3 units, Win (So, S; Wang, X)

INDE 208B. Medical Mandarin II: Intermediate

Continuation of 207B. See description for 207B. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

2-3 units, Win (Staff)

INDE 208C. Medical Mandarin III: Advanced

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Includes clinic visits and field activities. Prerequisite: completion of 207C, or advanced Chinese proficiency.

2 units, Win (Wang, X; So, S)

INDE 209A. Medical Mandarin III: Beginning

Continuation of 207A/208A. See description for 207A. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

2-3 units, Spr (So, S; Wang, X)

INDE 209B. Medical Mandarin III: Intermediate

Continuation of 207B/208B. See description for 207B. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

2-3 units, Spr (So, S; Wang, X)

INDE 209C. Medical Mandarin III: Advanced

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Includes clinic visits and field activities. Prerequisite: completion of 208C or advanced Chinese proficiency.

2 units, Spr (Wang, X; So, S)

INDE 211. Creative Writing

For medical students - all levels of writing skill. Examines uses of creative writing, including understanding the experience of medical training. May be repeated for credit.

1 unit, Win (Shafer, A)

INDE 212. The Human Condition: Medicine, Arts, and Humanities

The interdisciplinary field of medical humanities: the use of the arts and humanities to examine medicine in personal, social, and cultural contexts. Topics include the doctor/patient relationship, the patient perspective, the meaning of doctoring, and the meaning of illness. Sources include visual and performing arts, film, and literary genres such as poetry, fiction, and scholarly writing. Designed for medical students in the Biomedical Ethics and Medical Humanities Scholarly Concentration, but all students are welcome.

2 units, Spr (Zaroff, L; Shafer, A)

INDE 214. Stanford Medical Student Journal

Provides an opportunity for editors of all levels to cultivate their skills and assist in preparing pieces submitted by colleagues for publication in the Stanford Medical Student Clinical Journal (SMSCJ). Students enrolled in the course work closely with student authors as well as other editors. Editors examine multiple categories of writing, including opinion pieces, poetry, memoirs, book reviews, case reports and investigative reports. The SMSCJ is published two to three times per year and highlights the diverse talents of Stanford medical students in both scientific writing and the humanities.

1 unit, Aut (Shafer, A; Connolly, A), Win (Shafer, A; Connolly, A), Spr (Shafer, A; Connolly, A)

INDE 215. Queer Health and Medicine

Explores specific, pertinent, and timely issues impacting the health of the lesbian, gay, bisexual, and transgender community; examines the role of the primary care physician in addressing the health care needs of this community. Guest lecturers provide a gender-sensitive approach to the medical care of the LGBT patient, breaking down homophobic barriers and reaffirming patient diversity. Students write response papers to weekly lectures.

1 unit, Spr (Hendrickson, M)

INDE 216. Cells to Tissues

Focuses on the cell biology and structural organization of human tissues as self-renewing systems. Topics include identification and differentiation of stem cells, regulation of the cell cycle and apoptosis in normal and cancerous cells, cell adhesion and polarity in epithelial tissues, intracellular transport, and cell migration. Histology laboratory sessions examine normal and abnormal samples of blood, epithelia, skin, connective tissue, muscle, bone and cartilage. Patient presentations and small group discussions of current medical literature illustrate how cell biology influences medical practice.

3 units, Aut (Theriot, J; Connolly, A)

INDE 220. Human Health and Disease I

Establishes the foundation for the Human Health and Disease block which spans Q3 (Spring quarter Year One) through Q5 (Winter quarter Year Two). The Human Health and Disease block presents organ system-based histology, pathology, physiology, pharmacology, and infectious disease in a sequence of interdisciplinary courses. Each organ-specific integrated course includes a review of the anatomy and related histology, normal function of that organ system, how the organ system is affected by and responds to disease including infection, and how diseases of that organ system are treated (therapeutics).

3 units, Win (Siegel, R; Whitlock, J; Regula, D)

INDE 221. Human Health and Disease II

Structure, function, disease, and therapeutics of the respiratory system and the cardiovascular system. See INDE 220 for a description of the Human Health and Disease block .

12 units, Spr (Regula, D; Kobilka, B; Kao, P; Connolly, A; Whitlock, J)

INDE 222. Human Health and Disease III

Structure, function, disease, and therapeutics of the renal/genitourinary system, the gastrointestinal system, the endocrine system, male and female reproductive systems, and women's health. See INDE 220 for a description of the Human Health and Disease block .

15 units, Aut (Regula, D; Bhalla, V; Lowe, A; Gesundheit, N; Hillard, P; Connolly, A; Siegel, R; Pao, A)

INDE 223. Human Health and Disease IV

Structure, function, disease, and therapeutics of the central nervous system, hematologic system and multi-systemic diseases. See INDE 220 for a description of the Human Health and Disease block.

11 units, Win (Regula, D; Connolly, A; Siegel, R; Glader, B; Ferrell, J; Schwartz, N)

INDE 225. Popular and Clinical Nutrition: Food Facts, Fads, and Pharmacology

Designed for medical students and other health care professionals. Lunchtime lectures review the epidemiological and clinical research related to eating patterns and misconceptions of the public, the mechanisms of pharmacological effects of food, and related topics common to patient nutritional concerns. Topics include fad diets, the impact of dietary addiction, longevity associated with caloric restriction, toxins in foods and the action of phytonutirents. Epidemiological, clinical, and biochemical studies are reviewed in the discussion of these and other topics.

1 unit, Win (Staff)

INDE 226. History of Medicine Online

Via Internet. Topics include: ancient medicine, Egypt and Babylonia, ancient Greece and Rome, Europe in the Middle Ages and the Renaissance, 18th-century schools of thought, and technological medicine. Sources include Kleinman's core clinical functions, and text, pictures, hypertext links, and sound clips. For assistance accessing the course, email: cwpsupport@lists.stanford.edu. Enroll in Axess, then ask cwpsupport to be added to the course site as a student

1 unit, Aut (Shafer, A), Win (Shafer, A), Spr (Shafer, A)

INDE 227. Careers in Medicine: Pathways in the Medical Sciences

Open to medical students, graduate and undergraduate students. Interactive, seminar-style sessions expose students to diverse career opportunities and the challenges of developing work-life bal-

ance in medicine. Recognized experts in clinical medicine and biomedical research who have been innovators in their careers discuss their work, decision-points in their career pathways, and lifestyle aspects of their choices.

1 unit, Spr (Gesundheit, N)

INDE 228. Career Transition Planning: Taking Action Today for a Successful Tomorrow

Open to School of Medicine MD and graduate students; post-docs and clinical fellows may audit by consent of instructor. How to prioritize career goals and develop an effective job search campaign. Topics: translating scientific and clinical training into a variety of workplace environmennts, professional network development, professional interest assessment, recruiters' perspectives, credentials development, and creating a marketing plan. Guest speakers from myriad career fields. May be repeated for credit.

1 unit, Spr (Eberle, S; Puglisi, J)

INDE 229. Managing Difficult Conversations

(Same as GSBGEN 568) Dealing effectively with difficult interpersonal situations in medical contexts. Focus is on improving students' judgment as to how to prepare for and confront difficult discussions in medical situations. Relevant principles of professionalism, leadership, and psychology underlie the course pedagogy. Case-based; student-to-student and student-to-instructor role-playing in actual medical situations. Patient and physician-expert participation as class guests. Enrollment limited to 20 medical students (2nd year and beyond) and 15 2nd year MBA students.

1 unit, Aut (Grousbeck, I; Prober, C)

INDE 230. Scientific Management Series

Designed for postdocs and advanced graduate students. Reviews management skills necessary for successfully assuming leadership roles in scientific research. Addresses some of the most difficult aspects of developing, directing, and managing people and projects and running a research group, especially issues that new faculty have traditionally learned by trial and error over a number of years. Topics include: the faculty job search process and strategies, key elements in starting a lab, basic principles regarding legal dimensions of scientific activity (intellectual property, royalities, links with industry), writing and securing grants.

1 unit, Win (Sanford, R; Pringle, J)

INDE 231. Future Faculty Seminar

(Same as CTL 231) For graduate students from all disciplines who are considering faculty careers. Postdoctoral fellows, TGR students, and research/clinical trainees may audit by consent of instructor. Explores the broad spectrum of duties and opportunities presented through faculty positions beyond the research-related aspects. Develops awareness of resources and skills that lead to faculty success; answers field-specific and related faculty job questions through discussions with representatives of a variety of academic institutions and fellow course participants. Topics include: finding and obtaining faculty positions, negotiating and navigating the first year, and working toward tenure. May be repeated for credit.

1 unit, Aut (Eberle, S; Puglisi, J; Wright-Dunbar, R)

INDE 232. Introduction to Academic Medicine for Physician-Scientists

Open only to accepted MSTP students. Presentations by Stanford faculty on professional development topics, including: choosing a dissertation advisor, giving oral presentations, writing a grant proposal, attending scientific meetings, developing a research career. Substantial writing component.

3 units, Sum (Kim, S; Utz, P;)

INDE 233. Medical Education Seminar Series

For pre-clinical and clinical medical students. A series of sessions rotating among the following formats: Medical Education Journal Club; sessions designed for faculty to discuss planned projects and practice upcoming presentations; mini-lectures on education methods; reflections on teaching experiences; and discussions of controversies and challenges in medical education. Repeatable for credit.

1 unit, Aut (Braddock, C; Irvine, C; Violanti, M), Win (Braddock, C; Violanti, M; Irvine, C), Spr (Braddock, C; Violanti, M; Irvine, C)

INDE 255A. Health Policy, Finance and Economics I

Open to medical students and resident physicians. Introduction to basic concepts and current issues in health policy, health finance, and health economics. Goals are to promote understanding of the forces that shape healthcare; to integrate medical students with graduate medical education (residents); to motivate participants to pursue further scholarly activity in these subjects through coursework, graduate programs or research . Team taught by world-renowned experts in their respective fields. Prerequisite: instructor consent.

1 unit, not given this year

INDE 255B. Health Policy, Finance and Economics II

Continuation of INDE 255A. Open to medical students and resident physicians. Introduction to basic concepts and current issues in health policy, health finance, and health economics. Goals are to promote understanding of the forces that shape healthcare; to integrate medical students with graduate medical education (residents); to motivate participants to pursue further scholarly activity in these subjects through coursework, graduate programs or research . Team taught by world-renowned experts in their respective fields. For medical students 255A is not prerequisite to 255B. Prerequisite: instructor consent.

1 unit, not given this year

INDE 297. Reflections, Research, and Advances in Patient Care

For clinical MD students. Two-year curriculum designed to provide structured time for students to step back from clerkships, in order to promote reflection on and reinforcement for their learning in the clniical environment. Goals are: to discuss and reflect upon critical experiences in clerkships; to provide continuity of instruction in translational science topics across the curriculum; to reinforce and extend the study of behavioral, cultural, ethical, social and socioeconomic topics introduced in the Practice of Medicine course sequence; to expose students to recent advances in medical discoveries, emphasizing their application to clinical practice (translational medicine); and to develop research and critical thinking skills, acquiring new information in areas related to the Scholarly Concentrations. Components of this curriculum include Doctoring with CARE small groups, the Translating Discoveries lecture/seminar series, and Scholarly Concentration breakout groups.

4 units, Aut (Prober, C; Shafer, A), Win (Prober, C; Shafer, A), Spr (Prober, C; Shafer, A), Sum (Prober, C; Shafer, A)

INDE 298. Women's Health Independent Project

Required for Women's Health Scholarly Concentration. Students pursue individual projects under the supervision of a faculty member. Prerequisite: consent of instructor.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MEDIEVAL STUDIES (MEDVLST) COURSES

GRADUATE COURSES IN MEDIEVAL STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MEDVLST 299. Materials and Methods: Medieval and Early Modern Books and Manuscripts

Hands-on seminar dealing with bibliography, codicology, paleography, and other skills associated with advanced research in the humanities using book and manuscript sources. Topics include: paper, ink, marginalia, binding, printing, type, illustration, collation, and formatting; and English, French, German, Italian, and Latin paleography. Guest experts from faculty and library staff.

1-2 units, not given this year

MICROBIOLOGY AND IMMUNOLOGY (MI) COURSES

UNDERGRADUATE COURSES IN MICROBIOLOGY AND IMMUNOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MI 104. Innate Immunology
(Same as IMMUNOL 204, MI 204) Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants.
3 units, Spr (Schneider, D)

MI 115B. The Vaccine Revolution
(Same as HUMBIO 155B) Advanced seminar. Human aspects of viral disease, focusing on recent discoveries in vaccine development and emerging infections. Journal club format: students choose articles from primary scientific literature, write formal summaries, and synthesize them into a literature review. Emphasis is on analysis, experimental design, and interpretation of data. Oral presentations. Enrollment limited to 10. Prerequisites: HUMBIO 155H, MI 155V.
6 units, not given this year

MI 116. The Human Virosphere
(Same as MI 216) Focus on interaction of humans and viruses from a number of perspectives: historical, cultural, political, and demographic. Organismal, molecular biological, biochemical, human and viral interactions; clinical aspects of viral disease, epidemiology and risk factors, public and international health, aspects of virology including emerging viruses and biological weapons. Case studies involving particular viruses: human herpes viruses, retroviruses, oncogenic viruses; vaccination and disease eradication, evolution of viruses as tools for research and therapy. Emphasis on general principles of biology and matters of decision making policy. Prerequisite: Biology core, Human Biology core, or consent of instructor.
5 units, Win (Siegel, R)

MI 155H. Humans and Viruses I
Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis is on host pathogen interactions and policy issues. Topics: polio and vaccination, smallpox and eradication, yellow fever and history, influenza and genomic diversity, rubella and childhood infections, adenovirus and viral morphology, ebola and emerging infection, lassa fever and immune response.
6 units, not given this year

MI 155V. Humans and Viruses II
Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis on host pathogen interactions and policy issues. Topics: measles and viral epidemiology, rotavirus and world health, rabies and infections of the brain, HPV and cancer -causing viruses, herpes simplex and viral latency, CMV and viral teratogenesis, retrovirology and endogenous viral sequences, HIV and viral treatement, viral hepatitis and chronic infections, prions and diseases of life style. Prerequisite: MI155H.
6 units, not given this year

MI 185. Topics in Microbiology
(Same as MI 285) For advanced undergraduates and graduate students. Topics include diversity, molecular regulation, growth, bioenergetics, and unique matabolic processes. Presentation of student papers on current topic selected with student input. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: CHEM 31X, Biology core.
3 units, Win (Matin, A)

MI 198. Directed Reading in Microbiology and Immunology
Fields of study are decided in consultation with sponsoring professor. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MI 199. Undergraduate Research
Investigations sponsored by individual faculty members. Possible fields: microbial molecular biology and physiology, microbial pathogenicity, immunology, virology, and molecular parasitology. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN MICROBIOLOGY AND IMMUNOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MI 204. Innate Immunology
(Same as IMMUNOL 204, MI 104) Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants.
3 units, Spr (Schneider, D)

MI 209. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites: Part I
For graduate students and advanced undergraduates; required of first-year graduate students in Microbiology and Immunology. Emphasis is on mechanisms to establish infection in the host and responses of the host to infection. Current literature. Prerequisite: background in biochemistry and molecular biology.
4 units, not given this year

MI 210. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites
For graduate and medical students, and advanced undergraduates; required of first-year graduate students in Microbiology and Immunology. The molecular mechanisms by which microorganisms invade animal and human hosts, express their genomes, interact with macromolecular pathways in the infected host, and induce disease. Current literature.
4 units, Win (Sarnow, P)

MI 211. Advanced Immunology I
(Same as IMMUNOL 201) For graduate and medical students and advanced undergraduates. Molecules and cells of the innate and adaptive immune systems; genetics, structure, and function of immune molecules; lymphocyte differentiation and activation; regulation of immune responses; autoimmunity and other problems in immune system dysfunction. Prerequisites: undergraduate course in Immunology and familiarity with experimental approaches in biochemistry, molecular biology, and cell biology.
3 units, Win (Chien, Y)

MI 215. Principles of Biological Technologies
(Same as IMMUNOL 215) The principles underlying commonly utilized technical procedures in biological research. Lectures and primary literature critiques on gel electrophoresis, protein purification and stabilization, immunofluorescence microscopy, FACS. Prerequisites: biochemistry. Required of first-year graduate students in Microbiology and Immunology, and the Immunology program.
3 units, Spr (Kirkegaard, K)

MI 216. The Human Virosphere
(Same as MI 116) Focus on interaction of humans and viruses from a number of perspectives: historical, cultural, political, and demographic. Organismal, molecular biological, biochemical, human and viral interactions; clinical aspects of viral disease, epidemiology and risk factors, public and international health, aspects of virology including emerging viruses and biological weapons. Case studies involving particular viruses: human herpes viruses, retroviruses, oncogenic viruses; vaccination and disease eradication, evolution of viruses as tools for research and therapy. Emphasis on general principles of biology and matters of decision making policy. Prerequisite: Biology core, Human Biology core, or consent of instructor.
5 units, Win (Siegel, R)

MI 233. The Biology of Small Modulatory RNAs
(Same as GENE 233, PATH 233) Open to graduate and medical students. How recent discoveries of miRNA, RNA interference, and short interfering RNAs reveal potentially widespread gene regulatory mechanisms mediated by small modulatory RNAs during animal and plant development. Required paper proposing novel research.
2 units, Aut (Chen, C; Fire, A)

MI 234. Fundamentals of RNA Biology
(Same as GENE 234, PATH 234) For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students.
2 units, alternate years, not given this year

MI 250. Frontiers in Microbiology and Immunology
Required of first- and second-year students in Microbiology and Immunology. How to evaluate biological research. Held in conjunction with the Microbiology and Immunology Friday noon seminar series. Before the seminar, students and faculty discuss one or more papers from the speaker's primary research literature on a related topic. After the seminar, students meet informally with the speaker to discuss their research.
1 unit, Aut (Schneider, D), Win (Schneider, D), Spr (Schneider)

MI 285. Topics in Microbiology
(Same as MI 185) For advanced undergraduates and graduate students. Topics include diversity, molecular regulation, growth, bioenergetics, and unique matabolic processes. Presentation of student papers on current topic selected with student input. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: CHEM 31X, Biology core.
3 units, Win (Matin, A)

MI 299. Directed Reading in Microbiology and Immunology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MI 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MI 399. Graduate Research
Students who have completed the necessary foundation courses undertake investigations in general bacteriology, bacterial physiology and ecology, bacterial genetics, microbial pathogenicity, immunology, parasitology, or virology sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MI 801. TGR Master's Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MI 802. TGR PhD Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MODERN THOUGHT AND LITERATURE (MTL) COURSES

GRADUATE COURSES IN MODERN THOUGHT AND LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MTL 299. Edgework: New Directions in the Study of Culture
Workshop. Required of first-year students in the doctoral program. Methodologies of different disciplines, the possibility and difficulty of interdisciplinary work within these disciplines, and their connection with the individual projects of students in Modern Thought and Literature. May be repeated for credit.
1-3 units, Spr (Staff)

MTL 334A. Concepts of Modernity 1: Philosophical Foundations
(Same as LAW 501) The philosophical foundations of the modern period through the prism of law and legal rationality. Focus is on concepts of the nation state, justice, legal interpretation, individual agency and moral choice, equality, punishment, legislation, and international society. Readings include: Rousseau, Locke; Hegel; Montesquieu, Kant, Bentham, Marx, Weber; and may also include critiques of those works offered by writers including: Arendt, Habermas, Foucault; Rose; Said; Spivak; Butler; MacKinnon.
5 units, Aut (Stacy, H)

MTL 334B. Concepts of Modernity 2: Aesthetics and the Public Sphere
(Same as ENGLISH 334B) A selection of 20th-century theory focusing on the relation of aesthetics and the public sphere. Themes include the conceptualization of the public sphere, the debates over the relation of art and politics, aesthetics as form of public rhetoric, the social mission of literature and other arts. Readings from Habermas, Adorno, Horkheimer, Arendt, Lukacs, Bloch, Brecht, Jameson, Negt and Kluge, Kristeva, Spivak, Appiah, Coetzee.
5 units, Win (Majumdar, S)

MTL 390. Qualifying Paper
Preparation and writing of the qualifying paper for the Ph.D. in Modern Thought and Literature. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MTL 395. Ad Hoc Graduate Seminar
Graduate students (three or more) who wish to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a member of the faculty to supervise it. May be repeated for
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MTL 398. Research
Students pursue a special subject of investigation under supervision of a member of the committee or another faculty member. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MTL 399. Reading for Orals
Reading in preparation for the University Oral Examination. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MTL 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MOLECULAR AND CELLULAR PHYSIOLOGY (MCP) COURSES

UNDERGRADUATE COURSES IN MOLECULAR AND CELLULAR PHYSIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MCP 126. NEURONS AND DISEASE
Diseases of the nervous system. First lecture of each week focuses on the clinical, epidemiological and behavioral aspects of a selected disease or syndrome. Second lecture exposes the cell biological, electrophysiological, biochemical and/or molecular biological processes that underlie each disease presented. Instructors maintain some flexibility in the diseases chosen for elucidation, but students can expect those covered to range from the relatively straightforward, for example Multiple Sclerosis (MS) or Amyotrophic Lateral Sclerosis (ALS), to the more complex, for example, Schizophrenia or Obsessive Compulsive Disorder (OCD). 3 units for lecture and discussion only; 4 units includes a paper. Prerequisite: Biology or Human Biology core.
3-4 units, Win (Staff)

MCP 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN MOLECULAR AND CELLULAR PHYSIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MCP 200. Cardiovascular Physiology
Offered jointly with the Department of Medicine. Lectures, small group instruction, clinical presentations, and lab demonstrations of normal and disordered human cardiovascular physiology. Prerequisite: understanding of general biochemistry.
5 units, Spr (Staff)

MCP 202. Advanced Immunology II
(Same as IMMUNOL 202) Readings of immunological literature. Classic problems and emerging areas based on primary literature. Student and faculty presentations. Prerequisite: IMMUNOL 201/MI 211.
3 units, Spr (Garcia, K)

MCP 216. Genetic Analysis of Behavior
(Same as NBIO 216) Advanced seminar. Findings and implications of behavioral genetics as applied to invertebrate and vertebrate model systems. Topics include biological clocks, and sensation and central pattern generators. Relevant genetic techniques and historical perspective. Student presentation.
4 units, Win (Staff)

MCP 221. Advanced Cell Biology
(Same as BIO 214, BIOC 224) For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor.
2-5 units, Win (Kopito, R; Theriot, J; Pfeffer, S; Straight, A; Nachury, M)

MCP 222. Imaging: Biological Light Microscopy
(Same as BIO 152) Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Lab. Prerequisites: some college physics, Biology core.
3 units, Spr (Staff)

MCP 232. Advanced Imaging Lab in Biophysics
(Same as APPPHYS 232, BIO 132, BIO 232, BIOPHYS 232) Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.
4 units, Spr (Block, S; Smith, S; Stearns, T)

MCP 256. How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
Open to graduate and medical students, and advanced undergraduates. Dynamic aspects of cell behavior and function, including cellular energetics, homeostasis, heterogeneity of membranes, structure and function of organelles, solute and water transport, signaling and motility. Emphasis is on the principles of how coupling of molecular processes gives rise to essential functions at the cellular level. Mathematical models of cell function. Student presentations.
4 units, Aut (Maduke, M; Goodman, M)

MCP 258. Information and Signaling Mechanisms in Neurons and Circuits
(Same as NBIO 258) How synapses, cells, and neural circuits process information relevant to a behaving organism. How phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.
4 units, not given this year

MCP 299. Directed Reading in Molecular and Cellular Physiology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MCP 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MCP 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Research fields include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology. Prerequisite: consent of instructor. (Staff)
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MCP 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MCP 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC (MUSIC) COURSES

UNDERGRADUATE COURSES IN MUSIC

Primarily for undergraduates; graduate students may enroll with consent of adviser.

MUSIC 1A. Music, Mind, and Human Behavior
An introductory exploration of the question of why music is a pervasive and fundamental aspect of human existence. The class will introduce aspects of music perception and cognition as well as anthropological and cultural considerations. GER:DB-Hum
3 units, not given this year

MUSIC 4SI. Interactive Introduction to North American Taiko
Taught by Stanford Taiko members. Techniques and history. No experience necessary. May be repeated for credit.
1 unit, Win (Sano, S)

MUSIC 5G. Introduction to Guzheng
Introduction to Chinese music through learning how to play guzheng, a 21-stringed traditional Chinese instrument. The cultural, social, and historical significance of guzheng. 15 guzheng techniques, how to read Chinese music and guzheng notation, and two simple classic guzheng pieces. May be repeated for credit a total of 14 times. (AU)
1 unit, Aut (You, H), Win (You, H), Spr (You, H)

MUSIC 7B. Musical Cultures of the World
Musical cultures from Africa, Asia, Europe, and the Americas. Course objectives: cultivate an appreciation for the diversity of human musical expression; discover how music is used to shape social interactions and systems of meaning; develop active listening skills that can be used when encountering any music; gain a preliminary understanding of ethnomusicological concepts and vocabulary. No musical experience necessary. Lectures, discussion, listening, guest performances, musical participation, and a concert analysis. GER:DB-Hum
3 units, Spr (Schultz, A)

MUSIC 8A. Rock, Sex, and Rebellion
Development of critical listening skills and musical parameters through genres in the history of rock music. Focus is on competing aesthetic tendencies and subcultural forces that shaped the music. Rock's significance in American culture, and the minority communities that have enriched rock's legacy as an expressively diverse form. Lectures, readings, listening, and video screenings. GER:DB-Hum, EC-AmerCul
3 units, Win (Applebaum, M)

MUSIC 10AX. Sound Art
The course will explore the use of sound as a medium for artistic expression, from recording and manipulating environmental sounds to studio-created and processed sounds and musical in-

strument recordings. We will study the physics of sound, how sound is perceived, how to record and manipulate sound, and how to combine all of this knowledge into the creation of sound art. Instruction will include using portable sound recorders, using the recording studio, and how to think about sound as a medium of expression. A final project will combine these elements in the creation of a presentation of the works we produce in the class.

2 units, Aut (Kadis, J; Leitman, S)

MUSIC 12A. Introductory Piano Class

(A=level 1; B=level 2; C=level 3)

1 unit, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T), Sum (Zerlang, T)

MUSIC 12B. Introductory Piano Class

(A=level 1; B=level 2; C=level 3)

1 unit, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T), Sum (Zerlang, T)

MUSIC 12C. Introductory Piano Class

(A=level 1; B=level 2; C=level 3.) May be repeated for credit a total of 14 times.

1 unit, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T), Sum (Zerlang, T)

MUSIC 13Q. Classical Music and Politics: Western Music in Modern China

(Stanford Introductory Seminar) Preference to sophomores. Social history, cultural studies, China studies, international relations, and music. From the Italian Jesuit, Matteo Ricci who presented a clavichord to the Chinese emperor to the emergence of a modern generation of Chinese musicians. GER:DB-Hum, EC-GlobalCom

3 units, Spr (Cai, J)

MUSIC 17N. The Operas of Mozart

(Stanford Introductory Seminar) Preference to freshmen. Four of Mozart's mature operas, the earliest works in the operatic repertoire never to go out of fashion. What accounts for this extraordinary staying power? Focus on the history of their composition, performance, and reception, and their changing significance from Mozart's time to the present. GER:DB-Hum

3 units, Win (Berger, K)

MUSIC 17Q. Perspectives in North American Taiko

(Stanford Introductory Seminar) Preference to sophomores. Taiko, or Japanese drum, is a newcomer to the American music scene. Emergence of the first N. American taiko groups coincided with increased Japanese American activism, and to some it is symbolic of Japanese American identity. N. American taiko is associated with Japanese American Buddhism. Musical, cultural, historical, and political perspectives of taiko. Hands-on drumming. Japanese music and Japanese American history, and relations among performance, cultural expression, community, and identity. GER:DB-Hum, EC-AmerCul

4 units, Spr (Sano, S; Uyechi, L)

MUSIC 18A. Jazz History: Ragtime to Bebop, 1900-1940

From the beginning of jazz to the war years. GER:DB-Hum, EC-AmerCul

3 units, Win (Berry, F)

MUSIC 18B. Jazz History: Bebop to Present, 1940-Present

Modern jazz styles from Bebop to the current scene. Emphasis is on the significant artists of each style. GER:DB-Hum, EC-AmerCul

3 units, Spr (Berry, F)

MUSIC 19. Introduction to Music Theory

For non-music majors and Music majors or minors unable to pass the proficiency test for entry to MUSIC 21. The fundamentals of music theory and notation, basic sight reading, sight singing, ear training, keyboard harmony; melodic, rhythmic, and harmonic dictation. Skill oriented, using piano and voice as basic tools to develop listening and reading skills. GER:DB-Hum

3 units, Aut (Berger, T), Spr (Berger, T)

MUSIC 20A. Jazz Theory

Introduces the language and sounds of jazz through listening, analysis, and compositional exercises. Students apply the fundamentals of music theory to the study of jazz. Prerequisite: 19 or consent of instructor. GER:DB-Hum

3 units, Aut (Nadel, J)

MUSIC 20B. Advanced Jazz Theory

Approaches to improvisation through listening and transcribing, and developing familiarity with important contributors to this music. Topics: scale theory, altered dominants, and substitute harmony. Prerequisite: 20A or consent of instructor. GER:DB-Hum

3 units, Win (Nadel, J)

MUSIC 20C. Jazz Arranging and Composition

Jazz arranging and composition for small ensembles. Foundation for writing for big band. Prerequisite: 20A or consent of instructor.

3 units, alternate years, not given this year

MUSIC 21. Elements of Music I

Preference to majors. Introduction to tonal theory. Practice and analysis. Diatonic harmony focusing on melodic and harmonic organization, functional relationships, voice-leading, and tonal structures. Ear-training and keyboard-harmony skills; analytical methods and listening strategies.Enrollment limited to 40. Prerequisites: (1) Piano Proficiency Exam (must be passed within the first two weeks of the term) or MUSIC 12A (may be taken concurrently); (2) Passing grade on a basic musical skills proficiency examination on the first day of class or MUSIC 19. GER:DB-Hum

4 units, Aut (Aquilanti, G), Win (Berger, T)

MUSIC 22. Elements of Music II

Preference to majors. Introduction to chromatic harmony focusing on secondary functions, modulations, harmonic sequences, mode mixture, and the Neapolitan, and augmented sixth chords. Analysis of musical forms and harmonizations complemented by harmonic and melodic dictation, sight singing, and other practical skills. Prerequisites: (1) MUSIC 21; (2) Piano Proficiency Exam or MUSIC 12B (may be taken concurrently). GER:DB-Hum

4 units, Win (Aquilanti, G), Spr (Berger, T)

MUSIC 23. Elements of Music III

Preference to majors. Continuation of chromatic harmony, complex forms, and introduction to early 20th-century techniques. Satisfactory passage of ear-training proficiency exam, part of the course's final, is a requirement for course completion and for continuation in the major sequence. Prerequisites: (1) MUSIC 22; (2) Piano Proficiency Exam or MUSIC 12C (may be taken concurrently). GER:DB-Hum

4 units, Aut (Berger, T), Spr (Ulman, E)

MUSIC 32N. Sculpting with Sounds, Images, and Words

(Stanford Introductory Seminar) Preference to freshmen. Contemporary culture abounds in multimedia forms, in which sounds, images and words are interwoven in unique ways. What are their individual and combined powers? How would you harness them? Participants face these questions in creative projects as well as through in-class viewing, analysis and debates, readings, guest lectures and student presentations. The seminar is taught at the Center for Computer Research in Music and Acoustics where students have access to new media technologies. GER:DB-Hum, DB-Hum

3 units, Win (Kapuscinski, J)

MUSIC 35N. A Union of Diversities: Charles Ives and American Musical Traditions

(Stanford Introductory Seminar) (Same as AMSTUD 35N) Preference to freshmen. The life and work of Charles Ives, and the polarized reception his compositions received. Music includes Ives' Victorian songs and his symphonic works; his philosophical and political writings, historic recordings, oral and photographic histories, and live performances. Hands-on work with original manuscripts and editions. Recommended: ability to read music. GER:DB-Hum

3 units, Spr (Barth, G)

MUSIC 38N. Singing Early Music

(Stanford Introductory Seminar) Preference to freshmen. 15th- and 16th-century musical repertories and their contexts; performance practice. GER:DB-Hum

3 units, Aut (Rodin, J)

MUSIC 40. Music History to 1600

Pre- or corequisite: 21. GER:DB-Hum

4 units, Aut (Rodin, J)

MUSIC 41. Music History 1600-1830

Pre- or corequisite: 22. GER:DB-Hum

4 units, Win (Hadlock, H)

MUSIC 42. Music History Since 1830
Pre- or corequisite: 23. GER:DB-Hum
4 units, Spr (Kronengold, C)

MUSIC 65A. Voice Class I
Group (7 students to a section) beginning voice for the non-major (A = level 1; B = level 2). May be repeated for credit.
1 unit, Aut (Giovannetti, C), Win (Giovannetti, C), Spr (Giovannetti, C), Sum (Linduska, M)

MUSIC 65B. Voice Class II
Group (7 students to a section) beginning voice for the non-major (A = level 1; B = level 2). May be repeated for credit.
1 unit, Aut (Giovannetti, C), Win (Giovannetti, C), Spr (Giovannetti, C), Sum (Linduska, M)

MUSIC 72A. Intermediate Piano Class
For intermediate students. May be repeated for credit a total of 14 times. Prerequisites: 12C or equivalent, audition.
1 unit, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T), Sum (Zerlang, T)

MUSIC 72B. Organ Class
For beginning organ students who have keyboard skills. May be repeated for credit a total of 14 times.
1 unit, Aut (Morgan, R), Win (Morgan, R), Spr (Morgan, R)

MUSIC 72C. Harpsichord Class
For beginning harpsichord students who have keyboard skills. May be repeated for credit a total of 14 times.
1 unit, Aut (Thornburgh, E), Win (Thornburgh, E), Spr (Thornburgh, E)

MUSIC 72D. Jazz Piano Class
By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times.
1 unit, Aut (Low, M), Win (Low, M), Spr (Low, M)

MUSIC 73. Intermediate Voice Class
For intermediate students. Admission by audition. May be repeated for credit a total of 14 times.
1 unit, Aut (Giovannetti, C), Win (Giovannetti, C), Spr (Giovannetti, C)

MUSIC 74C. Classical Guitar Class
May be repeated for credit a total of 14 times.
1 unit, Aut (Ferguson, C), Win (Ferguson, C), Spr (Ferguson, C)

MUSIC 74D. Harp Class
May be repeated for credit a total of 14 times.
1 unit, Aut (Chauvel, M), Win (Chauvel, M), Spr (Chauvel, M)

MUSIC 75B. Renaissance Wind Instruments Class
May be repeated for credit.
1 unit, Aut (Myers, H), Win (Myers, H), Spr (Myers, H)

MUSIC 76. Brass Instruments Class
May be repeated for credit a total of 14 times.
1 unit, Aut (Kenley, M), Win (Kenley, M), Spr (Kenley, M)

MUSIC 77. Percussion Class
May be repeated for credit a total of 14 times.
1 unit, Aut (Veregge, M), Win (Veregge, M), Spr (Veregge, M)

MUSIC 121. Analysis of Tonal Music
Complete movements, or entire shorter works of the 18th and 19th centuries, are analyzed in a variety of theoretical approaches. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations. GER:DB-Hum
4 units, Win (Barth, G)

MUSIC 122A. Renaissance and Baroque Counterpoint
Analysis and composition of contrapuntal styles from the Renaissance and Baroque periods. Use of keyboard, ear training, and sight singing underlies all written work. Prerequisites: 23 and successful completion of the ear-training and piano-proficiency examinations. GER:DB-Hum
4 units, not given this year

MUSIC 122B. Harmonic Materials of 19th Century
Analysis of 19th-century music, with compositional exercises based on 19th-century models. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations. GER:DB-Hum
4 units, Aut (Ulman, E)

MUSIC 122C. Introduction to 20th-Century Composition
Contemporary works, with emphasis on music since 1945. Projects in free composition based on 20th-century models. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations. GER:DB-Hum
4 units, Win (Ferneyhough, B)

MUSIC 123. Undergraduate Seminar in Composition
Current trends in composition. May be repeated for credit a total of 7 times. Prerequisites: Music major; 23 or consent of instructor. GER:DB-Hum
3 units, Aut (Kapuscinski, J), Spr (Ulman, E)

MUSIC 125. Individual Undergraduate Projects in Composition
May be repeated for credit a total of 14 times. Prerequisites: music major, and one quarter of 123.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 126. Introduction to Thoroughbass
The development of continuo techniques and skills for figured-bass realization. Performance and analysis of selected repertoire, using thoroughbass principles and exercises based on historical theoretical treatises. Prerequisite: 21.
1-3 units, Win (Berger, T)

MUSIC 127. Instrumentation and Orchestration
Individual instruments, instrumental groups within the orchestra, and combinations of groups. Arrangements from piano to orchestral music. Score analysis with respect to orchestration. Practical exercises using chamber ensembles and school orchestra. Prerequisite: 23. GER:DB-Hum
3 units, alternate years, not given this year

MUSIC 128. Stanford Laptop Orchestra: Composition, Coding, and Performance
(Same as CS 170) Classroom instantiation of the Stanford Laptop Orchestra (SLOrk) which includes public performances. An ensemble of more than 20 humans, laptops, controllers, and special speaker arrays designed to provide each computer-mediated instrument with its sonic identity and presence. Topics and activities include issues of composing for laptop orchestras, instrument design, sound synthesis, programming, and live performance. May be repeated four times for credit.
1-5 units, Spr (Wang, G)

MUSIC 130A. Introduction to Conducting
Baton techniques and rehearsal procedures. The development of coordination of the members of the body involved in conducting; fluency in beat patterns and meters; dynamics, tempi, cueing, and use of the left hand in conducting. Prerequisites: 121 and diagnostic musicianship exam given first day of class; preference to students who have completed 122B.
3 units, Aut (Aquilanti, G)

MUSIC 130B. Elementary Orchestral Conducting
Prerequisites: 127 or previous orchestral performance experience, 130A.
3 units, Win (Cai, J), alternate years, not given next year

MUSIC 130C. Elementary Choral Conducting
Techniques specific to the conducting of choral ensembles: warm-ups, breathing, balance, blend, choral tone, isolation principles, recitative conducting, preparation, and conducting of choral/orchestral works. Prerequisite: 130A.
3 units, alternate years, not given this year

MUSIC 140. Studies in Medieval Music
(Same as MUSIC 240) Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, Aut (Mahrt, W)

MUSIC 141. Studies in Renaissance Music
(Same as MUSIC 241) Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, Win (Rodin, J)

MUSIC 142. Studies in Baroque Music
(Same as MUSIC 242) Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, Spr (Hadlock, H)

MUSIC 143. Studies in Classic Music
(Same as MUSIC 243) Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, not given this year

MUSIC 144. Studies in Romantic Music
(Same as MUSIC 244) Prerequisites: MUSIC 23, MUSIC 42 (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, not given this year

MUSIC 145. Studies in Modern Music
(Same as MUSIC 245) Prerequisites: MUSIC 23, MUSIC 42. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, not given this year

MUSIC 146. Music and Urban Film
(Same as MUSIC 246) How music and sound work in urban cinema. What happens when music's capacity to transform everyday reality combines with the realism of urban films? Provides an introduction to traditional theories of film music and film sound; considers how new technologies and practices have changed the roles of music in film. Readings discuss film music, realistic cinema, urban musical practices and urban culture. Viewing includes action/adventure, Hindi film, documentary, film noir, hip hop film, the musical, and borderline cases by Jean-Luc Godard, Spike Lee, Wong Kar-Wai and Tsai Ming-Liang. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4 unit level only.) GER:DB-Hum, EC-GlobalCom
3-4 units, Spr (Kronengold, C)

MUSIC 147. The Soul Tradition in African American Music
(Same as MUSIC 247) The African American tradition of soul music from its origins in blues, gospel, and jazz to its influence on today's r&b, hip hop, and dance music. Style such as rhythm and blues, Motown, Southern soul, funk, Philadelphia soul, disco, Chicago house, Detroit techno, trip hop, and neo-soul. Soul's cultural influence and global reach; its interaction with politics, gender, place, technology, and the economy. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4 units only.) GER:DB-Hum, EC-AmerCul
3-4 units, Win (Kronengold, C)

MUSIC 148. Musical Shakespeare: Theater, Song, Opera, and Film
(Same as MUSIC 248) The role of music in productions, adaptations, and interpretations of Shakespeare's plays as theater, opera, and film from the Elizabethan era through the present. Emphasis is on the role of songs, stage music, and music in operatic and film adaptations. Incidental music, orchestral tone poems, and art-song settings of lyrics from the plays. Plays include Romeo and Juliet, Othello, Macbeth, Hamlet, The Tempest, Midsummer Night's Dream, and Twelfth Night. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.) GER:DB-Hum
3-5 units, not given this year

MUSIC 149. Reactions to the Record: Early Recordings, Lost Styles, and Music's Future
(Same as MUSIC 249) Seminar. The transformation of musical style, audience expectations, the composer-performer relationship, and the musical score from the late 1800s to the present. Sources include: recordings from Stanford's Archive of Recorded Sound; recordings of (Brahms, Debussy, Rachmaninoff, Saint-Saëns, Prokofiev, Bartók; concert programs; interviews; and reviews. Readings include Hamilton's After the Golden Age and Philip's Performing Music in the Age of Recording. Emphasis is on voice, strings, piano, chamber music, and orchestra. Guest residencies in conjunction with January 2009 symposium; see http://music.stanford.edu/Events/StanfordMusicSymposium/. May be repeated for credit. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4-unit level only.) GER:DB-Hum
3-4 units, not given this year

MUSIC 150. Musical Acoustics
The physics of vibrating systems, waves, and wave motion. Time- and frequency-domain analysis of sound. Room acoustics, reverberation, and spatialization. The acoustics of musical instruments: voice, strings, and winds. Emphasis is on the practical aspects of acoustics in making music. Hands-on and computer-based lab. See http://ccrma.stanford.edu/courses/150/. Prerequisites: music performance/composition experience, basic algebra, calculus, and physics. GER:DB-EngrAppSci
3 units, Spr (Rossing, T)

MUSIC 150G. Wagnerian Echos: A Cultural History from Modernism to Popular Culture
(Same as GERGEN 161) The afterlives of mythological themes from the operas and music dramas of Richard Wagner (The Flying Dutchman, Tannhäuser, Lohengrin, Ring Cycle, Parsifal) in literature, modernist aesthetics, fascist politics, film, philosophy, and contemporary media. GER:DB-Hum
3-5 units, Spr (Daub, A; Grey, T)

MUSIC 154. Composition and Performance of Instrumental Music with Electronics
Aesthetic and analytical issues from the pioneers of Musique Concrete to the electro of the 2000's. Electroacoustic scholarship over the past 60 years discussing problems and development of the genre. Emphasis on listening, writing, tools development, space, serendipity, concert ritual, interdisciplinarity, relationship with other styles of music, gesture, and sound/image. Considered composers include: Schaeffer, Henry, Varese, Xenakis, Stockahausen, Messiaen, Boulez, Ferrari, Risset, Berio, Chowning, Parmegiani, Bayle, Chion, Dhomont. Focus on one or a few works leading to a public performance at the end of the quarter. Prerequisite: experience in analysis of contemporary music and in electronic music. May be repeated for credit once.
1-5 units, Spr (Ruviaro, B)

MUSIC 155. Intermedia Workshop
(Same as ARTSTUDI 139) Students develop and produce intermedia works. Musical and visual approaches to the conceptualisation and shaping of time-based art. Exploration of sound and image relationship. Study of a wide spectrum of audiovisual practices including experimental animation, video art, dance, performance, non-narrative forms, interactive art and installation art. Focus on works that use music/sound and image as equal partners. Limited enrollment. Prerequisites: consent of instructors, and one of FILMPROD 114, ARTSTUDI 131, 138, 167, 177, 179, or MUSIC 123, or equivalent.
3-4 units, Spr (Kapuscinski, J; DeMarinis, P)

MUSIC 156. "sic": Improvisation Collective
Small ensemble devoted to learning trans-idiomatic improvisation techniques and composing indeterminate pieces in a workshop setting. One major concert. Prerequisite: access to an instrument. Improvisational experience and conventional instrumental virtuosity not required. May be repeated for credit for a total of 3 times.
1 unit, Win (Applebaum, M)

MUSIC 157. Introduction to Mariachi Ensemble
Introduction to the practice of mariachi music, tradition, and history. Focus is on learning traditional sones, rancheras, huapangos, and boleros. Requirements: ability to play and access to instruments (violin, trumpet, guitar, vihuela, and guitarron). May be repeated for credit.
1 unit, Aut (Clark, J), Win (Clark, J), Spr (Clark, J)

MUSIC 158. Soundwire Ensemble
Stanford's Internet2-based Soundwire Ensemble rehearses with the East Coast Tintinnabulate Ensemble directed by Pauline Oliveros, Rensselaer Polytechnic Institute. Concerts, composition, and improvisation projects using resources available when connecting with remote musicians. State-of-the-art audio and video technology developed by ensemble participants. May be repeated for credit.
2-3 units, not given this year

MUSIC 159. Early Music Singers
Small choir specializing in Medieval, Renaissance, and early Baroque vocal music. One major concert per quarter. May be repeated for credit for a total of 14 times.
1 unit, Aut (Mahrt, W), Win (Mahrt, W), Spr (Mahrt, W)

MUSIC 160. Stanford Symphony Orchestra
70- to 100-member ensemble performing major orchestral works; minimum one concert per quarter. May be repeated for credit a total of 14 times.
1 unit, Aut (Staff), Win (Cai, J), Spr (Cai, J)

MUSIC 160A. Stanford Philharmonia Orchestra
Prerequisite: audition, one year of 160, or consent of instructor. May be repeated for credit.
1 unit, Aut (Staff), Win (Cai, J), Spr (Cai, J)

MUSIC 160B. Stanford New Ensemble
Performing compositions of the 20th century, recent works of this century, and new works by Stanford faculty and student composers. Musicians collaborate with composers and artists visiting and performing at Stanford. One concert per quarter. May be repeated for credit.
1 unit, Aut (Staff), Win (Cai, J), Spr (Cai, J)

MUSIC 160S. Summer Orchestra
50- to 100-member ensemble performing major orchestral works. Program: Zoltan Kodaly, Dances of Galanta; Joaquin Rodrigo, Fantasia para un Gentilhombre; featuring Charles Ferguson in guitar; Ludwig van Beethoven, Symphony no.3 in E-flat major Op. 55 ""Heroic""; Auditions of ten minutes each on June 21, 22, 23 and 24 from 4:00 to 8:00PM. Please, visit http://sso.stanford.edu/audtions/ for sign-up. See http://music.stanford.edu/Ensembles/SummerSSO.html for additional information. Questions: Contact Martín Fraile, music director and conductor at: mailto:mfraile@stanford.edu. May be repeated for credit.

1 unit, Sum (Fraile, M)

MUSIC 161A. Stanford Wind Ensemble
40- to 50-member ensemble performing transcriptions of symphonic music, brass band music, and repertoire composed specifically for symphonic band. One concert per quarter. May be repeated for credit a total of 14 times.

1 unit, Aut (Aquilanti, G), Win (Aquilanti, G), Spr (Aquilanti, G)

MUSIC 161B. Jazz Orchestra
Big band format. Repertoire drawn primarily from the contemporary jazz-ensemble literature. One formal concert per quarter. May be repeated for credit a total of 14 times.

1 unit, Aut (Berry, F), Win (Berry, F), Spr (Berry, F)

MUSIC 161C. Red Vest Band
A small ensemble of the Leland Stanford Junior University Marching Band open to members of the LSJUMB by audition and consent of instructor. Members perform at all men's and women's home basketball games and travel to some away and post-season games. Twice-weekly rehearsals focus on introduction of new student arrangements and the LSJUMB's repertoire of rock, funk, and traditional styles. May be repeated for credit a total of 7 times.

1 unit, Win (Aquilanti, G)

MUSIC 161D. Stanford Brass Ensemble
Performance of works for full brass choir and for smaller ensembles of brass instruments. Once weekly rehearsals. May be repeated for credit. Prerequisite: audition and consent of instructor.

1 unit, Aut (Kenley, M), Win (Kenley, M), Spr (Kenley, M)

MUSIC 162. Symphonic Chorus
100- to 150-voice ensemble, performing major choral masterworks with orchestra. One concert per quarter. May be repeated for credit a total of 14 times.

1 unit, Aut (Sano, S), Win (Sano, S), Spr (Sano, S)

MUSIC 163. Memorial Church Choir
Official choir of Memorial Church, furnishing music for Sunday services and special occasions in the church calendar. May be repeated for credit a total of 14 times.

1 unit, Aut (Morgan, R), Win (Morgan, R), Spr (Morgan, R)

MUSIC 165. Chamber Chorale
Select 24-voice chamber ensemble, specializing in virtuoso choral repertoire from all periods of Western art music. May be repeated for credit a total of 14 times.

1 unit, Aut (Sano, S), Win (Sano, S), Spr (Sano, S)

MUSIC 167. University Singers
Mixed-repertory chorus, performing choral repertoire from all periods of Western art music and other world cultures. May be repeated for credit a total of 14 times.

1 unit, Aut (Morgan, R), Win (Morgan, R), Spr (Morgan, R)

MUSIC 167S. Summer Chorus
80-100 voice ensemble, performing major choral masterworks.

1 unit, Sum (Hunn, A)

MUSIC 169. Stanford Taiko
Select North American taiko ensemble, performing traditional and contemporary repertoire for Japanese drums. Multiple performances in Winter and Spring quarters, also touring; instrument construction and maintenance. Admission by audition in Autumn Quarter only. May be repeated for credit a total of 14 times.

1 unit, Aut (Sano, S; Uyechi, L), Win (Sano, S; Uyechi, L), Spr (Sano, S; Uyechi, L)

MUSIC 170. Collaborative Piano
Performance class in a workshop setting. Techniques of collaboration with vocalists and instrumentalists in repertoire ranging from songs and arias to sonatas and concertos. Prerequisite: private-lesson proficiency level in piano, or consent of instructor.

1 unit, Aut (Dahl, L)

MUSIC 171. Chamber Music
Audition required. Weekly one-hour coachings from Music department faculty. Classical string quartets and piano/string groups are supervised by the St. Lawrence String Quartet and require attendance at a weekly Wednesday 4:15 p.m. master class. May be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 172A. Piano
Private lessons and group master class weekly. May be repeated for credit a total of 14 times.

1-3 units, Aut (Barth, G), Win (Barth, G), Spr (Barth, G)

MUSIC 172B. Organ
May be repeated for credit a total of 14 times.

1-3 units, Aut (Morgan, R), Win (Morgan, R), Spr (Morgan, R)

MUSIC 172C. Harpsichord
May be repeated for credit a total of 14 times.

1-3 units, Aut (Thornburgh, E), Win (Thornburgh, E), Spr (Thornburgh, E)

MUSIC 172D. Jazz Piano
By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times.

1-3 units, Aut (Low, M), Win (Low, M), Spr (Low, M)

MUSIC 172E. Fortepiano
May be repeated for credit a total of 14 times.

1-3 units, Aut (Barth, G), Win (Barth, G), Spr (Barth, G)

MUSIC 172F. Carillon
May be repeated for credit a total of 14 times.

1-3 units, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T)

MUSIC 173. Voice
May be repeated for credit a total of 14 times.

1-3 units, Aut (Giovannetti, C), Win (Giovannetti, C), Spr (Giovannetti, C)

MUSIC 174A. Violin
May be repeated for credit a total of 14 times.

1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 174B. Viola
May be repeated for credit a total of 14 times.

1-3 units, Aut (Robertson, L), Win (Robertson, L), Spr (Robertson, L)

MUSIC 174C. Violoncello
May be repeated for credit a total of 14 times.

1-3 units, Aut (Harrison, S), Win (Harrison, S), Spr (Harrison, S)

MUSIC 174D. Contrabass
May be repeated for credit a total of 14 times.

1-3 units, Aut (Moyer, B), Win (Moyer, B), Spr (Moyer, B)

MUSIC 174E. Viola Da Gamba
May be repeated for credit a total of 14 times.

1-3 units, Aut (Dornenburg, J), Win (Dornenburg, J), Spr (Dornenburg, J)

MUSIC 174F. Classical Guitar
May be repeated for credit a total of 14 times.

1-3 units, Aut (Ferguson, C), Win (Ferguson, C), Spr (Ferguson, C)

MUSIC 174G. Harp
May be repeated for credit a total of 14 times.

1-3 units, Aut (Chauvel, M), Win (Chauvel, M), Spr (Chauvel, M)

MUSIC 174H. Baroque Violin
May be repeated for credit a total of 14 times.

1-3 units, Aut (Martin, A), Win (Martin, A), Spr (Martin, A)

MUSIC 174I. Jazz Bass

1-3 units, Aut (McCain, J), Win (McCain, J), Spr (McCain, J)

MUSIC 174J. Jazz Guitar
Individual lessons in jazz guitar.

1-3 units, Aut (Vandivier, R), Win (Vandivier, R), Spr (Vandivier, R)

MUSIC 175A. Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Hawley, A), Win (Hawley, A), Spr (Hawley, A)

MUSIC 175B. Oboe
May be repeated for credit a total of 14 times.
1-3 units, Aut (Hubbard, R), Win (Matheson, J), Spr (Matheson, J)

MUSIC 175C. Clarinet
May be repeated for credit a total of 14 times.
1-3 units, Aut (Brandenburg, M), Win (Brandenburg, M), Spr (Brandenburg, M)

MUSIC 175D. Bassoon
May be repeated for credit a total of 14 times.
1-3 units, Aut (Olivier, R), Win (Olivier, R), Spr (Olivier, R)

MUSIC 175E. Recorder/Renaissance Wind Instruments
May be repeated for credit a total of 14 times.
1-3 units, Aut (Myers, H), Win (Myers, H), Spr (Myers, H)

MUSIC 175F. Saxophone
May be repeated for credit a total of 14 times.
1-3 units, Aut (McCarthy, C), Win (McCarthy, C), Spr (McCarthy, C)

MUSIC 175G. Baroque Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 176A. French Horn
May be repeated for credit a total of 14 times.
1-3 units, Aut (Ragent, L), Win (Ragent, L), Spr (Ragent, L)

MUSIC 176B. Trumpet
May be repeated for credit a total of 14 times.
1-3 units, Aut (Johnson-Hamilton, J), Win (Johnson-Hamilton, J), Spr (Johnson-Hamilton, J)

MUSIC 176C. Trombone
May be repeated for credit a total of 14 times.
1-3 units, Aut (Kenley, M), Win (Kenley, M), Spr (Kenley, M)

MUSIC 176D. Tuba
May be repeated for credit a total of 14 times.
1-3 units, Aut (Clements, A), Win (Clements, A), Spr (Clements, A)

MUSIC 177. Percussion
May be repeated for credit a total of 14 times.
1-3 units, Aut (Veregge, M), Win (Veregge, M), Spr (Veregge, M)

MUSIC 182. Diction for Singers
The international phonetic alphabet and its application to German, French, and Italian vocal literature. Open also to pianists interested in vocal coaching and choral conducting.
1 unit, Win (Dahl, L)

MUSIC 183A. German Art Song Interpretation
Including composers from Beethoven and Schubert to Wolf and Strauss. for advanced singers and pianists as partners. Performance class in a workshop setting. Prerequisite: consent of instructor. Recommended: 170 for pianists or 182 for singers. May be repeated for credit a total of 2 times.
1 unit, not given this year

MUSIC 183B. French Art Song Interpretation
Composers include Fauré, Debussy, Ravel, and Poulenc. For advanced singers and pianists as partners. Performance class in a workshop setting. May be repeated for credit a total of 2 times. Prerequisite: consent of instructor. Recommended: 170 for pianists or 182 for singers.
1 unit, Spr (Dahl, L)

MUSIC 184. Vocal Repertory Workshop
A practical workshop in vocal repertoire. Each quarter's offering emphasizes a specific genre or period, therefore the course can be repeated with consent of instructor. In addition to broadening the student's knowledge of vocal repertoire, the following skills are developed: text preparation, foreign language translation and diction; historically informed performance practice; editorial practice through comparison or preparation; rehearsal for performance and/or recording. Prerequisite: vocal or instrumental instruction, as the class is open to singers or collaborative artists.
1-3 units, Aut (Catsalis, M), Win (Catsalis, M), Spr (Catsalis)

MUSIC 192A. Foundations of Sound-Recording Technology
For upper division undergraduates and graduate students; preference given to Music majors with MST specialization. Topics: elementary electronics; the physics of sound transduction and microphone operation, selection, and placement; mixing consoles; connectors and device interconnection; grounding and shielding; principles of analog magnetic recording; operation maintenance of recording equipment; and principles of recording engineering. Enrollment limited. Prerequisites: algebra, physics basics, and consent of instructor. GER:DB-EngrAppSci
3 units, Aut (Kadis, J)

MUSIC 192B. Advanced Sound Recording Technology
Topics: noise reduction techniques; dynamics and time-delay audio effects; the principles of digital audio; disk- and tape-based digital recorders; digital audio workstations and editing; advanced multitrack techniques; SMPTE and MIDI time code and device synchronization; MIDI sequencing and synchronization. See http://ccrma.stanford.edu/courses/. Prerequisite: 192A. GER:DB-EngrAppSci, DB-Hum
3 units, Win (Kadis, J)

MUSIC 192C. Session Recording
Independent engineering of recording sessions. May be repeated for credit a total of 14 times. Prerequisites: 192A,B.
1-2 units, Aut (Kadis, J), Win (Kadis, J), Spr (Kadis, J)

MUSIC 197. Undergraduate Teaching Apprenticeship
Work in an apprentice-like relationship with faculty teaching a student-initiated course. Prerequisite: consent of instructor. (Staff)
1-2 units, Aut (Staff), Win (Sano, S), Spr (Sano, S)

MUSIC 198. Concentrations Project
For concentration program participants only. Must be taken in senior year.
4 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 199. Independent Study
For advanced undergraduates and graduate students who wish to do work outside the regular curriculum. Before registering, student must present specific project and enlist a faculty sponsor. May be repeated for credit a total of 14 times.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 201. CCRMA Colloquium
Weekly review of work being done in the field, research taking palce at CCRMA, and tools to make the most of the CCRMA technical facilities.
1 unit, Aut (Leitman, S; Wilkerson, C)

MUSIC 222. Sound in Space
Historical background, techniques and theory on the use of space in music composition and diffusion. Listening and analysis of relevant pieces. Experimental work in spatialization techniques leading to short studies to be diffused in concert at the end of the quarter.
1-4 units, Spr (Lopez-Lezcano, F)

MUSIC 251. Psychophysics and Music Cognition
Lecture, lab and experiment-based course in perception, psychoacoustics, cognition, and neuroscience of music. (WIM at 4 or 5 units only.) GER:DB-Hum, WIM
1-5 units, Win (Berger, J)

MUSIC 252. Music Notation Software: An Introduction
Learn to use music notation programs Finale®, Sibelius® and open-source alternatives.
1-2 units, Aut (Selfridge-Field, E)

GRADUATE COURSES IN MUSIC

Primarily for graduate students; undergraduates may enroll with consent of instructor.

MUSIC 200. Graduate Proseminar
Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, philosophy, and methods in music history. Guest lecturers and individual research topics.
3-4 units, Aut (Berger, K; McBride, J)

MUSIC 220A. Fundamentals of Computer-Generated Sound
Techniques for digital sound synthesis, effects, and reverberation. Topics: summary of digital synthesis techniques (additive, subtractive, nonlinear, wavetable, spectral-modeling, and physical-modeling); digital effects algorithms (phasing, flanging, chorus,

pitch-shifting, and vocoding); and techniques for digital reverberation. Majors (undergraduate or graduate) must take for 4 units. See http://ccrma.stanford.edu/.

2-4 units, Aut (Chafe, C)

MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Computational Music

The use of high-level programming language as a compositional aid in creating musical structures. Advanced study of sound synthesis techniques. Simulation of a reverberant space and control of the position of sound within the space. See http://ccrma.stanford.edu/. Prerequisite: 220A.

2-4 units, Win (Wang, G)

MUSIC 220C. Research Seminar in Computer-Generated Music

Individual projects in composition, psychoacoustics, or signal processing. See http://ccrma.stanford.edu. May be repeated for credit. Prerequisite: 220B.

2-4 units, Spr (Chafe, C)

MUSIC 220D. Research in Computer-Generated Music

Independent research projects in composition, psychoacoustics, or signal processing. See http://ccrma.stanford.edu/. May be repeated for credit. Prerequisite: 220C.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 221. Topics in the History of Theory

The intersection of music theory and compositional practice in different eras of Western music history. Primary sources in music theory and issues such as notation, rhythm, mode, dissonance treatment, counterpoint, tonality, form, rhetoric, affect and imitation, expression, linear analysis, 12-tone and set theory, in light of relevant repertoire and modern scholarship. May be repeated for credit a total of 5 times.

3-5 units, Win (Staff), alternate years, not given next year

MUSIC 223. Composition for Electronic Musicians

Composition for any combination of acoustic and electroacoustic instrumentation, computer-generated sound, invented instruments, sound-sculptures, and multi-disciplinary elements including theater and visual media. Project-based laboratory to advance original student works, supported by lectures on the fundamentals of composition. Concert performance of final works. Taught at CCRMA with a focus on engendering deliberate conversation on the enrichment of a cultural context for new media. Open to undergraduates and graduates.

1-4 units, not given this year

MUSIC 230. Advanced Orchestral Conducting

May be repeated for credit a total of 8 times. Prerequisite: 130B.

2-4 units, Aut (Staff), Win (Cai, J), Spr (Cai, J)

MUSIC 231. Advanced Choral Conducting

May be repeated for credit a total of 8 times. Prerequisite: 130C.

2-4 units, Aut (Sano, S), Win (Sano, S), Spr (Sano, S)

MUSIC 240. Studies in Medieval Music

(Same as MUSIC 140) Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.)

3-4 units, Aut (Mahrt, W)

MUSIC 241. Studies in Renaissance Music

(Same as MUSIC 141) Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.)

3-4 units, Win (Rodin, J)

MUSIC 242. Studies in Baroque Music

(Same as MUSIC 142) Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.)

3-4 units, Spr (Hadlock, H)

MUSIC 243. Studies in Classic Music

(Same as MUSIC 143) Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.)

3-4 units, not given this year

MUSIC 244. Studies in Romantic Music

(Same as MUSIC 144) Prerequisites: MUSIC 23, MUSIC 42 (WIM at 4-unit level only.)

3-4 units, not given this year

MUSIC 245. Studies in Modern Music

(Same as MUSIC 145) Prerequisites: MUSIC 23, MUSIC 42. (WIM at 4-unit level only.)

3-4 units, not given this year

MUSIC 246. Music and Urban Film

(Same as MUSIC 146) How music and sound work in urban cinema. What happens when music's capacity to transform everyday reality combines with the realism of urban films? Provides an introduction to traditional theories of film music and film sound; considers how new technologies and practices have changed the roles of music in film. Readings discuss film music, realistic cinema, urban musical practices and urban culture. Viewing includes action/adventure, Hindi film, documentary, film noir, hip hop film, the musical, and borderline cases by Jean-Luc Godard, Spike Lee, Wong Kar-Wai and Tsai Ming-Liang. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4 unit level only.)

3-4 units, Spr (Kronengold, C)

MUSIC 247. The Soul Tradition in African American Music

(Same as MUSIC 147) The African American tradition of soul music from its origins in blues, gospel, and jazz to its influence on today's r&b, hip hop, and dance music. Style such as rhythm and blues, Motown, Southern soul, funk, Philadelphia soul, disco, Chicago house, Detroit techno, trip hop, and neo-soul. Soul's cultural influence and global reach; its interaction with politics, gender, place, technology, and the economy. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4 units only.)

3-4 units, Win (Kronengold, C)

MUSIC 248. Musical Shakespeare: Theater, Song, Opera, and Film

(Same as MUSIC 148) The role of music in productions, adaptations, and interpretations of Shakespeare's plays as theater, opera, and film from the Elizabethan era through the present. Emphasis is on the role of songs, stage music, and music in operatic and film adaptations. Incidental music, orchestral tone poems, and art-song settings of lyrics from the plays. Plays include Romeo and Juliet, Othello, Macbeth, Hamlet, The Tempest, Midsummer Night's Dream, and Twelfth Night. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.)

3-5 units, not given this year

MUSIC 249. Reactions to the Record: Early Recordings, Lost Styles, and Music's Future

(Same as MUSIC 149) Seminar. The transformation of musical style, audience expectations, the composer-performer relationship, and the musical score from the late 1800s to the present. Sources include: recordings from Stanford's Archive of Recorded Sound; recordings of (Brahms, Debussy, Rachmaninoff, Saint-Saëns, Prokofiev, Bartók; concert programs; interviews; and reviews. Readings include Hamilton's After the Golden Age and Philip's Performing Music in the Age of Recording. Emphasis is on voice, strings, piano, chamber music, and orchestra. Guest residencies in conjunction with January 2009 symposium; see http://music.stanford.edu/Events/StanfordMusicSymposium/. May be repeated for credit. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4-unit level only.)

3-4 units, not given this year

MUSIC 250A. HCI Theory and Practice

HCI issues as they relate to music applications in composition and performance. Project-oriented, examining issues from the technical and theoretical perspectives of computer science, haptics, and music theory. See http://ccrma.stanford.edu/.

3-4 units, Aut (Ju, W; Berdahl, E)

MUSIC 250B. HCI Performance Systems

Continuation of 250A, concentrating on interactive computer-music performance systems. See http://ccrma.stanford.edu/courses/250b/. Prerequisite: 250A.

1-4 units, Win (Leitman, S; Wilkerson, C)

MUSIC 253. Music Notation and Representation Software

Focus on symbolic data for music applications including advanced notation systems, optical music recognition, musical data conversion, and internal structure of MIDI files.

2-4 units, Win (Selfridge-Field, E)

MUSIC 254. Symbolic Music Analysis and Retrieval
Leveraging off three synchronized sets of symbolic data resources for notation and analysis, the lab portion introduces students to the open-source Humdrum Toolkit for music representation and analysis. Issues of data content and quality as well as methods of information retrieval, visualization, and summarization are considered in class. Grading based primarily on student projects. Prerequisite: 253 or consent of instructor.
2-4 units, Spr (Selfridge-Field, E)

MUSIC 256A. Music, Computing, and Design I: Software Paradigms for Computer Music
(Same as CS 476A) Software design and implementation for computer audio. Strategies, best practices, and tradeoffs in building audio software systems of various sizes (S, M, L, XL), with a focus on interactive (real-time) systems. Lectures examine high-level designs as well as dissect code in a hands-on manner. Course work includes small programming assignments and a final software project. This course is the prerequisite for MUSIC 256B. Prerequisite: experience in C/C++ and/or Java.
1-4 units, Aut (Wang, G)

MUSIC 256B. Mobile Music
(Same as CS 476B) Aesthetic, design, and implementation of mobile music, centered around the modern super smartphones such as the iPhone). Similarities and intrinsic differences between mobile and traditional computing and design for music. Topics include mobile software design, social and cloud computing, mobile interface design, and programming phones, in the service of music. Prerequisite: MUSIC 256A.
1-4 units, Win (Wang, G)

MUSIC 260. Music of South Asia
Focuses on the history, theory, and practice of South Asian music with particular emphasis on the classical traditions of North and South India. Also addresses regional folk, popular, and devotional musical styles of India, Pakistan, and Afghanistan. Topics include: raga, tala, vocal and instrumental genres, improvisation, aesthetics, music transmission, musical nationalism, social organization of musicians, music and ritual, music and gender, and technology. Lecture with discussion, some singing (no experience necessary), guest performances, reading, listening, and analysis.
3-4 units, Spr (Schultz, A)

MUSIC 269. Research in Performance Practices
Directed reading and research. May be repeated for credit a total of 5 times.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 272A. Advanced Piano
Private lessons and group masterclass weekly. May be repeated for credit a total of 14 times.
1-3 units, Aut (Barth, G), Win (Barth, G), Spr (Barth, G)

MUSIC 272B. Advanced Organ
May be repeated for credit a total of 14 times.
1-3 units, Aut (Morgan, R), Win (Morgan, R), Spr (Morgan, R)

MUSIC 272C. Advanced Harpsichord
May be repeated for credit a total of 14 times.
1-3 units, Aut (Thornburgh, E), Win (Thornburgh, E), Spr (Thornburgh, E)

MUSIC 272D. Advanced Jazz Piano
By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times.
1-3 units, Aut (Low, M), Win (Low, M), Spr (Low, M)

MUSIC 272E. Advanced Fortepiano
May be repeated for credit a total of 14 times.
1-3 units, Aut (Barth, G), Win (Barth, G), Spr (Barth, G)

MUSIC 272F. Advanced Carillon
May be repeated for credit a total of 14 times.
1-3 units, Aut (Zerlang, T), Win (Zerlang, T), Spr (Zerlang, T)

MUSIC 273. Advanced Voice
May be repeated for credit.
1-3 units, Aut (Giovannetti, C), Win (Giovannetti, C), Spr (Giovannetti, C)

MUSIC 274A. Advanced Violin
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 274B. Advanced Viola
May be repeated for credit a total of 14 times.
1-3 units, Aut (Robertson, L), Win (Robertson, L), Spr (Robertson, L)

MUSIC 274C. Advanced Violoncello
May be repeated for credit a total of 14 times.
1-3 units, Aut (Harrison, S), Win (Harrison, S), Spr (Harrison, S)

MUSIC 274D. Advanced Contrabass
May be repeated for credit a total of 14 times.
1-3 units, Aut (Moyer, B), Win (Moyer, B), Spr (Moyer, B)

MUSIC 274E. Advanced Viola da Gamba
May be repeated for credit a total of 14 times.
1-3 units, Aut (Dornenburg, J), Win (Dornenburg, J), Spr (Dornenburg, J)

MUSIC 274F. Advanced Classical Guitar
May be repeated for credit a total of 14 times.
1-3 units, Aut (Ferguson, C), Win (Ferguson, C), Spr (Ferguson, C)

MUSIC 274G. Advanced Harp
May be repeated for credit a total of 14 times.
1-3 units, Aut (Chauvel, M), Win (Chauvel, M), Spr (Chauvel, M)

MUSIC 274H. Advanced Baroque Violin
May be repeated for credit a total of 14 times.
1-3 units, Aut (Martin, A), Win (Martin, A), Spr (Martin, A)

MUSIC 274I. Advanced Jazz Bass
1-3 units, Aut (McCain, J), Win (McCain, J), Spr (McCain, J)

MUSIC 274J. Advanced Jazz Guitar
Individual lessons in jazz guitar
1-3 units, Aut (Vandivier, R), Win (Vandivier, R), Spr (Vandivier, R)

MUSIC 275A. Advanced Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Hawley, A), Win (Hawley, A), Spr (Hawley, A)

MUSIC 275B. Advanced Oboe
May be repeated for credit a total of 14 times.
1-3 units, Aut (Hubbard, R), Win (Matheson, J), Spr (Matheson, J)

MUSIC 275C. Advanced Clarinet
May be repeated for credit a total of 14 times.
1-3 units, Aut (Brandenburg, M), Win (Brandenburg, M), Spr (Brandenburg, M)

MUSIC 275D. Advanced Bassoon
May be repeated for credit a total of 14 times.
1-3 units, Aut (Olivier, R), Win (Olivier, R), Spr (Olivier, R)

MUSIC 275E. Advanced Recorder/Renaissance Wind Instruments
May be repeated for credit a total of 14 times.
1-3 units, Aut (Myers, H), Win (Myers, H), Spr (Myers, H)

MUSIC 275F. Advanced Saxophone
May be repeated for credit a total of 14 times.
1-3 units, Aut (McCarthy, C), Win (McCarthy, C), Spr (McCarthy, C)

MUSIC 275G. Advanced Baroque Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 276A. Advanced French Horn
May be repeated for credit a total of 14 times.
1-3 units, Aut (Ragent, L), Win (Ragent, L), Spr (Ragent, L)

MUSIC 276B. Advanced Trumpet
May be repeated for credit a total of 14 times.
1-3 units, Aut (Johnson-Hamilton, J), Win (Johnson-Hamilton, J), Spr (Johnson-Hamilton, J)

MUSIC 276C. Advanced Trombone
May be repeated for credit a total of 14 times.
1-3 units, Aut (Kenley, M), Win (Kenley, M), Spr (Kenley, M)

MUSIC 276D. Advanced Tuba
May be repeated for credit a total of 14 times.
1-3 units, Aut (Clements, A), Win (Clements, A), Spr (Clements, A)

MUSIC 277. Advanced Percussion
May be repeated for credit a total of 14 times.
1-3 units, Aut (Veregge, M), Win (Veregge, M), Spr (Veregge, M)

MUSIC 280. TA Training Course
Required for doctoral students serving as teaching assistants. Orientation to resources at Stanford, guest presentations on the principles of common teaching activities, supervised teaching experience. Students who entered in the Autumn should take 280 in the Spring prior to the Autumn they begin teaching.
1 unit, Spr (Saiki, J; Ricciardi, E)

MUSIC 300A. Medieval Notation
Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.
4 units, Aut (Mahrt, W)

MUSIC 300B. Renaissance Notation
Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.
4 units, alternate years, not given this year

MUSIC 301A. Analysis of Music: Modal
4 units, Win (Mahrt, W)

MUSIC 301B. Analysis of Music: Tonal
4 units, Aut (Grey, T)

MUSIC 301C. Analysis of Music: Post-Tonal
Current analytical trends, issues, and methods.
4 units, Spr (Ferneyhough, B)

MUSIC 302. Research in Musicology
Directed reading and research. May be repeated for credit a total of 14 times.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 310. Research Seminar in Musicology
For graduate students. Topics vary each quarter. May be repeated for credit a total of 8 times.
3-5 units, Aut (Kronengold, C), Win (Schultz, A), Spr (Rodin, J)

MUSIC 312A. Aesthetics and Criticism of Music, Ancients and Moderns: Plato to Nietzsche
For graduate students. Primary texts focusing on the nature, purposes, and uses of music and other arts.
4 units, Win (Berger, K)

MUSIC 312B. Aesthetics and Criticism of Music, Contemporaries: Heidegger to Today
For graduate students. Primary texts focusing on the nature, purposes, and uses of music and other arts.
4 units, Spr (Berger, K)

MUSIC 318. Advanced Acoustics
Current topics. May be repeated for credit.
1-5 units, not given this year

MUSIC 319. Research Seminar on Computational Models of Sound Perception
All aspects of auditory perception, often with emphasis on computational models. Topics: music perception, signal processing, auditory models, pitch perception, speech, binaural hearing, auditory scene analysis, basic psychoacoustics, and neurophysiology. See http://ccrma.stanford.edu/courses/. May be repeated for credit a total of 14 times.
1-3 units, Aut (Slaney, M), Win (Slaney, M), Spr (Slaney, M)

MUSIC 320. Introduction to Digital Audio Signal Processing
Digital signal processing for music and audio research. Topics: complex numbers, sinusoids, spectrum representation, sampling and aliasing, digital filters, frequency response, z transforms, transfer-function analysis, and associated Matlab software. See http://ccrma.stanford.edu/courses/320/.
3-4 units, Aut (Abel, J; Berners, D)

MUSIC 321. Readings in Music Theory
Directed reading and research. May be repeated for credit a total of 5 times.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 323. Doctoral Seminar in Composition
Illustrated discussions of compositional issues and techniques. Presentation of relevant topics, including students' own compositional practice. May be repeated for credit a total of 14 times.
3-4 units, Aut (Ferneyhough, B), Win (Berger, J), Spr (Kapuscinski, J)

MUSIC 325. Individual Graduate Projects in Composition
May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 341. Ph.D Dissertation
May be repeated for credit a total of 5 times.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 390. Practicum Internship
On-the-job training under the guidance of experienced, on-site supervisors. Meets the requirements for curricular practical training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. May be repeated for credit. Prerequisite: qualified offer of employment and consent of adviser.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 399. D.M.A. Final Project
May be repeated for credit a total of 5 times.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC 420A. Signal Processing Models in Musical Acoustics
Computational methods in musical sound synthesis and digital audio effects based on acoustic physical models. Topics: acoustic simulation with delay lines, digital filters, and nonlinear elements; comb filters; allpass filters; artificial reverberation; delay-line interpolation and sampling-rate conversion; phasing, flanging, and chorus effects; efficient computational models of strings, woodwinds, brasses, and other musical instruments. See http://ccrma.stanford.edu/courses/420/. Prerequisites: 320 or equivalent; PHYSICS 21 or equivalent course applying Newton's laws of motion; and CS 106B or equivalent programming in C and C++.
3-4 units, Win (Smith, J)

MUSIC 420B. Software for Sound Synthesis and Audio Effects
Preferred software embodiments for digital sound synthesis and audio effects. Topics: the Faust language for audio signal processing, effects programming, plugin generation for various platforms, software components for stringed and wind musical instruments, delay effects, variable filters, and nonlinear effects such as compression and distortion. The principal activity is a software project due at the end of the quarter. Prerequisite: MUSIC 420A or equivalent experience with audio signal processing in C++. Recommended corequisite: MUSIC 424.
1-10 units, Spr (Smith, J)

MUSIC 421. Audio Applications of the Fast Fourier Transform (FFT)
Spectrum analysis and signal processing using the FFT with emphasis on audio applications. Topics: Fourier theorems; FFT windows; spectrum analysis; spectrograms; sinusoidal modeling; spectral modeling synthesis; FFT convolution; FIR filter design and system identification; overlap-add and filter-bank-summation methods for short-time Fourier analysis, modification, and resynthesis. See http://ccrma.stanford.edu/courses/421/. Prerequisites: 420 or consent of instructor.
3-4 units, Spr (Smith, J)

MUSIC 422. Perceptual Audio Coding
History and basic principles: development of psychoacoustics-based data-compression techniques; perceptual-audio-coder applications (radio, television, film, multimedia/internet audio, DVD, EMD). In-class demonstrations: state-of-the-art audio coder implementations (such as AC-3, MPEG) at varying data rates; programming simple coders. Topics: audio signals representation; quantization; time to frequency mapping; introduction to psychoacoustics; bit allocation and basic building blocks of an audio codec; perceptual audio codecs evaluation; overview of MPEG-1, 2, 4 audio coding and other coding standards (such asAC-3). Prerequisites: knowledge of digital audio principles, familiarity with C programming. Recommended: 320, EE 261. See http://ccrma.stanford.edu/.
3 units, Win (Bosi-Goldberg, M)

MUSIC 423. Signal Processing Research
Graduate research seminar. Problems in music and/or audio signal processing. Presentation of research-in-progress by graduate students, visiting scholars, and CCRMA faculty. See http://ccrma.stanford.edu/courses/423/. May be repeated for credit a total of 11 times.
1-4 units, Aut (Abel, J; Berners, D)

MUSIC 424. Signal Processing Techniques for Digital Audio Effects
Techniques for dynamic range compression, reverberation, equalization and filtering, panning and spatialization, digital emulation of analog processors, and implementation of time-varying effects. Single-band and multiband compressors, limiters, noise gates, de-essers, convolutional reverberators, parametric and linear-phase equalizers, wah-wah and envelope-following filters, and the Leslie. Students develop effects algorithms of their own design in labs. Prerequisites: digital signal processing, sampling theorem, digital filtering, and the Fourier transform at the level of 320 or EE 261; Matlab and modest C programming experience. Recommended: 420 or EE 264; audio effects in mixing and mastering at the level of 192.
3-4 units, Spr (Berners, D; Abel, J)

NATIVE AMERICAN STUDIES (NATIVEAM) COURSES

UNDERGRADUATE COURSES IN NATIVE AMERICAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

NATIVEAM 25SI. Our Country, Our Way of Life: Indigenous Peoples and Environmental Justice
The struggles of indigenous peoples from Gwich'in to Alaska to the Ngai Tahu of Aotearoa (New Zealand) to protect their lands, resources, and ways of life from the desecreations and exploitations of colonialism and neocolonialism. Topics: self-determination, sovereignty, environmental justice, natural resource management, sacred geography protection, water rights, cultural survival, and intellectual property rights.
2 units, Win (Wilcox, M)

NATIVEAM 109A. Federal Indian Law
(Same as CSRE 109A) Cases, legislation, comparative justice models, and historical and cultural material. The interlocking relationships of tribal, federal, and state governments. Emphasis is on economic development, religious freedom, and environmental justice issues in Indian country.
5 units, Aut (Biestman, K)

NATIVEAM 117S. History of California Indians
(Same as CSRE 117S, HISTORY 250A) Demographic, political, and economic history of California Indians, 1700s-1950s. Processes and events leading to the destruction of California tribes, and their effects on the groups who survived. Geographic and cultural diversity. Spanish, Mexican, and Anglo-American periods. The mission system. GER:EC-AmerCul
5 units, Win (Shively, J)

NATIVEAM 120. Native American Writers, 1880-1920
(Same as CSRE 120) Hoxie's historical work provides a framework for analyzing what effects policies had on American Indian people. His work does not provide an American Indian perspective; he stated at the onset, that this was not an objective in this study. His main objective was to present a study that shows Indians' relations with whites as a clash of two complex cultures from a white point of view. Three American Indians writing during this time period provide the needed Indian perspective lacking in Hoxie's work.
5 units, Aut (Shaw, D)

NATIVEAM 143A. American Indian Mythology, Legend, and Lore
(Same as ENGLISH 43A, ENGLISH 143A) (English majors and others taking 5 units, register for 143A.)Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, Black Elk Speaks. GER:DB-Hum
3-5 units, Aut (Fields, K)

NATIVEAM 200R. Directed Research
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

NATIVEAM 200W. Directed Reading
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

NEUROBIOLOGY (NBIO) COURSES

UNDERGRADUATE COURSES IN NEUROBIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

NBIO 101. Social and Ethical Issues in the Neurosciences
(Same as NBIO 201) Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor.
2-4 units, Spr (Hurlbut, W; Newsome, W)

NBIO 198. Directed Reading in Neurobiology
Prerequisite: consent of instructor. (Staff)
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NBIO 199. Undergraduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN NEUROBIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

NBIO 201. Social and Ethical Issues in the Neurosciences
(Same as NBIO 101) Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor.
2-4 units, Spr (Hurlbut, W; Newsome, W)

NBIO 206. The Nervous System
Structure and function of the nervous system, including neuroanatomy, neurophysiology, and systems neurobiology. Topics include the properties of neurons and the mechanisms and organization underlying higher functions. Framework for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.
7-8 units, Win (Dolmetsch, R)

NBIO 216. Genetic Analysis of Behavior
(Same as MCP 216) Advanced seminar. Findings and implications of behavioral genetics as applied to invertebrate and vertebrate model systems. Topics include biological clocks, and sensation and central pattern generators. Relevant genetic techniques and historical perspective. Student presentation.
4 units, Win (Staff)

NBIO 218. Neural Basis of Behavior
Advanced seminar. The principles of information processing in the nervous system and the relationship of functional properties of neural systems with perception, behavior, and learning. Original papers; student presentations. Prerequisite: NBIO 206 or consent of instructor.

5 units, Spr (Knudsen, E; Raymond, J), alternate years, not given next year

NBIO 220. Central Mechanisms in Vision-based Cognition
Contemporary visual neuroscience, emphasizing the neural mechanisms underlying primate vision and visually guided behavior. Seven foundational topics in visual neuroscience; current papers concerning each topic. Student presentations. Computer-based demonstration exercises.

2-4 units, Spr (Staff)

NBIO 221. Frontiers in Translational Medicine
Small group course for first year MSTP and Master's in Medicine students only. Focus is on pathways for combining science and medicine during graduate and postdoctoral training and in one's career, and practical aspects of translational medicine. Guest lecturers are physician-scientists who have advanced the frontiers of translational medicine. Previous lecturers have included Drs. Gilbert Chu, Jamie Topper, Irv Weissman, Beverly Mitchell, Geoff Duyk, William Mobley, Judy Shizuru, and David Cox. Prerequisite: consent of instructor.

1 unit, Spr (Barres, B; Spulak, M)

NBIO 227. Understanding Techniques in Neuroscience
Techniques commonly used in the field of neuroscience, including molecular/genetic, electrophysiological, and whole brain imaging. Presentations by senior graduate students and examples from the literature. Optional laboratory demonstrations.

2 units, Aut (Pradhan, S; Adelson, J; Clark, K; Newsome, W)

NBIO 228. Mathematical Tools for Neuroscience
Student-instructed. For students with no math background beyond basic calculus, or as a review for more advanced students. Techniques useful for analysis of neural data including linear algebra, Fourier transforms, probability and statistics, signal detection, Bayesian inference, and information theory.

1-3 units, not given this year

NBIO 254. Molecular and Cellular Neurobiology
(Same as BIO 154, BIO 254) For advanced undergraduates and graduate students. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases. Satisfies Central Menu Areas 2 or 3. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors.

4-5 units, Aut (Clandinin, T; Luo, L; Shen, K), alternate years, not given next year

NBIO 258. Information and Signaling Mechanisms in Neurons and Circuits
(Same as MCP 258) How synapses, cells, and neural circuits process information relevant to a behaving organism. How phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.

4 units, not given this year

NBIO 299. Directed Reading in Neurobiology
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NBIO 300. Professional Development and Integrity in Neuroscience
Required of Neurosciences Ph.D. students every quarter. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature in the visual presentation of quantitative data and writing research grants. The role of animals in lab research, fraud in science, the responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions.

1-2 units, Aut (Moore, T), Win (Moore, T), Spr (Moore, T)

NBIO 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NBIO 399. Graduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEUROLOGY AND NEUROLOGICAL SCIENCES (NENS) COURSES

UNDERGRADUATE COURSES IN NEUROLOGY AND NEUROLOGICAL SCIENCES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

NENS 25SI. Discoveries and Debates in Neuroscience Research
Contradictory results and models in the accelerating field of neuroscience research. Critical examination of controversial topics: the genetic determination of intelligence, the neurobiolobical correlates of consciousness, adult neural stem cell function and therapeutic potential, interpretation of cognitive tests in animals, the origin of brain tumors, the biology of addiction, and gender differences in brain function and disease. How to analyze scientific experiments and models with a critical eye.

1 unit, Win (Duane, D)

NENS 67N. Intracellular Trafficking and Neurodegeneration
(Stanford Introductory Seminar) Preference to freshmen. Cell structures and functions, the intracellular trafficking system that maintains exchanges of materials and information inside cells, and clinical features and pathologies of neurodegenerative diseases. Techniques for examining cellular and subcellular structures, especially cytoskeletons; functional insights generated from structural explorations. Prerequisite: high school biology.

3 units, Spr (Yang, Y)

NENS 199. Undergraduate Research
Students undertake research sponsored by an individual faculty member. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN NEUROLOGY AND NEUROLOGICAL SCIENCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

NENS 202. Longevity
(Same as HUMBIO 149L, PSYCH 102) Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists.

4 units, given next year

NENS 204. Stroke Seminar
Standing at the intersection of many fields of medicine, including neurology, internal medicine, cerebrovascualr surgery, diagnostic and interventional radiology, and emergency medicine, as the third leading cause of death and the leading cause of disability, stroke is a critical topic for all practitioners of medicine. This seminar draws upon Stanford's leaders in stroke research to present and discuss the causes, presentation, treatment, and imaging characteristics of the disease.

1 unit, Win (Staff)

NENS 205. Neurobiology of Disease Seminar
Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic prin-

ciples underlying modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity. Prerequisite: Neurobiology 206 or consent of instructor.

3 units, Win (Staff)

NENS 206. Introduction to Neurology Seminar
Exploration of aspects of neurology, including subspecialties. Current issues, clinical cases, and opportunities in the field.

1 unit, Aut (Reimer, R; Jafari, A)

NENS 220. Computational Neuroscience
Computational approaches to neuroscience applied at levels ranging from neurons to networks. Addresses two central questions of neural computation: How do neurons compute; and how do networks of neurons encode/decode and store information? Focus is on biophysical (Hodgkin-Huxley) models of neurons and circuits, with emphasis on application of commonly available modeling tools (NEURON, MATLAB) to issues of neuronal and network excitability. Issues relevant to neural encoding and decoding, information theory, plasticity, and learning. Fundamental concepts of neuronal computation; discussion focus is on relevant literature examples of proper application of these techniques. Final project. Recommended for Neuroscience Program graduate students; open to graduate, medical, and advanced undergraduate students with consent of instructor. Prerequisite: NBIO 206. Recommended: facility with linear algebra and calculus.

4 units, Win (Staff)

NENS 267. Molecular Mechanisms of Neurodegenerative Disease
(Same as BIO 267) The epidemic of neurodegenerative disorders such as Alzheimer's and Parkinson's disease occasioned by an aging human population. Genetic, molecular, and cellular mechanisms. Clinical aspects through case presentations.

4 units, alternate years, not given this year

NENS 299. Directed Reading in Neurology and Neurological Science
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NENS 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NENS 399. Graduate Research
Students undertake research sponsored by individual faculty members. Includes laboratory work in neurophysiology and neurochemistry.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NENS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NENS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEUROSCIENCES PROGRAM (NEPR) COURSES

GRADUATE COURSES IN NEUROSCIENCES PROGRAM

NEPR 299. Directed Reading in Neurosciences
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEPR 399. Graduate Research
StudenInvestigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEPR 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEPR 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NEUROSURGERY (NSUR) COURSES

UNDERGRADUATE COURSES IN NEUROSURGERY

NSUR 70Q. Experimental Stroke
(Stanford Introductory Seminar) Preference to sophomores. How stroke is studied in the laboratory; advances in stroke research over the last two decades; and future directions. Topics include: cellular and molecular mechanisms of neuronal death and survival in the brain after stroke, including necrosis, apoptosis, inflammation, and cell signaling pathways; experimental tools for stroke treatment, such as gene therapy, cell therapy, hypothermia, preconditioning, postconditioning, and other pharmacological treatments; the gap and barrier between laboratory research and clinical translation.

2 units, Spr (Zhao, H)

NSUR 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN NEUROSURGERY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

NSUR 261. Principles and Practice of Stem Cell Engineering
(Same as BIOE 261) Quantitative models used to characterize incorporation of new cells into existing tissues emphasizing pluripotent cells such as embryonic and neural stem cells. Molecular methods to control stem cell decisions to self-renew, differentiate, die, or become quiescent. Practical, industrial, and ethical aspects of stem cell technology application. Final projects: team-reviewed grants and business proposals.

3 units, not given this year

NSUR 278A. From Science to Business: Innovation in Neurologic Disease Beyond Neurosurgery
For medical, business, and engineering students. The process of innovation and company building in the medical field, emphasizing the neurosciences. Overview of neurological diseases; business and regulatory aspects of device and biotech product development. Guest speakers on healthcare entrepreneurship. Venture capital and entrepreneurial mentors guide interdisciplinary student teams in evaluating a solution to an unmet clinical need or a project within a biotech company. May be taken for 2 units without the team project.

2-4 units, alternate years, not given this year

NSUR 278B. Independent Study on Healthcare Innovation and Entrepreneurship
Continuation of NSUR 278A for students wishing to work on actual strategy and implementation of their idea developed in 278A or, more generally, for students who wish to develop a strategic plan for a specific healthcare (drug or device) venture.

2-4 units, Aut (Kallmeyer, V; Steinberg, G), Win (Kallmeyer, V; Steinberg, G), Spr (Kallmeyer, V; Steinberg, G), Sum (Kallmeyer, V)

NSUR 279. Concepts in Drug Delivery and Drug Device Combinations
Open to all graduate students. Issues relating to drug-device combination products, including review of recently approved products such as cardiac stent), and development, regulatory, and reimbursement issues. Emphasis is on market evaluation, product development, and regulatory strategies. Lecture only for 2 units; project for 4 units.

2-4 units, Win (Kallmeyer, V; Steinberg, G), alternate years, not given next year

NSUR 280. Early Clinical Experience in Neurosurgery
Provides an observational experience as formulated by the instructor and student. Prerequisite: consent of instructor.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NSUR 299. Directed Reading in Neurosurgery
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NSUR 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

NSUR 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OBSTETRICS AND GYNECOLOGY (OBGYN) COURSES

UNDERGRADUATE COURSES IN OBSTETRICS AND GYNECOLOGY

OBGYN 199. Undergraduate Research in Reproductive Biology
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN OBSTETRICS AND GYNECOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

OBGYN 202. Assisted Reproductive Technologies
(Same as DBIO 202, HUMBIO 150A) Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation.Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors.
1-3 units, Win (Porzig, E)

OBGYN 216. Current Issues in Reproductive Health
Reproductive Health is a broad subject encompassing many concepts and practices. Issues and services within the context of reproductive health include such diverse topics as fertility, pregnancy, contraception, abortion, sexuality, menopause and parenting. This course focuses on topics related to abortion services, fertility and contraception; current research and practices in family planning; legislation and issues of access. Sponsored by Medical Students for Choice.
1 unit, Win (Staff)

OBGYN 230. Women's Health Medical Forum
Required for the Women's Health Scholarly Concentration. Ten seminars featuring a Women's Health research presentation (by faculty or student), followed by discussion. Emphasis is on topics related to the five Stanford Institutes of Medicine (cardiovascular; cancer; stem cell; neurosciences; and immunity), and the subspecialties of Obstetrics & Gynecology. Assigned readings and related papers.
1 unit, Aut (Westphal, L), Win (Westphal, L), Spr (Westphal, L)

OBGYN 240. Sex Differences in Human Physiology and Disease
(Same as HUMBIO 140, MED 240) Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Consequences of sex hormones and environmental factors that differ between men and women in systems including the musculoskeletal, neurological, cardiovascular, and immunological. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor.
2-3 units, Win (Stefanick, M)

OBGYN 256. Current Controversies in Women's Health
(Same as HUMBIO 125) Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor.
2-3 units, Spr (Jacobson, M; Stefanick, M)

OBGYN 280. Early Clinical Experience in Obstetrics and Gynecology
Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OBGYN 282. Pregnancy, Birth, and Infancy
(Same as PEDS 282) Comprehensive clinical experience where medical students follow pregnant women in the community to attend prenatal visits, delivery, and postnatal visits. Continuity clinic format, combined with didactic lessons, discussion seminars and practical teaching sessions. Students are exposed to clinical activities in a meaningful context, related to their on-going classroom studies in anatomy, physiology, embryology and human development, as well as social, economic, and personal issues related to medicine. This program spans one quarter, covering topics related to pregnancy, labor and delivery and newborn care. In addition to clinic experiences, students are expected to spend 1-2 hours/week in lectures and workshops, and to complete a reflection of their experiences in the course. Prerequisite: medical student.
3 units, Spr (El-Sayed, Y; Aby, J; Harrysson, I; Lomeli, D)

OBGYN 299. Directed Reading in Obstetrics and Gynecology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OBGYN 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OBGYN 399. Graduate Research in Reproductive Biology
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OPHTHALMOLOGY (OPHT) COURSES

UNDERGRADUATE COURSES IN OPHTHALMOLOGY

OPHT 199. Undergraduate Research
Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN OPHTHALMOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

OPHT 201. Clinical Topics in Ophthalmology
Introduction to the professional opportunities available to the ophthalmologist in the areas of clinical research, community health, biotech and pharmaceutical development, international blindness prevention, graduate and post-graduate education.
1 unit, Aut (Fredrick, D; Dreyfuss, A)

OPHT 202. Clinical Topics in Ophthalmology
(Continuation of 201) Professional opportunities available to the ophthalmologist in the areas of clinical research, community health, biotech and pharmaceutical development, international blindness prevention, graduate and post-graduate education.
1 unit, not given this year

OPHT 203. Introduction to Ophthalmology
(Continuation of 202) Introduction to the practical skills used within the field of ophthalmology. Diagnostic tools and instruments; applications of these tools; practice using instruments under the guidance of faculty and residents; practice in microsurgical techniques with one-on-one guidance.
1 unit, Spr (Staff)

OPHT 280. Early Clinical Experience in Ophthalmology
Provides an observational experience as formulated by the instructor and student. Prerequisite: consent of instructor.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OPHT 299. Directed Reading in Ophthalmology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OPHT 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OPHT 399. Graduate Research
Students to undertake investigations sponsored by individual faculty members. Opportunities are available at both predoctoral and postdoctoral levels. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ORTHOPEDIC SURGERY (ORTHO) COURSES

UNDERGRADUATE COURSES IN ORTHOPEDIC SURGERY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine
(Stanford Introductory Seminar) (Same as HUMBIO 97Q) Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.
3 units, Aut (Matheson, G), Win (Matheson, G), Spr (Matheson)

ORTHO 102. Orthopaedic Surgical Anatomy
(Same as ORTHO 202) Open to medical students and undergraduates. Opportunity to enhance knowledge of anatomy as it pertains to the practice of orthopaedic surgery and to improve dissection skills. Follows the operative anatomy syllabus used by the Stanford Orthopaedic Surgery Residency Program. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic sessions, prosection review, dissection.
2 units, Sum (Huddleston, J)

ORTHO 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN ORTHOPEDIC SURGERY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ORTHO 201. Musculoskeletal Exam Practicum
Student initiated course. Opportunity to enhance knowledge and skills for conducting musculoskeletal exams. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic introductions followed by hands-on practice of specific aspects of the musculoskeletal exam.
1 unit, Win (Wasterlain, A; Cheng, I)

ORTHO 202. Orthopaedic Surgical Anatomy
(Same as ORTHO 102) Open to medical and undergraduate students. Opportunity to enhance knowledge of anatomy as it pertains to the practice of Orthopaedic Surgery and to improve dissection skills. Follows the operative anatomy syllabus used by the Stanford Orthopaedic Surgery Residency Program. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic sessions, prosection review, dissection.
2 units, Sum (Huddleston, J)

ORTHO 222. Anatomy of Movement
Musculoskeletal and neuromuscular anatomy and physiology form the foundation of this multi-disciplinary course. Examines normal motor function and functional deficit from disease or injury. Clinical and scientific perspectives include orthopaedic surgery, neurology, mechanical engineering, computer science, anthropology, and art. Bioengineering challenges that assist or emulate human movement, such as design of an artificial joint or simulation of tendon transfer surgery for cerebral palsy are discussed. Evolution of upright walking and hand anatomy, as it became an instrument of purpose are discussed along with the expression of human movement throughout history in art masterpieces, photography, and animation. Student team projects. Lecture only for 3 units; project for 4 units.
3-4 units, not given this year

ORTHO 260. Tissue Engineering
Biological principles underlying the use of engineering strategies and biocompatible materials for tissue repair and regeneration. Structure, physiology, and mechanics of articular cartilage, bone, and dense soft connective tissues. Current ideas, approaches, and applications being implemented as therapeutic regimens for arthritis, spinal deformities, and limb salvage. Multidisciplinary constraints on the design and creation of tissue constructs. Prerequisite: familiarity with basic cell and molecular mechanisms underlying tissue differentiation.
3 units, not given this year

ORTHO 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS SEMINARS (OSPGEN) COURSES

OSPGEN 40. Community Health in Oaxaca
Social, economic, and cultural factors impacting the health of Mexicans and Mexican immigrants to the United States. Broaden public health knowledge, increase linguistic competency in Spanish, and gain exposure to health care systems and clinical interactions in another culture. Close observation of clinicians at work in community health settings; service with local community health organizations. Structured reflection sessions support integration of studies with clinical observations and service work.
2 units, Aut (Garcia, G; Banchoff, A)

OSPGEN 41. Arts and Society in Contemporary China
Immersion in urban China's arts scene in Beijing and Shanghai with class meetings and discussions providing a deeper understanding of contemporary Chinese society. Emphasis on arts that are currently popular and influential rather than traditionally

Chinese. Museum and gallery visits; performance and concert attendance; observation of old and new architectural monuments; meetings with artists, writers and critics.

2 units, Aut (Cai, J)

OSPGEN 42. How to Build a Habitable Planet: An Example from the European Alps

Feedback and links between global climate, mountain building, and biological evolution and landscape development of the European Alps. Long and short-term carbon cycle and the role of human perturbation; climate of Europe and influence of global connections on climate change; origin of the glaciers, global cooling and the migration of humans into Europe; policies and strategies employed by EU to mitigate effects of global warming. Students and faculty camp in three different locations. Location: Alps in Switzerland, northern Italy and France.

2 units, Aut (Chamberlain, P)

OSPGEN 43. Turkey at the Crossroads of Energy, Sustainability, and Geography

Current analysis of energy systems and sustainability in Turkey. Energy Resources Engineering analysis of sustainability and use of energy resources. Questions of resources, extraction, transportation, and environmental quality are considered in concert. Comparative study of conventional fossil fuel energy resources versus renewable geothermal and solar energy.

2 units, Aut (Kovscek, A)

OSPGEN 44. Devising Otherness in Uganda and America: Creating a Theatrical Performance Based on Identity

Working with students from Makerere University, Kampala Uganda, students create a performance based on the questions: what do Americans think about Africa and Africans; and what do Africans think about America and Americans? Students perform together at both the National Theatre in Kampala and Pigott Theater at Stanford.

2 units, Aut (Ramsaur, M)

OSPGEN 45. British Contributions to Computing

Leading role played by the British in addressing fundamental and intellectually challenging problems in computer science; scientific advances in the United Kingdom that made computing possible. Ideas behind automatic computing developed by Charles Babbage and collaborator Ada Lovelace including the idea of building a programmable machine. Theoretical groundwork for computer science developed by English mathematician Alan Turing.

2 units, Aut (Roberts, E)

OSPGEN 46. America and Vietnam: After Three Decades

Legacies of the American war in Vietnam (circa 1961-1973) and contemporary aspects of Vietnam's integration into the global economy; visits to Ho Chi Minh City and vicinity, the imperial capital at Hue, and the modern capital at Hanoi. Student presentations on relevant topics and sites; and visits and seminars with officials, academics, students, and members of the business-industrial community.

2 units, Aut (Goldstein, J; Rakove, J)

OSPGEN 70. Indigenous Australia

Culture and ecology of desert Aboriginal people living in a remote region of W. Australia. Students live with their Martu hosts. Issues in greater Australian human prehistory; social, ecological, and political factors that shape contemporary relationships between rural Aborigines, their urban counterparts, and the broader Australian society. Location: Newman, Parnngurr Community, Western Australia.

2 units, Aut (Bird, R; Bird, D)

OSPGEN 88. The Bloomsbury Group

The 20th-century literary and intellectual concentration of individuals in Britain. Readings include Virginia Woolf and E.M. Forster. Students select a member of the group for individual concentration. Meetings in King's College, Cambridge, where the Bloomsbury Group originated, with visits to sites associated with the group in London and Sussex.

2 units, Aut (Stansky, P)

OVERSEAS STUDIES: AUSTRALIA (OSPAUSTL) COURSES

OSPAUSTL 10. Coral Reef Ecosystems

Key organisms and processes, and the complexity of coral reef ecosystems. Students explore the Great Barrier Reef from the southern end which demonstrates the physical factors that limit coral reefs, to the northern reef systems which demonstrate key aspects of these high biodiversity ecosystems. Human-related changes. Emphasis is on research experiences and development of analytical skills. Two units only counted for Biological Sciences major. GER:DB-EngrAppSci

3 units, Aut (Ward, S; Arrigo, K; Dunn, S)

OSPAUSTL 20. Coastal Resource Management

Problem solving, research, communication, teamwork, and social assessment skills in sustainable coastal zone management. Issues include: ecosystem functions and values at risk under the proposed development in case study; environmental outcomes most desirable for the local stakeholders and how those are defined; features of the human communities and their function as they relate to the management options; tools or mechanisms for a sustainable management outcome. Taught by multidisciplinary team that includes Australian and developing country experts. Two units only counted for Biological Sciences major. GER:DB-EngrAppSci

3 units, Aut (Johnstone, R)

OSPAUSTL 30. Coastal Forest Ecosystems

Prehistory of Australian rainforest and how rainforest structure and biodiversity change with altitude, latitude, and geology. Tropical coastal marine wetlands, mangrove forests, and the relationship between land- and sea-based biota. Biology and ecology of marine plants, mangroves, and tropical salt marsh. Introduction to specialized fields of marine plant biology and ecology including biogeography and evolution, aquatic plant ecophysiology, water quality and bioindicator techniques, pollution and eutrophication, and environmental control of marine plant distribution and productivity. Two units only counted for Biological Sciences major. GER:DB-EngrAppSci

3 units, Aut (Duke, N; Baker, C)

OSPAUSTL 40. Australian Studies

Introduction to Australian society, history, culture, politics, and identity. Social and cultural framework and working understanding of Australia in relationship to the focus on coastal environment in other program courses. Field trips. GER:DB-SocSci, EC-GlobalCom

3 units, Aut (Lilley, I)

OSPAUSTL 50. Targeted Research Project

Prior to arriving in Australia, students establish a link with University of Queensland faculty to develop project ideas that combine personal interests and career goals with opportunities presented by the Australian Coastal Studies program, such as how mangrove roots find sediment rich zones of the shore, or the dynamics of ecotourism in southern and northern coastal Queensland. Project report and presentation in Australia.

4 units, Aut (Staff)

OVERSEAS STUDIES CONSORTIUM IN BARCELONA—CASB (OSPBARCL)

OSPBARCL 101. Language and Culture in Catalonia
Preparation for students to function in the academic and social environment of Barcelona. Basic listening, reading, and comprehension in Catalan; review of Spanish with focus on writing academic papers and listening to lectures. Introduction to Barcelona with emphasis on contemporary history, culture, and politics. Bilingualism; multiculturalism; varieties of nationalism and globalization in context of Barcelona.
4 units, Aut (Staff)

OSPBARCL 111. The City in Modernity: Gaudi's Barcelona
Barcelona and Gaudi as paragigm for process of urban growth into modernity. Development of modern city; impact on film, art, and literature. Topics: organization of city life in specific spaces; urban literature; and urban art.
5 units, Aut (Staff)

OSPBARCL 121. Gendered Experiences: Women's Lives in Spanish History
Analysis of Spanish women's life experiences in past 500 years. Relationship between gender. society, culture, politics and progress in the Spanish context; additionally current debates and perspectives. Use of individual biographies know as life course/circle of selected women.
5 units, Aut (Staff)

OVERSEAS STUDIES: BEIJING (OSPBEIJ) COURSES

OSPBEIJ 9. Chinese Language Tutorial
2 units, Aut (Staff, 1), Spr (Staff, 1)

OSPBEIJ 10. Beijing Past and Present
Introduction to the history, culture, and people of Beijing via field trips to historical sites, old and new neighborhoods, art district and local museums, film and performance in and around Beijing.
1 unit, Aut (Shen, X), Spr (Shen, X)

OSPBEIJ 19. Population and Society in East Asia
Current demographic situation, and country differences. Emphasis is on China; attention to Japan and S. Korea. Relationship between social change and demographic change in the past. Factors influencing and influenced by fertility, mortality, and migration. Fertility control, the aging process, old age care, and migration. GER:DB-SocSci, EC-GlobalCom
4 units, Spr (Zhou, Y)

OSPBEIJ 21C. Second-Year Modern Chinese
5 units, Aut (Chen, L)

OSPBEIJ 23C. Second-Year Modern Chinese
5 units, Spr (Zhu, X)

OSPBEIJ 24. China's Economic Development
Historical stages, economic and political rationale, and effectiveness of the economic policies and institutional changes that have shaped China¿s economic emergence. China as case study for understanding how institutions and institutional change affect economic and social development. Guest speakers; field study; trip to rural areas. GER:DB-SocSci
5 units, Aut (Rozelle, S)

OSPBEIJ 27. Topics in China's Development
Independent study in one of: finding balance between growth and the environment; finding balance between urban and rural; finding balance between incentives in work and social welfare; China's elections at the grassroots; China's education system; or China's health system.
2-4 units, Aut (Staff)

OSPBEIJ 37. Independent Study on Aspects of Change in China
Independent work on topic proposed by student and approved by instructor.
3-4 units, Spr (Staff)

OSPBEIJ 39. China and the World
Ways China perceives and prioritizes key international issues; how China is viewed by other nations; and how China¿s interactions with the rest of the world shape and are shaped by its domestic challenges. GER:DB-SocSci
4-5 units, Spr (Fingar, T)

OSPBEIJ 41. Chinese Society and Business Culture
Key features of Chinese society and their applications to Chinese business culture from a sociological perspective. Structural differences between Chinese and U.S. societies and their social, economic, and cultural implications. Emerging patterns in areas such as retailing and consumer behaviors, work relations and management, and business negotiation and collaboration. GER:DB-SocSci, EC-GlobalCom
4 units, Spr (Li, B)

OSPBEIJ 42. Chinese Media Studies
Fundamental changes in Chinese media. Issues such as: how Chinese media emerge and evolve against the background of modern Chinese history; how they interact with government, sponsors, receivers, and other social institutions; and implications for Chinese social development. GER:DB-SocSci
4 units, Aut (Li, K)

OSPBEIJ 46. Introduction to Chinese Economy
Major aspects of Chinese economy and challenges it faces. Topics: historical background; transition to market economy; issues associated with the transition process. Cultural, political, and institutional environment from a historical perspective. Economic theory and empirical analysis applied to explain economic phenomena in China. GER:DB-SocSci, EC-GlobalCom
5 units, Spr (Chen, D)

OSPBEIJ 48. Chinese Literature: Tradition in Transformation
Classical Chinese literature from the beginning (ca. 1000 BC) to the 14th centure. Primary texts in translation with attention to the poetic works that feature Chinese literary tradition. Understanding of past experience of Chinese people living in another cultural space through observation, analysis, and reconstruction.
4 units, Aut (Zhang, P)

OSPBEIJ 66. Essentials of China's Criminal Justice System
Criminal laws and cases. Topics include criminal legal thinking, liability, prosecution and defense in criminal litigation, death penalty debates, evidence and compulsory measures, and the Chinese prison system. Comparisons with other systems. Human rights protection. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Wang, S)

OSPBEIJ 67. China-Africa and Middle East Relations
China¿s relations with the outside world, with a focus on Africa and the Middle East. Historically contextualized relations; evolution of relations within the international climate during different periods, especially in the present; impact of geopolitical and geoeconomic relations on the existing international order.
4 units, Aut (Wang, S; Li, A)

OSPBEIJ 101C. Third-Year Modern Chinese
5 units, Aut (Zhu, X)

OSPBEIJ 103C. Third-Year Modern Chinese
5 units, Spr (Wang, Y)

OSPBEIJ 199A. Directed Reading A
1-4 units, Aut (Staff), Spr (Staff)

OSPBEIJ 199B. Directed Reading B
1-4 units, Aut (Staff), Spr (Staff)

OSPBEIJ 211C. Advanced Modern Chinese
5 units, Aut (Wang, Y)

OVERSEAS STUDIES: BERLIN (OSPBER) COURSES

OSPBER 1Z. Accelerated German: First and Second Quarters
A jump start to the German language, enabling students with no prior German to study at the Berlin Center. Covers GERLANG 1 and 2 in one quarter.
8 units, Aut (Wohlfeil, J), Win (Wohlfeil, J)

OSPBER 2Z. Accelerated German, Second and Third Quarters
Qualifies students for participation in an internship following the study quarter. Emphasis is on communicative patterns in everyday life and in the German work environment, including preparation for interviews.
8 units, Spr (Wohlfeil, J)

OSPBER 11. The Vanishing City: Lost Architecture and the Art of Commemoration in Berlin
Berlin as archaeology of modernity and its lost utopias. The projection of new models simultaneous with destruction such as new Prussian, new fascist, new socialist, and new democratic Berlins. Field trips to sites including destroyed Prussian castles, Nazi buildings, and socialist architecture. Methods of visualizing what disappeared, deciphering what is left, and understanding what is new. GER:DB-Hum
4-5 units, Spr (Ebeling, K)

OSPBER 15. Shifting Alliances? The European Union and the U.S.
The development of European integration, a model for global security and peace, and a possible replacement for the U.S. position as unilateral superpower. Competing arguments about the state of transatlantic relations. GER:DB-SocSci, EC-GlobalCom
4-5 units, Win (Brueckner, U)

OSPBER 17. Split Images: A Century of Cinema
20th-century German culture through film. The silent era, Weimar, and the instrumentalization of film in the Third Reich. The postwar era: ideological and aesthetic codes of DEFA, new German cinema, and post-Wende filmmaking including Run Lola Run and Goodbye Lenin. Aesthetic aspects of the films including image composition, camera and editing techniques, and relation between sound and image. GER:DB-Hum, EC-GlobalCom
4 units, Win (Kramer, K)

OSPBER 21B. Intermediate German
Grammar review, vocabulary building, writing, and discussion of German culture, literature, and film. Corequisite: OSPBER 100B.
5 units, Aut (Strachota, K), Win (Kloetzer, S), Spr (Kloetzer, S)

OSPBER 26. Germany in Europe
Broad survey of German history, in a pan-European context, from its mythical origins in the forests of Germania to the reunification of 1989. Focus on politics and religion, including violence and war, and the place of the German polity within Europe.
5 units, Win (Buc, P)

OSPBER 27. Selected Topics in German History
Students choose one of the following for an independent study topic: medieval anti-Semitism and Nazi anti-Semitism, compared; the Teutonic Knights; Luther on politics and religion; the rise of Prussia; Germans and Romans in late antiquity. Weekly meetings to review progress and set goals.
3-5 units, Win (Staff)

OSPBER 30. Berlin vor Ort: A Field Trip Module
The cultures of Berlin as preserved in museums, monuments, and architecture. Berlin's cityscape as a narrative of its history from baroque palaces to vestiges of E. German communism, from 19th-century industrialism to grim edifices of the Sachsenhausen concentration camp.
1 unit, Aut (Jander, M), Win (Pabsch, M), Spr (Jander, M)

OSPBER 34. Science, Medicine and Technology in Nazi Germany
Exploration of the profound and complex relationship between science and politics under the Nazis. Three areas: the German atomic bomb project; the German rocket program; science, racism, and the Holocaust. Topics include behavior of scientists under Nazi rule; degree to which Nazis integrated science and engineering into their ideology; effect of Nazi ideology on scientific research and medical practice; harm done to German science by Nazi racial policies. Issues of ethics and historical interpretation central to course. GER:DB-SocSci
5 units, Aut (Holloway, D)

OSPBER 36. Germany in the Cold War
History of Germany from 1945 to 1990: the period of occupation; the creation of two German states and societies; the crises of the Cold War; Ostpolitik; and unification. Germany¿s centrality to the Cold War both because of geopolitics and because of the different ideas about social organization embodied in Germany¿s two parts. GER:DB-SocSci
3-5 units, Aut (Holloway, D)

OSPBER 40B. Introductory Electronics
Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43. GER:DB-EngrAppSci
5 units, Aut (Lee, T), Win (Howe, R), Spr (Howe, R)

OSPBER 50B. Introductory Science of Materials
GER:DB-EngrAppSci
4 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPBER 56. A Laboratory of Modernity: Concert and Concerto in 19th-Century Germany
How the emerging institution of the concert and the musical genre of the concerto produced and mirrored identities of the rising bourgeoisie in 19th-century Germany: discourses about the value and idea of the concert; aspects of the performance; the music and its perception. The development of the genre of the concerto through live performances in Berlin concert halls. No musical reading skills required. GER:DB-Hum
4 units, Win (Bork, C)

OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin
Diversity of Berlin's architecture and urban design resulting from its historical background. Architect Ludwig Mies van der Rohe and his artistic ancestors. Role of the cultural exchange between Germany and the U.S. Changing nature of the city from the 19th century to the present. GER:DB-Hum
5 units, Aut (Pabsch, M)

OSPBER 62. Shades of Green: Environmental Policy in Germany and the U.S. in Historical Perspective
How political institutions, political culture, and economic structure influence domestic and foreign environmental policies across countries in areas such as climate change, urbanization, and management of finite resources. Impact on cooperative solutions between countries with focus on Germany and the U.S. GER:DB-SocSci
5 units, Win (Tempel, S)

OSPBER 66. Theory from the Bleachers: Reading German Sports and Culture
German culture past and present through the lens of sports. Intellectual, societal, and historical-political contexts. Comparisons to Britain, France, and the U.S. The concepts of Körperkultur, Leistung, Show, Verein, and Haltung. Fair play, the relation of team and individual, production and deconstruction of sports heroes and heroines, and sports nationalism. Sources include sports narrations and images, attendance at sports events, and English and German texts.
3 units, Win (Junghanns, W)

OSPBER 68. Protestant Reformation
New forms of Christian religious thought and practice that emerged in Western Europe in the early to mid-sixteenth century and decisively shaped the course of Western history. Religious status quo and other forms of religious dissent that challenged late medieval Christendom; proposals for reform exemplified by Martin Luther, Andreas Karlstadt, Thomas Müntzer; impact of the changes in religion and the conflicts over religion for society more broadly. GER:DB-Hum
4 units, Spr (Pitkin, B)

OSPBER 69. Theology in Dark Times: The Churches Under Hitler
Roles of the Christian churches, their intellectual representatives (almost all university professors), and clerical leaders in resisting, supporting, and capitulating to fascist ideology and anti-Semitism. Topics include: Emanuel Hirsch¿s embrace of National Socialism; Karl Barth¿s penning of the ¿Barmen Declaration¿ of the Confessing Church movement; the nationalistic ¿German Christians,¿ who added `das Volk,¿ i.e., race, to the Reformation concept of God¿s ¿orders of creation¿; controversies over Pope Pius XII¿s public neutrality toward the plight of the Jews in Europe; Dietrich Bonhoeffer¿s resistance to the Nazi regime. GER:DB-Hum
4 units, Spr (Sockness, B)

OSPBER 100B. Berlin Heute
Required for students enrolled in GERLANG 3B; open to students in other German language classes. Active use of German, including vocabulary from a variety of fields and disciplines, and discussion of current issues.
2 units, Aut (Topkara, U), Win (Topkara, U), Spr (Topkara, U)

OSPBER 101A. Contemporary Theater
Texts of plays supplemented by theoretical texts or reviews. Weekly theater visits, a tour of backstage facilities, and discussions with actors, directors, or other theater professionals. In German. Prerequisite: completion of GERLANG 3 or equivalent. GER:DB-Hum
5 units, Aut (Kramer, K), Spr (Kramer, K)

OSPBER 101B. Advanced German
For intermediate and advanced students. Focus is on Berlin through film, literature, music, live performance, news media, and field trips. Essay writing, vocabulary building, and in-class presentations. Reading literature and news stories, essay writing, vocabulary building, and in-class presentations.
5 units, Aut (Biege, M), Win (Biege, M), Spr (Biege, M)

OSPBER 115X. The German Economy: Past and Present
The history of the German economy in the Wilhelmine Empire, the Weimar Republic, the Third Reich, the postwar real socialism of the GDR, and the free market economy of the FRG. The processes of economic transition since unification and current challenges faced by united Germany. GER:DB-SocSci, DB-SocSci, EC-GlobalCom
4-5 units, Aut (Klein, I)

OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU
The institutional architecture of the EU and its current agenda. Weaknesses, strengths, and relations with partners and neighbors. Discussions with European students. Field trips; guest speakers. GER:DB-SocSci, DB-SocSci, EC-GlobalCom
4-5 units, Spr (Brueckner, U)

OSPBER 161X. The German Economy in the Age of Globalization
Germany's role in the world economy: trade, international financial markets, position within the European Union; economic relations with Eastern Europe, Russia, the Third World, and the U.S. International aspects of German economic and environmental policies. The globalization of the world's economy and Germany's competitiveness as a location for production, services, and R&D, focusing on the German car industry. GER:DB-SocSci, DB-SocSci, EC-GlobalCom
4-5 units, Win (Klein, I)

OSPBER 174. Sports, Culture, and Gender in Comparative Perspective
Theory and history of mass spectator sports and their role in modern societies. Comparisons with U.S., Britain, and France; the peculiarities of sports in German culture. Body and competition cultures, with emphasis on the entry of women into sports, the modification of body ideals, and the formation and negotiation of gender identities in and through sports. The relationship between sports and politics, including the 1936 Berlin Olympic Games. GER:DB-SocSci, EC-Gender
5 units, Spr (Junghanns, W)

OSPBER 198D. Humboldt Universitat: Humanities 2
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 198F. Humboldt Universitat: Social Sciences 2
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 198H. Freie Universitat: Humanities 3
1-5 units, Spr (Staff)

OSPBER 198K. Weissensee Art University 1
1-4 units, Spr (Staff)

OSPBER 198L. Weissensee Art University 2
1-4 units, Spr (Staff)

OSPBER 198M. Weissensee Art University 3
1-4 units, Spr (Staff)

OSPBER 199A. Directed Reading A
2-4 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199B. Directed Reading B
2-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199D. Humboldt Universitat: Humanities
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199F. Humboldt Universitat: Social Sciences
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199G. Freie Universitat: Social Sciences 1
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199H. Freie Universitat: Humanities 1
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199J. Freie Universitat: Natural Sciences 1
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199K. Freie Universitat: Social Sciences 2
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199L. Freie Universitat: Humanities 2
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 199M. Freie Universitat: Natural Sciences 2
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES: CAPE TOWN (OSPCPTWN) COURSES

OSPCPTWN 16. South Africa Sites of Memory
Required Course. Relation between conventional histories and different kinds of individual and collective memory that are focused on places and spaces, testing the relation between grand narratives and more particularized pasts. Questions of cultural heritage, in particular its contestations among individual, familial, local, national, and international interests.
2 units, Win (Stanton, T)

OSPCPTWN 17. Western Cape Sites of Memory
Required Course. Relation between conventional histories and different kinds of individual and collective memory that are focused on places and spaces, testing the relation between grand narratives and more particularized pasts. Questions of cultural heritage, in particular its contestations among individual, familial, local, national, and international interests.
1 unit, Spr (Stanton, T)

OSPCPTWN 18. Xhosa Language and Culture
History of the Xhosa language; understanding Xhosa culture and way of life. Listening, speaking, reading and writing, combined with the social uses of the language in everyday conversations and interactions. Intercultural communication. Content drawn from the students¿ experiences in local communities through their service learning/volunteer activities to support the building of the relationships in these communities. How language shapes communication and interaction strategies.
2 units, Win (Tyam, N), Spr (Tyam, N)

OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development
For students intending to engage in community-based research in South Africa in the summer following spring study quarter in Cape Town. Approaches and methods of collaborative, community-based research; qualitative data gathering and analysis methods in community-based research; effective collaboration with community partners and data sources; race and privilege in community-based research. Identifying research partners and

sponsors; articulating potential research questions; and planning research projects.

3 units, Spr (Stanton, T)

OSPCPTWN 23. History and Politics of South Africa in Transition

Key issues in contemporary South African politics including: South Africa¿s negotiated settlement; the sustainability of democracy in South Africa; the heterogeneity of South Africa; and questions of agency and subordination globally and locally. GER:EC-GlobalCom

4 units, Spr (Simons, M)

OSPCPTWN 24A. Targeted Research Project in Community Health and Development

Two-quarter sequence for students engaging in Cape Town-sponsored community based research. Introduction to approaches, methods and critical issues of partnership-based, community-engaged research and to the community-based research partners. Qualitative data gathering and analysis methods in community-based research; effective collaboration with community partners and data sources; race and privilege in community-based research. Preparation of research proposals and plans for research carried out during spring quarter through OSPCPTWN 24B.

3 units, Win (Stanton, T)

OSPCPTWN 24B. Targeted Research Project in Community Health and Development

Two-quarter sequence for students engaging in Cape Town-sponsored community-based research. Substantive community health or development investigations in collaboration with the Stanford Centre's community partners: Western Cape NGOs or government agencies, or community-based organizations or groups. Students' research supported through methods workshops, sharing of progress and problems, and data and findings presentations. Prerequisite: OSPCPTWN 24A.

5 units, Spr (Stanton, T)

OSPCPTWN 25. Independent Study of South African Built Environment, Economy, and Institutions

Students select from independent study topics such as: Political Economics of Informal Urban Settlements; Infrastructure Delivery in Developing Countries; the Unique Challenges of Marine Construction; Role of Students in the Anti-Apartheid Movement during the Late 1060s; Documenting Vanishing African Music and Dance Traditions; South African Fiction, Theater and Poetry; the History of Ostrich Ranching in South Africa.

1-4 units, Win (Staff)

OSPCPTWN 26. Managing Global Projects

Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Student teams model and simulate cross-cultural teams engaged in global projects. Opportunities to participate in research in the Collaboratory for Research on Global Projects involving faculty from Stanford departments and schools; see http://crgp.stanford.edu.

3-4 units, Win (Levitt, R)

OSPCPTWN 27. Service Learning Practice

Prerequisite: OSPCPTWN 20 or permission of instructor

3 units, Spr (McMillan, J)

OSPCPTWN 31. Theory and Politics of Foreign Aid

Political economy approach to foreign aid. Context of debate on development: differences between developed and less developed countries, concept of poverty, how to measure development. History of foreign aid; main actors and characteristics of official development assistance. Theoretical and empirical impact of aid with regard to economic growth and governance. Benefits and problems associated with aid.

3 units, Win (Klingebiel, S)

OSPCPTWN 32. Learning, Development, and Social Change: Service Learning in the Contemporary South African Contex-

Adult learning and its role in community social action; development; service learning. Micro contexts of people's daily lives and experiences in the context of an emergent democracy; understanding possibilities of community action and mobilisation for social change. Service in a historically marginalised community near Cape Town to understand realities of everyday life in informal settlements, to engage with education in a developmental context, and to gain insight into sociopolitical factors that shape social action and learning. GER:DB-SocSci, EC-GlobalCom

3-5 units, Win (McMillan, J), Spr (McMillan, J)

OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa

Comparison of the transition from apartheid to democracy in Namibia and South Africa. Focus on peaceful process involving negotiated settlement in South Africa. Significance of democracy in Namibia post 1990 and in South Africa post 1994; South Africa's truth and reconciliation commission and post-1994 economic policy.

4 units, Win (Saunders, C)

OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers

Archaeology, history and ethnography of the aboriginal hunter gatherers of southern Africa, the San people. Formative development of early modern humans and prehistory of hunters in southern Africa before the advent of herding societies; rock paintings and engravings of the subcontinent as situated in this history. Spread of pastoralism throughout Africa. Problems facing the descendants of recent hunter gatherers and herders in southern Africa, the Khoisan people. GER:DB-SocSci, EC-GlobalCom

4 units, Spr (Parkington, J)

OSPCPTWN 38. Genocide: The African Experience

Genocide as a major social and historical phenomenon, contextualized within African history. Time frame ranging from the extermination of indigenous Canary Islanders in the fourteenth and fifteenth centuries to more recent mass killings in Rwanda and Darfur. Emphasis on southern African case studies such Cape San communities and the Herero people in Namibia. Themes include: roles of racism, colonialism and nationalism in the making of African genocides. Relevance of other social phenomena such as modernity, Social Darwinism, ethnicity, warfare and revolution. Comparative perspective to elucidate global dimensions. GER:DB-SocSci, EC-GlobalCom

4 units, Win (Adhikari, M)

OSPCPTWN 40. Education in the Post-Apartheid City

The changing schooling landscape in the post apartheid city. How the desire for quality schooling is constructed and understood in light of the lived practices that people establish in and across the city¿s geographies. How schools establish their identities in relation to the complex urban processes in the post-apartheid city. Role of culture, politics and economics in making the cultures of schools in the city. The ¿lived¿ spatial dimensions of schools and schooling processes and practices in the city and the institutional and individual subjectivities they spawn in the city¿s diverse spaces. GER:DB-SocSci

4 units, Spr (Badroodien, A; Fataar, A)

OSPCPTWN 41. Race and the Division of Labor in South Africa: A Historical Perspective

Process of industrialization in South Africa, how it simultaneously depended on and contributed to the racial division that characterized the pre-1994 era; consequences in the post-apartheid workplace. Transformation of the economic sector from agriculture to mining and manufacturing through the opening up of South Africa to the global economy. Role of the state and its relationship with labor and capital as molded by race and class.

4 units, Win (Ngazimbi, X)

OSPCPTWN 43. Public and Community Health in Sub-Saharan Africa

Introduction to concept of public health as compared with clinical medicine. Within a public health context, the broad distribution of health problems in sub-Saharan Africa as compared with U.S. and Europe. In light of South Africa's status as a new democracy, changes that have occurred in health legislation, policy, and service arenas in past 16 years. Topics include: sector health care delivery, current distribution of infectious and chronic diseases, and issues related to sexual and reproductive health in South Africa. Site visits to public sector health services and health related NGOs.

4 units, Win (Staff)

OSPCPTWN 44. Negotiating Home, Citizenship and the South African City
Material and socio-cultural dimensions of the multiple spaces making up South African cities. The gendered, placed, sexual, and racial character of homes, neighborhoods, and cities. Ways in which crises such as housing shortages and tenure insecurity are materially and socially embodied in economically impoverished families and communities' lives. Interplay of this body politic with economic and political contexts in which the meaning of citizenship is crafted. Urban fieldwork with the Valhalla Park United Civic Front, a community-based organization in Cape Town. GER:DB-SocSci, EC-GlobalCom
4 units, Spr (Oldfield, S)

OSPCPTWN 52. The Ethics of Imperialism
Ethical underpinnings of empire; Europe's moral and political justification for often violent acquisition of distant territories and millions of new colonial subjects. European notions of liberal universalism (Mill, Tocqueville and others) as moral groundwork for colonial expansion. Colonial case studies: Leopole II's Congo, German Southwest Africa, and South Africa. Testing of European ideals to justify and critique racial inequality, violence, and genocide. Redefinition of imperialism under the guise of globalization beginning with international organizations such as the League of Nations. GER:DB-Hum
5 units, Spr (Daughton, J)

OSPCPTWN 53. The South African Environment in Historical Context
Group work to design a research project related to environmental change and conservation in South Africa in the 19th and 20th centuries. Using local archives, libraries, and other collections to identify a historical question, design a research project related to the political, social, cultural, and racial dynamics that have shaped modern S. African policies toward the environment.
5 units, Spr (Daughton, J)

OSPCPTWN 68. Cities in the 21st Century: Urbanization, Globalization and Security
Cities in a globalizing world. Themes: challenges posed by globalization; general and specific responses of cities to these challenges; security issues created by globalization and urbanization. Concerns related to food security, resource availability, and threat of political instability. Policies recommended by World Bank. Case study method. GER:DB-SocSci
4 units, Spr (Simons, M)

OSPCPTWN 199A. Directed Reading A
2-4 units, Win (Staff), Spr (Staff)

OSPCPTWN 199B. Directed Reading B
1-5 units, Spr (Staff)

OVERSEAS STUDIES: FLORENCE (OSPFLOR) COURSES

OSPFLOR 21F. Accelerated Second-Year Italian, Part A
Review of grammatical structures; grammar in its communicative context. Listening, speaking, reading, and writing skills practiced and developed through authentic material such as songs, newspaper articles, video clips, and literature. Insight into the Italian culture and crosscultural understanding.
5 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 22F. Accelerated Second-Year Italian Part B,
Grammatical structures, listening, reading, writing, speaking skills, and insight into the Italian culture through authentic materials. Intermediate to advanced grammar. Content-based course, using songs, video, and literature, to provide cultural background for academic courses.
5 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Staff, 1)

OSPFLOR 23. Rediscovering European Universities: The New Renaissance of Italian Higher Education
Worldwide market in higher education focusing on the role of Italy and all of Europe in providing education to Europeans and to the world. Reformation of European higher education represented by the Bologna Reforms. Implications of Italy¿s ongoing reforms on higher education in the United States. Field trips to the Universities of Florence and Bologna.
3 units, Spr (Bettinger, E)

OSPFLOR 24. Economics in the European Setting
Economics of Europe with special emphasis on the motivation for and challenges to the European Union. Role of the EU in fostering cooperation between countries and how it represents a significant departure from national autonomy. Focus on economics of local cities and states in Italy; how cities and states generate taxes in Italy and how the current form of financing state and local governments influences home ownership, unemployment, and mobility. Provision of education and health services to Italians.
3 units, Spr (Bettinger, E)

OSPFLOR 31F. Advanced Oral Communication: Italian
Refine language skills and develop insight into Italian culture using authentic materials. Group work and individual meetings with instructor. Minimum enrollment required. Prerequisite: ITALLANG 22A, 23 or placement.
3 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 34. The Woman in Florentine Art
Influence and position of women in the history of Florence as revealed in its art. Sculptural, pictorial, and architectural sources from a social, historical, and art historical point of view. Themes: the virgin mother (middle ages); the goddess of beauty (Botticelli to mannerism); the grand duchess (late Renaissance, Baroque); the lady, the woman (19th-20th centuries). GER:DB-Hum, EC-Gender
4 units, Aut (Verdon, T)

OSPFLOR 35. European Economic and Monetary Integration
Historical overview of economic and monetary integration process in Western Europe. European Union institutions: the Commission, the Parliament, the European Council, the Council of Ministers, and the Court of Justice. Microeconomic theory of inter-industry and intra-industry trade and the case of EU. Microeconomics of integration: the costs and benefits, also applicable to NAFTA. The Lisbon Strategy as a European response to the challenges of globalization. The euro, the dollar and the international monetary system. Monetary and fiscal policies in EMU: the European Central Bank and the Stability and Growth Pact. Prerequisites: ECON 51, 52 or equivalent. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Della Posta, P)

OSPFLOR 37. Directed Readings in Environmental Management in Europe
Students may choose from the following for independent study projects: policy instruments for environmental quality management; strategies for managing greenhouse gas emissions in the EU; environmental assessment requirements; beyond regulations: voluntary environmental management programs.
3-5 units, Aut (Staff)

OSPFLOR 38. Water Resources Engineering in Italy: Ancient Rome, Medieval Siena, and Modern Florence and Venice
Examination of significant examples of water resources development in Italian history as an introduction to the basic concepts of water resources engineering and management. Observation of results of application of basic ideas from hydrology and hydraulics to problems of water supply, waste water disposal and flood control. Topics include aqueducts of ancient Rome, water supply of Siena, flooding in Florence, and high water in Venice. GER:DB-EngrAppSci
4-5 units, Aut (Ortolano, L)

OSPFLOR 41. The Contemporary Art Scene in Tuscany: Theory and Practice
The ever-changing and multifaceted scene of contemporary art through visual and sensorial stimulation. How art is thought of and produced in Italy today. Hands-on experience. Sketching and exercises on-site at museums and exhibits, plus workshops on techniques. Limited enrollment.
3-5 units, Aut (Rossi, F)

OSPFLOR 42. Academic Internship
Mentored internships in banking, education, the fine arts, health, media, not-for-profit organizations, publishing, and retail. May be repeated for credit.
1-5 units, Aut (Campani, E), Win (Campani, E), Spr (Campani)

OSPFLOR 43. The Invention of the Book
From papyrus rolls in the Roman Empire through scripture laid out on parchment codices by the Catholic church to early printed books in Venice, follow the invention of the book. On-site study of ancient collections of some of the most remarkable libraries in the world. GER:DB-Hum

3-5 units, Win (Netz, R)

OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought
Galileo's life and scientific progress starting from his student years at the University of Pisa. Departure from traditional natural philosophy leading to radical reformation of cosmology and physics, emphasizing the science of motion. His innovative use of observation and measurement instruments, emphasizing the telescope. Cultural and social context. GER:DB-Hum

5 units, Win (Galluzzi, P)

OSPFLOR 45. Harmony: Ancient Science in the Italian Renaissance
The rules of Harmony and Proportion as observed during the Renaissance in art as in mechanics, in music as in architecture. Importance of proportion in major Florentine monuments. Intellectual route leading from Plato and Archimedes to Brunelleschi, Alberti and Galileo. GER:DB-Hum

3-5 units, Win (Netz, R)

OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition
The city's art and theories of how art should be presented. The history and typology of world-class collections. Social, economic, political, and aesthetic issues in museum planning and management. Collections include the Medici, English and American collectors of the Victorian era, and modern corporate and public patrons. GER:DB-Hum

4 units, Win (Rossi, F; Verdon, T)

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
Structural and ideological attributes of narrative cinema, and theories of visual and cinematic representation. How film directors have translated history into stories, and war journals into visual images. Topics: the role of fascism in the development of Italian cinema and its phenomenology in film texts; cinema as a way of producing and reproducing constructions of history; film narratives as fictive metaphors of Italian cultural identity; film image, ideology, and politics of style. GER:DB-Hum

5 units, Win (Campani, E)

OSPFLOR 50F. Introductory Science of Materials
GER:DB-EngrAppSci

4 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPFLOR 54. High Renaissance and Maniera
The development of 15th- and early 16th-century art in Florence and Rome. Epochal changes in the art of Michelangelo and Raphael in the service of Pope Julius II. The impact of Roman High Renaissance art on masters such as Fra' Bartolomeo and Andrea del Sarto. The tragic circumstances surrounding the early maniera: Pontormo and Rosso Fiorentino and the transformation of early Mannerism into the elegant style of the Medicean court. Contemporary developments in Venice. GER:DB-Hum

5 units, Spr (Verdon, T)

OSPFLOR 55. Academy of Fine Arts: Studio Art
Courses through the Academia delle Belle Arti. Details upon arrival. Minimum Autumn and Winter Quarter enrollment required; 1-3 units in Autumn. May be repeated for credit.

1-5 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPFLOR 56. University of Florence Courses

1-5 units, Aut (Campani, E), Win (Campani, E), Spr (Campani, E)

OSPFLOR 58. Space as History: Urban Change and Social Vision in Florence 1059 to the Present
A thousand years of intentional change in Florence. Phases include programmatic enlargement of ecclesiastical structures begun in the 11th century; aggressive expansion of religious and civic space in the 13th and 14th centuries; aggrandizement of private and public buildings in the 15th century; transformation of Florence into a princely capital from the 16th through the 18th centuries; traumatic remaking of the city¿s historic core in the 19th century; and development of new residential areas on the outskirts and in neighboring towns in the 20th and 21st centuries. GER:DB-Hum

4 units, Spr (Rossi, F; Verdon, T)

OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image
Film in the social construction of gender through the representation of the feminine, the female, and women. Female subjects, gaze, and identity through a historical, technical, and narrative frame. Emphasis is on gender, identity, and sexuality with references to feminist film theory from the early 70s to current methodologies based on semiotics, psychoanalysis, and cultural studies. Advantages and limitations of methods for textual analysis and the theories which inform them. Primarily in Italian. GER:DB-Hum, EC-Gender

4 units, Spr (Campani, E)

OSPFLOR 69. The "You" No One Knows: Self Expression through Abstract Art
Overview of the birth and evolution of abstract art with visual background necessary to produce works of art free of a realistic representation. Movements and trends in abstract art; experimentation with different media and techniques.

4 units, Win (Rossi, F)

OSPFLOR 71. Becoming an Artist in Florence: Contemporary Art in Tuscany and New Tendencies in the Visual Future
Recent trends in art, current Italian artistic production, differences and the dialogue among visual arts. Events, schools, and movements of the 20th century. Theoretical background and practical training in various media. Work at the Stanford Center and on site at museums, exhibits, and out in the city armed with a sketchbook and camera. Emphasis is on drawing as the key to the visual arts. Workshops to master the techniques introduced. Limited enrollment.

3-5 units, Spr (Rossi, F)

OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
Institutional design of EU, forthcoming changes, and comparison of the old and new designs. Interactions between the EU, member states, organized interests, and public opinion. Major policies of the EU that affect economics such as competition or cohesion policies, market deregulation, and single currency. Consequences of the expansion eastwards. The role of institutions as a set of constraints and opportunities for the economic actors; relationships between political developments and economic change in the context of regional integration; lessons for other parts of the world. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Morlino, L)

OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon
Interdisciplinary approach to the study of immigration. Typology of forms of migration through politics put into action by the EU and within single nations. Related cultural and religious questions which elicit symbolic borders, territorialization of cultural identities, and the often spatial differentiation of immigrants and locals. The politics of integration and the instruments necessary to manage it. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Allam, K)

OSPFLOR 106V. Italy: From Agrarian to Postindustrial Society
Italian history from the Risorgimento to the present. Society, crises, evolution, values, and the relation to the political institution in different periods. The ideologies, political doctrines, and historical events which contributed to the formation of modern Italy's predominant subcultures: Catholic and Socialist. GER:DB-SocSci, DB-SocSci, EC-GlobalCom

5 units, Aut (Mammarella, G)

OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence
Lectures, site visits, and readings reconstruct the circumstances that favored the flowering of architecture, sculpture, and painting in Florence and Italy, late 13th to early 16th century. Emphasis is on the classical roots; the particular relationship with nature; the commitment to human expressiveness; and rootedness in the real-world experience, translated in sculpture and painting as powerful plasticity, perspective space, and interest in movement and emotion. GER:DB-Hum
4 units, Win (Verdon, T)

OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization
The history, history of art, and symbolism of the two principal monuments of Florence: the cathedral and the town hall. Common meaning and ideological differences between the religious and civic symbols of Florence's history from the time of Giotto and the first Guelf republic to Bronzino and Giovanni da Bologna and the Grand Duchy. GER:DB-Hum
4 units, Aut (Verdon, T)

OSPFLOR 134F. Modernist Italian Cinema
As the embodiment of modernity, cinema develops in the wake of modernism proper, but can be understood as one of its technological and aesthetic expressions. Topics: cinema's archaeology in futurist texts and theories with their nationalistic political flavor and their iconoclastic, radical, and interdisciplinary rethinking of the language and form of all the arts (Marinetti, Pirandello, D'Annuzio). GER:DB-Hum
5 units, Aut (Campani, E)

OSPFLOR 199A. Directed Reading A
1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPFLOR 199B. Directed Reading B
1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES CONSORTIUM IN KYOTO—KCJS (OSPKYOCT) COURSES

OSPKYOCT 103A. Third-Year Japanese I
Preparation for function beyond basic level in a Japanese-speaking environment by developing and enhancing communicative competence through: review of basic grammar; new grammar; reading short essays and articles with help of dictionary; short writing and speaking assignments using formal style to describe, explain, and discuss sociocultural topics; enhancing listening comprehension.
12 units, Aut (Staff)

OSPKYOCT 103B. Third-Year Japanese II
Preparation for function beyond basic level in a Japanese-speaking environment by developing and enhancing communicative competence through: review of basic grammar; new grammar; reading short essays and articles with help of dictionary; short writing and speaking assignments using formal style to describe, explain, and discuss sociocultural topics; enhancing listening comprehension.
12 units, Win (Staff)

OSPKYOCT 104A. Fourth-Year Japanese I
Emphasis on applications of correct grammar and strengthening academic communication skills through: reading longer essays, articles, and novels with some dictionary work; reading and writing assignments in paragraph format using formal style to describe, explain and discuss sociocultural topics; developing listening comprehension.
12 units, Aut (Staff)

OSPKYOCT 104B. Fourth-Year Japanese II
Emphasis on applications of correct grammar and strengthening academic communication skills through: reading longer essays, articles, and novels with some dictionary work; reading and writing assignments in paragraph format using formal style to describe, explain and discuss sociocultural topics; developing listening comprehension.
12 units, Win (Staff)

OSPKYOCT 105A. Fifth-Year Japanese I
For students with advanced proficiency. Goals include advanced command of grammar, composition, and stylistics. Emphasis is on academic Japanese preparing students to audit classes at a Japanese university.
12 units, Aut (Staff)

OSPKYOCT 105B. Fifth-Year Japanese II
For students with advanced proficiency. Goals include advanced command of grammar, composition, and stylistics. Emphasis is on academic Japanese preparing students to audit classes at a Japanese university.
12 units, Win (Staff)

OSPKYOCT 108. Lost in Translation
The art and practice of translating literary texts from a variety of periods and genres. Strategies for translation and essays on translation by literary translators and theorists. Notable translations of Japanese literature in connection with the original texts. Students develop individual translation projects.
6 units, Spr (Staff)

OSPKYOCT 119. Economy, Political Economy, Society and Culture in Japan
Current topics using both writings in English and short selections of non-specialized articles in Japanese from current sources. Analysis and discussion from a social science perspective.
6 units, Spr (Staff)

OSPKYOCT 127. Outside the Mainstream: The Minority Experience in Japan
Historical analysis of how minority communities came into existence and struggled to maintain a distinctive lifestyle in Japan's homogeneous society. Japan's 1979 ratification of UN International Covenant on Civil and Political Rights.
6 units, Aut (Staff), Win (Staff)

OSPKYOCT 128. Families and Work in Post-war Japan
Factors that promoted both change and continuity in the social division of labor between the interdependent spheres of work and family. How cultural strategies for organizing contemporary Japanese social life were conditioned 1) by rapid industrialization and growth and 2) by later economic stasis. Class, gender, and regional variations; role of social psychology in Japanese responses to work-family conflicts.
6 units, Aut (Staff), Win (Staff)

OSPKYOCT 133. Economic Development of Japan
Consideration of Japan and the United States together, both comparatively and in terms of direct relations between the two. Emphasis on direct interaction: the Perry Expeditions, the founding of Doshisha University, influence of American technology in building the Biwako Canal, and in the work American architects in Kyoto. Prerequisite: prior coursework in Japanese history.
6 units, Spr (Staff)

OSPKYOCT 154. History and Culture of Japan
Survey of cultural, political, and economic history of Japan. Fundamental values and aspirations of Japanese who lived in different historical periods; analysis of political, social, and economic systems developed to represent beliefs and ambitions of different eras. Impact on domestic events from inclusion in the East Asia cultural zone and from interactions with the West.
6 units, Aut (Staff), Win (Staff)

OSPKYOCT 161. Kyoto: The Past in the Present
Exploration and observation of the city of Kyoto as a means of understanding its long and complex history; changing connections between past and present. Topics include: nature in the city; Raku tea ceramics; Kyoto street plan; survival of Genji monogatari; Buddhist cemeteries; public baths; Biwako Canal.
6 units, Aut (Staff)

OSPKYOCT 163. The 19th Century in Japan and America
Consideration of Japan and the United States together, both comparatively and in terms of direct relations between the two. Emphasis on direct interaction: the Perry Expeditions, the founding of Doshisha University, influence of American technology in building the Biwako Canal, and in the work American architects in Kyoto. Prerequisite: prior coursework in Japanese history.
6 units, Spr (Staff)

OSPKYOCT 165. History of Architectural Space in Japan
Built environment of Kyoto and the Kansai area with a focus on housing and its historical and cultural background. Overview of major periods of Japanese history from Heian to present as framework to study characteristics of Japanese architecture: asymmetry versus symmetry, relation of inside and outside, ambiguity of space, living with the seasons.
6 units, Aut (Staff)

OSPKYOCT 185. Noh and Kyogen
Noh drama as a mirror of Muromachi period culture. Broad literary heritage and Buddhist precepts reflected in plays. Performance traditions such as Shinto ritual, court dance, harvest festivals, exorcism rites, and narrative entertainment. Wider context of world drama and dramatic theories of the creators of Noh. Close reading of representative plays and first hand experience of performance.
6 units, Spr (Staff)

OSPKYOCT 189. Japanese Religions
Development of Shinto, Buddhism and the New Religions of Japan in historical and contemporary context. Topics include: Shinto mythology; transmission of Buddhism to Japan; teaching, rituals, and practices of the Japanese schools of Buddhism; mountain asceticism; pilgrimage; funerary and memorial rites. Field trips to religious and cultural institutions, rituals and festivals in Kansai area.
6 units, Aut (Staff)

OSPKYOCT 197. Independent Studies
Focused research using the Japanese language and taking advantage of local Kyoto resources. Directed reading and research, weekly meetings with professor, and final research paper. For full-year students with language skills adequate for the proposed research.
6 units, Spr (Staff)

OSPKYOCT 198. Women's Issues in Japan
Women's issues as related to mens issues in Japan. The house system and the legalized prostitution system in modern Japan. Topics include marriage, gender division of labor, child bearing, contraception, and domestic violence. How the private sphere is influenced by the public sphere including politics, economy, and culture.
6 units, Spr (Staff)

OVERSEAS STUDIES: KYOTO—SCTI (OSPKYOTO) COURSES

OSPKYOTO 9K. First-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff, 1)

OSPKYOTO 17K. Second-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff)

OSPKYOTO 17R. Religion and Japanese Culture
Major religious traditions of Japan. Topics include: relation between religion and culture; ancient Japanese religion and Shinto; Buddhist schools of Heian Japan; Zen Buddhism as it flourished in the Kamakura period; Confucianism, as originally conceived in ancient China and as transmitted to Japan in the Edo period in its neo-Confucian form; characteristic modern practices. Field trips to religious centers to observe current religious practices. GER:DB-Hum, EC-GlobalCom
4-5 units, Spr (Ludvik, C)

OSPKYOTO 19K. Second-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff, 1)

OSPKYOTO 33. Digital Systems II
The design of processor-based digital systems. Instruction sets, addressing modes, data types. Assembly language programming, low-level data structures, introduction to operating systems and compilers. Processor microarchitecture, microprogramming, pipelining. Memory systems and caches. Input/output, interrupts, buses and DMA. System design implementation alternatives, software/hardware tradeoffs. Labs involve the design of processor subsystems and processor-based embedded systems. Prerequisite: 108A, CS 106B.
3-4 units, Spr (Kozyrakis, C)

OSPKYOTO 40K. Introductory Electronics
Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43. GER:DB-EngrAppSci
5 units, Spr (Howe, R)

OSPKYOTO 60. Japan in World War II: Experiences and Memory
How various segments of Japanese society view the war in Asia, where fault lines lie, and what attempts have been made to achieve reconciliation. Topics include: origins of the Asia-Pacific War; foreign and domestic images of Japan's wartime actions; American Occupation policy and the Tokyo war crimes trial; impact of peace movements and the Cold War; the emergence of conflicting postwar narratives about the war; Asian perceptions of postwar Japan; the institutionalization of public memory; attempts and failures at reconciliation with Japan's neighbors; comparisons with Europe. GER:DB-SocSci, EC-GlobalCom
4-5 units, Spr (Duus, P; Horvat, A)

OSPKYOTO 119K. Third-Year Japanese Language, Culture, and Communication
5 units, Spr (Staff, 1)

OSPKYOTO 199. Directed Reading
1-4 units, Spr (Staff)

OSPKYOTO 210K. Advanced Japanese
5 units, Spr (Staff, 1)

OSPKYOTO 215X. The Political Economy of Japan
Institutions and processes in the political organization of economic activity in modern Japan. The interaction of public and private sector institutions in the growth of Japan's postwar economy. The organization and workings of key economic ministries and agencies of the government, private sector business groupings, government interaction, and public policy making. The transformation of Japanese industrial policy from the rapid growth of heavy and chemical industries to the promotion of high technology and communications industries. The international, political, and economic ramifications of the structure and importance of Japanese capitalism. GER:DB-SocSci
4-5 units, Spr (Hayashi, T)

OVERSEAS STUDIES: MADRID (OSPMADRD) COURSES

OSPMADRD 12M. Accelerated Second-Year Spanish I
Intensive sequence integrating language, culture, and geo/sociopolitics of Spain. Emphasis is on achieving advanced proficiency in oral and written discourse, including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: one year of college Spanish or 11 or 21B more than two quarters (six months) prior to arriving in Madrid.
5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 13M. Accelerated Second-Year Spanish II
Intensive sequence integrating language, culture, and geo/sociopolitics of Spain. Emphasis is on achieving advanced proficiency in oral and written discourse, including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: 11 or 21B

within two quarters (six months) of arriving in Madrid or 12 or 22B.

5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 14. Introduction to Spanish Culture

Required for Madrid students. Spain's historical, physical, and socioculutural diversity. Includes a weekend study trip and other cultural encounters. Linguistic skills and cultural knowledge through museum visits, readings, and writing a paper in Spanish. Study trips: Autumn Quarter to Cantabria-Léon and Basque country; Winter Quarter to Andalusia and Extremadura; Spring Quarter to Catalonia and Galacia.

1 unit, Aut (Tejerina-Canal, S), Win (Tejerina-Canal, S), Spr (Tejerina-Canal, S)

OSPMADRD 15. Flamenco Dance

Practical instruction. The rhythms and styles of flamenco and the expression of feelings proper to this art form which synthesizes song, music, and dance. Zapateado (footwork), braceo (arm positions and movement technique), and choreographies, including Rumba flamenca and Sevillanas. Enrollment limited. May be repeated for credit.

1 unit, Aut (Murcia Cánovas, L), Win (Murcia Cánovas, L), Spr (Murcia Cánovas, L)

OSPMADRD 32. Health Care Systems Design: Spain, Europe, and the United States

Principles of health care system design; examples from Spain, other European systems, and the United States. Central goals of health care systems in industrialized countries and the demographic, economic, and related challenges facing them. Approaches to system design. Tradeoffs between public sector and private sector approaches; financing issues; provider payment; care management; quality improvement. Operation of physician practices and hospitals. Economic concepts with themes from sociology, political science, demography, and related disciplines. GER:DB-SocSci

4 units, Win (Baker, L)

OSPMADRD 33. Spanish Language Tutorial

May be repeated for credit. Prerequisite: three years of Spanish at Stanford or placement.

2 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 36. Independent Studies in Health Care Systems and Policy

Students my choose one of the following areas for independent study: problems and challenges facing health care systems; approaches to the effective design of health care systems; and comparisons of systems in different countries. Weekly meetings to discuss progress and review goals.

2-4 units, Win (Staff)

OSPMADRD 37. Madrid in Film

Madrid and its people as seen through the lens of contemporary filmmakers from the Franco era to the prosperous times exemplified by the cultural trend known as ¿La Movida.¿ Beginning with the fifties, analyze the different ways Madrid has been depicted in melodramas, social and political characters and stories. Historical, artistic and urban past of Madrid. GER:DB-Hum

3-5 units, Aut (Ruffinelli, J)

OSPMADRD 38. Spanish Catholicism: Religion, Mysticism, Architecture, Art

Survey with emphasis on the Spanish Inquisition, sixteenth century mysticism, and the church in the twentieth and twenty-first centuries (Vatican II, the turn to conservatism in the 1980s, contemporary practice, and Opus Dei). Visits to cathedrals to study the relation between Spanish religion and its architectural expressions. Works of religious art during the era of the Counter-Reformation up to the modern period. GER:DB-Hum

3 units, Spr (Sheehan, T)

OSPMADRD 39. Independent Studies in Spanish Literature or Film

Students may select independent study topics in the following areas: 20th-century Spanish poetry; 20th-century Spanish narratives; 20th-century Spanish cinema; 21st-century Spanish cinema; 20th-century Spanish societal issues; internatiional terrorism in the 20th century; Spanish emigration/immigration.

3-5 units, Aut (Staff)

OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World

Technical and cultural vocabulary and methods to examine literary criticism in the literary genres, movements, and history of literature written in Spanish. Skills to consider Spanish texts critically. GER:DB-Hum

4-5 units, Aut (Tejerina-Canal, S)

OSPMADRD 41. Dissidence and Continuity: Spanish Theater, 1907 to the Present

Tradition, transformation, experimentation, rupture, renovation, and innovation in the theater in Spain as a reflection of the artistic, social and historical commotion that led to the Spanish Civil War, Franco, and the present democratic monarchy. Ortega y Gasset, Benavente, Grau, Valle-Inclán, García Lorca, Buero Vallejo, Sastre, Arrabal, Fernán Gómez, Paloma Pedrero, Yolanda Pallín or other playwrights who may be staged in Madrid theaters. GER:DB-Hum

4-5 units, Win (Tejerina-Canal, S)

OSPMADRD 42. A European Model of Democracy: The Case of Spain

Current Spanish political system, its main judicial and political institutions, outstanding actors' and the political process of the last decade. Historic antecedents; immediate precedents; and the current political system and life. Relation between the elements that constitute a political system; results of the process of democratization; integration to the EU. GER:DB-SocSci

5 units, Win (Bobillo de la Peña, F)

OSPMADRD 43. The Jacobean Star Way and Europe: Society, Politics and Culture

The Saint James' Way as a tool to understand historic dynamics from a global perspective. Its effect on the structures that form a political and institutional system, and its society, economy, and ideology. GER:DB-Hum, EC-GlobalCom

5 units, Spr (Larrañaga Zulueta, M)

OSPMADRD 45. Women in Art: Case Study in the Madrid Museums

Viewing the collections at the Prado Museum through study and analysis of the representations of women. Contemporary literary texts and images that situate paintings in the historical, social, and political conditions that produced the works. GER:DB-Hum, EC-Gender

4 units, Win (Doménech López, J)

OSPMADRD 46. Drawing with Four Spanish Masters: Goya, Velazquez, Picasso and Dali

Approaches, techniques, and processes in drawing. Visits to Madrid museums to study paintings and drawings by Goya, Velázquez, Picasso, and Dalí and to explore the experience of drawing. Subject matter: the figure, still life, interiors, landscape, and non-representational drawing. No previous experience required. Enrollment limited.

3 units, Aut (Sanchez Fuster, O)

OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velazquez, Fuentes, Amodovar

Literary theory and critical analysis of peninsular and Latin American texts. Emphasis is on the origins and development of self-conscious fiction (metafiction). Works by Cervantes, Velázquez, Unamuno, Borges, Fuentes, Torrente Ballester, and Almodóvar. Attendance at music, art, cinema, and Spanish novelist events. In Spanish. GER:DB-Hum

4-5 units, Spr (Tejerina-Canal, S)

OSPMADRD 51. The Meaning of Life: Art, Poetry, Philosophy

An investigation of the large questions about humanistic studies that often get lost such as: How does one investigate the meaning of a well-lived life? Using a novel (Sartre's Nausea), art works (Monet's Un Bar aux Folies Bergere; Monet's Still Life with Flowers and Van Gogh's Irises', poetry (Eliot, Prufrock, Waste

Land, and East Coker), and philosophy (Martin Heidegger's What Is Metaphysics?) raise the questions surrounding the course's title. GER:DB-Hum

3 units, Spr (Sheehan, T)

OSPMADRD 54. Contemporary Spanish Economy and the European Union

Concepts and methods for analysis of a country's economy with focus on Spain and the EU. Spain's growth and structural change; evolution of Spain's production sectors, agriculture, industry, and services; institutional factors such as the labor market and public sector; Spain's economic international relations, in particular, development of the EU, institutional framework, economic and monetary union, policies related to the European economic integration process, and U.S.-EU relationship. GER:DB-SocSci

5 units, Aut (Bunuel, M)

OSPMADRD 57. Health Care: A Contrastive Analysis between Spain and the U.S.

History of health care and evolution of the concept of universal health care based on need not wealth. Contrast with system in U.S. Is there a right to health care and if so, what does it encompass? The Spanish health care system; its major successes and shortcomings. Issues and challenges from an interdisciplinary perspective combining scientific facts with moral, political, and legal philosophy. GER:DB-SocSci

5 units, Spr (Perez Blanco, A)

OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities

Engagement with the real world of Madrid through public service work with NGOs and public service professions such as teaching. Depending on availability, topics relevant to present-day Spain may include: the national health plan, educational system, immigration, prostitution, refugees, youth, and fair trade. Fieldwork, lectures, and research paper. Limited enrollment. May be repeated for credit. Prerequisite: two years of college level Spanish or equivalent.

5 units, Aut (Klaiber, S), Win (Klaiber, S), Spr (Klaiber, S)

OSPMADRD 61. Society and Cultural Change: The Case of Spain

Complexity of socio-cultural change in Spain during the last three decades. Topics include: cultural diversity in Iberian world; social structure; family in Mediterranean cultures; ages and generations; political parties and ideologies; communication and consumption; religion; and leisure activities. GER:DB-SocSci

5 units, Aut (Munoz Carrion, A)

OSPMADRD 62. Spanish California: Historical Issues

Spanish exploration and colonization of California from the 16th century to the end of the Spanish colonial period in 1821. Themes include: geographical explorations in the context of European colonial expansion; demographic evolution of Native American inhabitants and immigrant population; general social and economic development of the colony; controversies surrounding the mission system; role of the Pacific coasts of North America in the Spanish enlightenment and in strategies for imperial defense and development in the revolutionary era of the late 18th and early 19th centuries.

5 units, Spr (Hilton, S)

OSPMADRD 71. Sociology of Communication

Understanding the sociocultural diversity of communication in Spain with the help of theoretical and practical tools. How communication happens through language and other means; significance of images in today's world; vision of the world produced by media; problems of social communication from perspective of reception. Offered at the Universidad Complutense with an additional tutorial for Stanford students.

5 units, Spr (Munoz Carrion, A)

OSPMADRD 72. Issues in Bioethics Across Cultures

Ethical dilemmas concerning the autonomy and dignity of human beings and other living creatures; principles of justice that rule different realms of private and public life. Interdisciplinary approach to assessing these challenges, combining scientific facts, health care issues, and moral philosophy. Sources include landmark bioethics papers.

5 units, Win (de Lora del Toro, P)

OSPMADRD 102M. Composition and Writing Workshop for Students in Madrid

Advanced. Writing as craft and process, emphasizing brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Students choose topics related to their studies. Prerequisite: 13, 23B, or equivalent placement.

3-5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 199A. Directed Reading

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES: MOSCOW (OSPMOSC) COURSES

OSPMOSC 10M. Intensive First-Year Russian

9 units, Aut (Kurganova, L)

OSPMOSC 15. Academic Internship

Placements in areas such as banking, finances, consulting, journalism, language teaching, and technology. Introduction to Russian society and work experience. Evaluation and analysis of experience in final academic paper.

2-3 units, Aut (Abashkin, A)

OSPMOSC 51M. Second-Year Russian

5 units, Aut (Boldyreva, T)

OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia

Russian economic history in the 20th century. Reasons and logic for economic transformation, major components of postcommunist economic transformation doctrine, and results of practical implementation. Mechanisms of economic policy decision making in modern Russia, and patterns of and alternatives in economic development. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Mau, V; Novikov, V)

OSPMOSC 72. Space, Politics, and Modernity in Russia

The idea of space as a key to understanding Russian politics and governance, economy, society, and culture. Phenomenology of Russian space: structure, topology, and features, including notions of enormity. Space in its relation to state power; how geography shaped Russian history and politics. Reification of space-state relationship on levels such as economy, politics and administration, security and social mobility, nationalism and imperialism, culture and language, and habits and ways. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Medvedev, S)

OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration

Analysis of the opportunities and challenges for political, economic, and military cooperation within the Shanghai Cooperation Organization (SCO). Likelihood of SCO¿s aspirations being realized and the potential of its becoming a political and military counterbalance to the West. Issues related to national security and security perceptions of post-Soviet states and China, their economic and energy ambitions and needs, and the role of external players in the region. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Bratersky, M; Kortunov, S)

OSPMOSC 78. Russian-American Relations: from the War of Independence to the War on Terror

Relations between Russia and the U.S. since the eighteenth century with an introduction covering the period prior to the American Revolution. GER:DB-SocSci

5 units, Aut (Ivanian, E)

OSPMOSC 80. Foundations of Russian Culture Through the Visual

Key elements of Russian culture, 16-19th centuries, explored by reference to visual objects that can be viewed in Moscow. Four themes: orthodoxy; autocracy; Europeanizing reforms; 19th-century intelligentsia, radical movement and realist historical art. Occasional excursions to see sights in situ, after reading and discussion. GER:DB-Hum

3-5 units, Aut (Kollmann, N)

OSPMOSC 81. Six Centuries of Russian History through Architecture: Walking Tour
Background lectures and discussion followed by excursions to sites that represent key stages in Russian history to the 20th century: Kremlin, Red Square, Kolomenskoe, WWII monuments, architectural representatives of Classicism, Art nouveau, Constructivism, Stalinist Monumentalism/Socialist Realism.
2 units, Aut (Kollmann, J; Kollmann, N)

OSPMOSC 111M. Third-Year Russian
5 units, Aut (Filatova, G)

OSPMOSC 177M. Fourth-Year Russian
5 units, Aut (Shishkina, I)

OSPMOSC 181M. Fifth-Year Russian
(Same as SLAVLANG 181M)
5 units, Aut (Kurganova, L)

OSPMOSC 199A. Directed Reading
2-5 units, Aut (Staff)

OVERSEAS STUDIES: OXFORD (OSPOXFRD) COURSES

OSPOXFRD 12. Oxford University, Yesterday and Today
Introduction to the history and culture of Oxford University. How the university's 800-year history has left its mark on the buildings for which Oxford is famous and how it helps explain the unique characteristics of the modern university: its collegiate structure, individualistic method of tutorial teaching, and idiosyncratic culture celebrated by writers such as Lewis Carroll, Gerard Manley Hopkins, and Evelyn Waugh. Lectures and walking-tours, mostly in the first three weeks of the term.
1 unit, Spr (Tyack, G)

OSPOXFRD 13. Politics and Economics of the Euro Zone
The political origins of the common European currency, how the idea of a shared currency spread throughout the community, and why some members, in particular, Britain, chose not to participate. How challenges to the dollar by the Euro and the Yuan have affected the world economy. Instances of financial instability of nations since 1990 and the extent to which bankers can act to stabilize world trade and investment flows. GER:DB-SocSci
5 units, Win (Goldstein, J)

OSPOXFRD 14. Independent Study: Selected Topics
Students select from three potential areas of independent study. If more than three students are interested in a particular topic, the class moves to a seminar format. Topics are: the European perspective on trade; European integration and the world economy; the expansion of the EU: will the EU survive?
1-5 units, Win (Staff)

OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850
The influence of classicism and the Renaissance. Insights into European art and architecture and the history of Britain from the Tudor era to the Industrial Revolution. Study trips to London and elsewhere in England. GER:DB-Hum
4-5 units, Aut (Tyack, G)

OSPOXFRD 17. Novels of Sensation: Gothic, Detective Story, Prohibition, and Transgression in Victorian Fiction
Literary and moral value of transgressive sub-genres of the novel; what they reveal about Victorian society's anxiety over prohibited elements in the domestic and public spheres. Sources include gothic and detective novels. GER:DB-Hum
5 units, Aut (Plaskitt, E)

OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics
UK and U.S. What should society look like? How should incomes be distributed? How should it be taxed? How much inequality is acceptable? The overlap of economics with practical politics through political philosophy behind the government decisions; how public policy ought to be formulated. Issues include poverty, environmental policy, trade and globalization, and transport. GER:DB-SocSci
4-5 units, Win (McMahon, R)

OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective
Introduction to the study of constitutions and constitutional systems of government. The workings of the British and American systems of government. Comparative study of the most important constitutional issues facing Britain and the U.S. such as how suspected terrorists should be treated in a time of war. How to think about fundamental constitutional questions. GER:DB-SocSci
4-5 units, Spr (McMahon, R)

OSPOXFRD 35. Modern UK and European Government and Politics
Background of main political systems in Europe and recent developments in European politics. Topics: Blair's constitutional reforms; the consequences of the German reunification; Berlusconi's rise to power in Italy; the extreme right in France and elsewhere; the single currency; the enlargement of the EU; and proposals for a constitution and their recent rejection by the French and Dutch electorates. GER:DB-SocSci
4-5 units, Aut (Capoccia, G)

OSPOXFRD 45. British Economic Policy since World War II
Development of British economic policy making from 1945, focusing on political economy including: ideological motives of governments; political business cycle; and the influence of changing intellectual fashions. Policy areas: attitude to the pound; control of the business cycle; and the role of the state in the economy. Prerequisite: ECON 50. GER:DB-SocSci
5 units, Aut (Forder, J)

OSPOXFRD 57. The Rise of the Woman Writer 1660-1860
Emergence and rise of the professional woman writer from playwright and Royalist spy Aphra Behn (1640-89) to novelist and proto-feminist Charlotte Bronte (1816-55). How women writers dealt with criticism for writing publicly, placing each author and text in its historical and literary context. Range of poets, playwrights, and novelists including Eliza Haywood, Frances Burney, and Mary Elizabeth Braddon. Topics: gender roles and proto-feminism, the public versus the private sphere, sexuality, courtship and marriage. GER:DB-Hum, EC-Gender
5 units, Spr (Plaskitt, E)

OSPOXFRD 58. British Science and Technology
Current status of science and technology in Britain, particularly with regard to the decision-making process. Focus on biological and physical sciences. Comparisons with equivalent processes and institutions in the US.
3 units, Aut (Sinclair, R)

OSPOXFRD 59. Soccer and English Society
Changes in English society as mirrored by changes in soccer. English social history over the past 150 years with particular regard to the working class struggle and more modern-day development of cosmopolitan Britain.
5 units, Aut (Sinclair, R)

OSPOXFRD 61. Castles and Satanic Mills: the Medieval in British Art, Architecture and Literature, 1750-1914
Changing visions of the Middle Ages in British culture through painting and poetry, novels, architecture and sculpture. Beginning with Horace Walpole¿s Strawberry Hill and his Castle of Otranto and later Thomas Beckford¿s house Fonthill, interpretations of the Middle Ages up to the First World War. Includes Walter Scott, Victorian Gothic, Thomas Carlyle, John Ruskin, Charles Darwin, Gerald Hopkins, George Bodley and Ninian Comper.
4 units, Spr (Hill, R)

OSPOXFRD 67. Art in Oxford
Paintings and drawings in the collections of the University and colleges of Oxford and how they relate to key themes and critical approaches in the history of art. Themes include collecting and patronage, the impact of art historical scholarship on collections, drawing and its purposes, changing approaches to Renaissance art, symbolism and realism in 19th-century painting, and romantic and modern landscapes. Limited Enrollment.
3 units, Win (Tyack, G)

OSPOXFRD 70. The History of London
London's physical growth, emphasizing characteristics which set it apart from other capitals, and its economic, social and political development, including the problems of poverty and the inner city, the provision of public services, and the growth of suburbs and public transport. Challenges facing London in modern times.

Walking tours, especially less frequented areas. GER:DB-SocSci, EC-GlobalCom

4-5 units, Spr (Tyack, G)

OSPOXFRD 71. Oxford Trans-Idiomatic Arts Practicum

Work of art as a noun: observation, appreciation and criticism of local artistic landscape through field trip examinations of architecture, theater, opera, experimental music, jazz, popular music, painting, sculpture, installation art, photography, film, dance, and cuisine. Work of art as a verb: creation of original works of art inspired by local environment; projects might include recording of Oxford's sound ecology to transform into electronic music works, group performance art, original dance or movement pieces, found object sculpture, and public poetry readings related to and staged throughout the city.

3 units, Spr (Applebaum, M)

OSPOXFRD 72. The British Invasion

How the British have been effective at celebrating, appropriating, reinterpreting, and exporting American popular music culture. Understanding not only British culture, but also America as seen through British eyes and heard through British voices through examination of rich legacy of British popular music. Three generations of British popular music in the 1960s and 1970s: the music of the ¿British Invasion,¿ focusing on the Beatles; development of progressive rock (art rock) as embodied in groups such as Pink Floyd; the emergence of punk in both its revolutionary (e.g., the Clash) and nihilistic (e.g., the Sex Pistols) forms. GER:DB-Hum

3 units, Spr (Applebaum, M)

OSPOXFRD 92. Britain and the Second World War

Britain's economy, society, and culture after its participation throughout the whole length of the war, 1939-1945; subsequent relations with rest of the world. Chronological account and interpretation of participation; effect of the war on British people, especially civilians. Historical scholarship, contemporary writings, propaganda films and feature films, art and photography, and recent television documentaries with reminiscences of participants. GER:DB-Hum

5 units, Win (Tyack, G)

OSPOXFRD 98. Creative Writing Workshop

Selection and combination; poetic language; metaphor and cohesion; setting and the pathetic fallacy; sentence variety; genres; dialogue; point of view; narrative positions; colors and senses; time management; plotting. Limited enrollment based on writing sample.

3 units, Win (Kidd, H), Spr (Kidd, H)

OSPOXFRD 117W. Gender and Social Change in Modern Britain

Changes in the social institutions, attitudes, and values in Britain over the past 20 years with specific reference to shifts in gender relations. Demographic, economic and social factors; review of theoretical ideas. Men's and women's shifting roles in a fast-moving society. GER:DB-SocSci, DB-SocSci, EC-Gender

4-5 units, Win (Palmer, A)

OSPOXFRD 163X. Shakespeare: Critical Commentary

For English majors or minors only. Topics include the use of soliloquy, epilogues, alternation of prose and verse, rhetoric, meta-theatricality. Close reading technique. GER:DB-Hum

5 units, Aut (Rowley, R)

OSPOXFRD 195A. Tutorial in Anthropology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195B. Tutorial in Biology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195C. Tutorial in Classics
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195E. Tutorial in Drama
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195F. Tutorial in Economics
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195G. Tutorial in Economic History
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195J. Tutorial in Jurisprudence
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195L. Tutorial in Health Care
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195M. Tutorial in History of Science
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195N. Tutorial in Human Biology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195P. Tutorial: Interdisciplinary
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195R. Tutorial in International Relations
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195T. Tutorial in Literature
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195U. Tutorial in Music
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195V. Tutorial in Philosophy
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 195Z. Tutorial in Political Science
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196A. Tutorial in Psychology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196B. Tutorial in Religion
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196C. Tutorial in Sociology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196E. Tutorial in History
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196F. Tutorial in History of Art
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196K. Tutorial in Zoology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196M. Tutorial in Public Policy
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 196N. Tutorial in Mathematics
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197A. Tutorial in Anthropology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197B. Tutorial in Biology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197C. Tutorial in Classics
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197E. Tutorial in Drama
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197F. Tutorial in Economics
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197J. Tutorial in Jurisprudence
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197L. Tutorial in Health Care
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197M. Tutorial in History of Science
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197N. Tutorial in Human Biology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197P. Tutorial: Interdisciplinary
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197R. Tutorial in International Relations
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197T. Tutorial in English Literature
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197U. Tutorial in Music
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197V. Tutorial in Philosophy
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 197Z. Tutorial in Political Science
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198A. Tutorial in Psychology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198B. Tutorial in Religion
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198C. Tutorial in Sociology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198E. Tutorial in History
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198F. Tutorial in History of Art
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198K. Tutorial in Zoology
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198M. Tutorial in Public Policy
6-7 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 198N. Tutorial in Mathematics
6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 199A. Directed Reading A
2-4 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 199B. Directed Reading B
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 199D. Directed Reading
1-3 units, Spr (Staff)

OVERSEAS STUDIES: PARIS (OSPPARIS) COURSES

OSPPARIS 10. Engineering Research Internship
For Paris Program students with academic experience in electronics, telecommunications or signal and image processing. Under direct guidance of researchers at Institut Supérieur d¿Electronique de Paris (ISEP), and where applicable, in collaboration with other French and international graduate students, contribute to the ISEP's ongoing research projects.
6 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 14. Media Internship
Case studies and independent research as groundwork for comparative analysis of media on both sides of the Atlantic. Nature of media in the U.S and in France. Media as a means for understanding culture.
3 units, Aut (Halevi, E), Win (Halevi, E), Spr (Halevi, E)

OSPPARIS 18. French in the Working Environment
Preparation for internships in Paris. Understanding cultural differences between the U.S.and France in the business world: formailty/familiarity; written/spoken language; sense of time and space. Vocabulary and jargon specific to French busines world. Official letter writing in French.
1 unit, Aut (Ricci, M), Win (Ricci, M)

OSPPARIS 19. Arranged Internship 1
Two-quarter stay required. Internships can be arranged in a number of areas including the arts, architecture, politics, engineering, marketing and PR, media and journalism, health and psychological services, IT, NGO's, research, and hospitality administration.
3-6 units, Aut (Halevi, E), Win (Halevi, E), Spr (Halevi, E)

OSPPARIS 19B. Arranged Internship 2
Two-quarter stay required. Internships can be arranged in a number of areas including the arts, architecture, politics, engineering, marketing and PR, media and journalism, health and psychological services, IT, NGO's, research, and hospitality administration.
3-6 units, Aut (Halevi, E), Win (Halevi, E), Spr (Halevi, E)

OSPPARIS 22P. Intermediate French I
4 units, Aut (Reychman, P), Win (Molkou, E), Spr (Reychman, P)

OSPPARIS 23. Independent Study: The Vertebrate Skull
Projects based on questions posed by Thomas Huxley on theory of evolution. Using the extensive skull collection in Paris' Museum of Natural History, gain an understanding of how the scientific method can be used to transform the way we think about our world.
3 units, Win (Staff)

OSPPARIS 23P. Intermediate French II
4 units, Aut (Molkou, E), Win (Ricci, M), Spr (Gourevitch, S)

OSPPARIS 24. Introduction to French Society
Required of Paris program participants. Engagement with French society through language immersion, volunteer work, projects with French students, encounters with prominent figures, and visits to French political and cultural institutions.
1 unit, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 29. Colonization, Decolonization and Immigration: Overview of French Global History in the 20th Century
Social and historical phenomena of colonization and decolonization in France during the 20th century, and their relation to the migratory movements that took shape after the Second World War. Case study of Algeria. Topics include: phenomenon of colonization in its administrative, judicial, social, economic and political context; conflicts leading to independence of colonized territories; migration of population before and after decolonization. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Hmed, C)

OSPPARIS 30. The Avant Garde in France through Literature, Art, and Theater
Multiple artistic trends and esthetic theories from Baudelaire to the Nouveau Roman, from the Surrealists to Oulipo, from the theater of cruelty to the theater of the absurd, from the Impressionists to Yves Klein. Interdisciplinary approach to reflect on the meaning of avant garde and modernity in general, and on the question of why revolutionary artists in France remained in search of institutional recognition, nonetheless. GER:DB-Hum
4 units, Spr (Karsenti, T)

OSPPARIS 32. Understanding French Politics
Key aspects of French politics including the constitutional framework, institutions, political parties and ideology, elections, political cultures, religion and politics, political elites and public policy-making, grass-root citizen participation, decentralization and local politics, and the major issues that structure and inform public debate, including attitudes and policies vis-à-vis the US. GER:DB-SocSci
4-5 units, Aut (Chamorel, P)

OSPPARIS 33. The Economics of Climate Change: Policies in Theory and Practice in the EU and the U.S.
Economic tools for tackling climate change. Analytical bases of existing cap-and-trade schemes. The European greenhouse gas Emission Trading Scheme within the frame of the Kyoto Protocol, and emerging regulatory or voluntary markets in the U.S. Carbon-pricing mechanisms with focus on power and gas markets. Possibilities of linking carbon pricing mechanisms on both sides of the Atlantic and conditions for integrating these markets into an international post-Kyoto agreement. GER:DB-SocSci, EC-GlobalCom
5 units, Spr (de Perthuis, C; Leguet, B)

OSPPARIS 36. French Writing Workshop
Offered upon request for students who have completed an Advanced French course. Focus on French writing style, enabling students to understand and master the subtleties of French writing.
3 units, Spr (Molkou, E)

OSPPARIS 40P. Introductory Electronics
Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43. GER:DB-EngrAppSci
5 units, Aut (Lee, T), Spr (Howe, R)

OSPPARIS 41. EAP: Perspective, Volume, and Design
May be repeated for credit.
2 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 42. EAP: Drawing with Live Models
May be repeated for credit.
2 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 43. EAP: Painting and Use of Color
May be repeated for credit.
2 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 44. EAP: Graphic Art
May be repeated for credit.
2 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 45. Notre-Dame de Paris: French Literature and the History of Paris
Reading one of the eleven books each week, focus is on the literary structures of the novel and the cultural context, for a broader understanding of the period known as the autumn of the Middle Ages. Hugo's descriptions and comments as a point of departure for detailed examination of the theme of the week.
5 units, Aut (Apostolides, J)

OSPPARIS 49. French Connections in America: the 18th and 19th Centuries
The deep intellectual, political, and cultural ties that linked France and America in the eighteenth and nineteenth centuries. Role of France in American history through case studies, documents, and images produced by Americans in France and the French in America. Topics include: British and French empires in North America; the American and French revolutions; the place of French republican thought in the American transition to republican government; the experience of an American slave in Paris; social commentaries of Alexis de Tocqueville and Lewis Cass. GER:DB-Hum
5 units, Spr (Winterer, C)

OSPPARIS 50P. Introductory Science of Materials
GER:DB-EngrAppSci
4 units, Aut (Staff, 1), Win (Staff, 1), Spr (Staff, 1)

OSPPARIS 53. The Shape of Things to Come: the Evolution of Science and Society
Following in the footsteps of Huxley, learn the origins of the skeleton and how science and societies co-evolved. GER: DB-NatSci
4 units, Win (Helms, J)

OSPPARIS 54. The Artist's World: The Workshop, Patronage and Public in 19th and 20th Century France
Synergy between artists, their workshops, patrons, models and the public in 19th and 20th century France. Weekly sessions in museums, artists' studios, and special venues within and around Paris, attempting to understand the world of the artist, and how, in many cases, this world became not only a place of refuge, but a metaphor of the artistic creation itself. GER:DB-Hum
4 units, Win (Halevi, E)

OSPPARIS 57. Human Rights in Comparative Perspective
Human rights arose from Enlightenment principles but their status in the American and French constitutions differ. Have European court decisions created a transatlantic human rights model giving more weight to Anglo-Saxon legal tradition? Philosophical, historical, and legal resources; recent case studies from both sides of the Atlantic. GER:DB-SocSci, EC-GlobalCom
4-5 units, Win (Boussaguet, L)

OSPPARIS 58. Tintin as a Hero and a Myth
Introduction to the work of the highly original 20th-century artist, Hergé. Focus is on the Adventures of Tintin, analyzed from a triple perspective: as a visual art achievement, as a piece of literature, and as a myth.
5 units, Aut (Apostolides, J)

OSPPARIS 60. Representations of Women in Christian Art: Boldness and Virtue
Representation of women as biblical heroes and saints in Christian art. Codes of iconography and the attributes of women saints from the Renaissance to the 19th century; underlying social and moral force of these women figures throughout history. Class sessions in Paris museums. GER:DB-Hum
4 units, Spr (Gallini, B)

OSPPARIS 81. France During the Second World War: Between History and Memory
French politics and society from the causes of the collapse of the French Third Republic and the emergence of the French State at Vichy. The political and cultural measures of this regime in the shadow of Nazi Germany. Anti-Jewish laws and action; deportations by Vichy, the Germans, the French Fascists, and reactions to the fate of the Jews. Visions of the Resistance, the combat for liberation, and WW II in the collective memory of France. GER:DB-SocSci
5 units, Win (Virgili, F)

OSPPARIS 91. Globalization and Its Effect on France and the European Union
Economic and political impact of globalization on France and the EU and influence of France and the EU on the process of globalization. Issues of sovereignty and national identity for France; protection from versus integration into the network of globalization. GER:DB-SocSci, EC-GlobalCom
5 units, Win (Le Cacheux, J; Laurent, E)

OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design
The development of Parisian building and architecture from the 17th century to the present. Interaction of tradition and innovation in its transformation and its historical, political, and cultural underpinnings. Visits and case studies throughout Paris illustrate the formation of the city landscape and its culture. GER:DB-Hum
4 units, Spr (Halevi, E)

OSPPARIS 103A. French Lecture Series 1
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 104A. French Lecture Series 2
1 unit, Aut (Halevi, E), Win (Halevi, E), Spr (Halevi, E)

OSPPARIS 105A. French Lecture Series 3
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 107Y. The Age of Cathedrals: Religious Art and Architecture in Medieval France
The major artistic and cultural movements that changed the face of France from the period of Suger in the 12th century through the reign of St. Louis in the 13th century. Monastic spirituality progressively gave way to an urban culture focused on man and secular knowledge, which developed daring and sophisticated building techniques. The years 1150-1250 represented a period of architectural renaissance and l'Ile-de-France was its birthplace. GER:DB-Hum
4 units, Aut (Deremble, C; Deremble, J)

OSPPARIS 122X. Challenges of Integration in the European Union
European integration is now an economic, social, and political reality. This integration has a history of mutation and a transformation of its very foundation. Topics: the evolution of welfare states, elites, political parties, and systems in Europe; lobbies, trade unions, voluntary associations, social movements, popular protest, citizenship, democracy. GER:DB-SocSci
4-5 units, Spr (Strudel, S)

OSPPARIS 124P. Advanced French I
4 units, Aut (Ricci, M)

OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead
Issues and challenges of European economic construction. The European Economic Union at the end of the 50s; European industrial, agricultural, social, and monetary economic policies. Topics: wider definitions of Europe, its relations with industrial and developing countries, and its challenges in confronting global economic crises. GER:DB-SocSci
5 units, Aut (Le Cacheux, J; Laurent, E)

OSPPARIS 125P. Advanced French II
4 units, Win (Guedon, P), Spr (Mercier, F)

OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time
Should health systems be organized or left to the free market? What is the role of the state in the delivery of health care? The evolution of the health profession, health policy, and reform in France and the U.S.; measures restraining professional autonomy such as prescription guidelines in the French Medical Convention. Is the solution to the increase of health expenditures and reduced access to health care the end of autonomy for the medical profession? GER:DB-SocSci, EC-GlobalCom
4-5 units, Aut (Fessler, J)

OSPPARIS 180. Paris Special Topics
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 186F. Contemporary African Literature in French
Focus is on African writers and those of the diaspora, bound together by a common history of slave trade, bondage, colonization, and racism. Their works belong to the past, seeking to save an oral heritage of proverbs, story tales, and epics, but they are also contemporary. GER:DB-Hum, EC-GlobalCom
4 units, Win (Mercier, F)

OSPPARIS 195C. Paris University: Health and Science 1
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 195D. Paris University: Health and Science 2
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 196C. Paris University: Humanities 1
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 196D. Paris University: Humanities 2
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 196E. Paris University: Humanities 3
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 197C. Paris University: Social Science 1
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 197D. Paris University: Social Science 2
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 198C. Paris University: Engineering 1
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 198D. Paris University: Engineering 2
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 199A. Directed Reading A
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 199B. Directed Reading B
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 199C. Directed Reading: C
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES: SANTIAGO (OSPSANTG) COURSES

OSPSANTG 10. Borges and Argentina
His work and readings of other key figures of Argentine literature during the period. Close reading technique. Readings in the context of the main developments in Argentine history, and in relationship to the major literary and philosophical trends of the 20th century. Topics include Borges' rejection of the novel, storytelling as a reaction against romanticism, philosophical concerns, paradoxical plot devices, humor, and influence in Latin America. Readings include short stories such as The Library of Babel and The Aleph, poems and essays, and texts by key Argentine writers of the period including Arlt, Bioy Casares, Silvina Ocampo, and Cortázar. GER:DB-Hum
4-5 units, Spr (Missana, S)

OSPSANTG 12S. Accelerated Second-Year Spanish, Part I: Chilean Emphasis
Intensive sequence integrating language, culture, and sociopolitics of Chile. Emphasis is on achieving advanced proficiency in oral and written discourse including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: one year of college Spanish, or 11 or 21B if taken more than two quarters prior to arriving in Santiago.
5 units, Aut (Abad, M), Win (Abad, M), Spr (Abad, M)

OSPSANTG 13S. Accelerated Second-Year Spanish, Part II: Chilean Emphasis
Intensive sequence integrating language, culture, and sociopolitics of Chile. Emphasis is on achieving advanced proficiency in oral and written discourse including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: 11 or 21B within two quarters of arriving in Santiago, or 12 or 22B.
5 units, Aut (Abad, M), Win (Abad, M), Spr (Abad, M)

OSPSANTG 14. Women Writers of Latin America in the 20th Century
Key figures in poetry, narrative fiction, theater, and testimonio, such as Mistral, Garro, Lispector, Poniatowska, Valenzuela, Eltit and Menchú. Close reading technique. Issues raised in literary texts that reflect the evolution of the condition of women in Latin America during the period. Topics include gender differences and relationships, tradition versus transgression, relationship between changes in the status of women and other egalitarian transformations, and women writers and the configuration of literary canons. GER:DB-Hum, EC-Gender
4-5 units, Aut (Missana, S), Win (Missana, S)

OSPSANTG 27. Humans and the Environment: The Great Transitions
Environmental conditions and major environmental changes that accompanied the major transitions: the change from hunter-gatherers to agriculture ca. 10000 years ago; the spread of farming over the next 6000 years; the early development of science and technology; the industrial revolution and the first demographic transition; the second demographic transition to low fertility; and the third demographic transition to long lives. Focus on four main dimensions: demography, culture and choice, environment, and technology, using an evolutionary perspective. 3 units may be counted toward Biology major. GER: DB-NatSci
3-5 units, Win (Tuljapurkar, S)

OSPSANTG 33. Spanish Language Tutorial
Prerequisite: two years of college Spanish or equivalent placement.
2 units, Aut (Toledo, G), Win (Toledo, G), Spr (Toledo, G)

OSPSANTG 40. Academic Internship
2-3 units, Aut (Jaksic, I), Win (Jaksic, I), Spr (Jaksic, I)

OSPSANTG 58. Living Chile: A Land of Extremes
Physical, ecological, and human geography of Chile. Perceptions of the Chilean territory and technologies of study. Flora, fauna, and human adaptations to regional environments. Guest lectures; field trips; workshops. GER:DB-EngrAppSci
5 units, Aut (Bustamante, M), Win (Staff, 1)

OSPSANTG 62. Topics in Chilean History
Independent study topic concerning any aspect of Chilean history such as independence and nation building, social and economic development, ideas and culture, dictatorship and democracy. Research paper based on primary and secondary sources. GER:DB-Hum
4-5 units, Win (Staff)

OSPSANTG 66. Latin American Current Affairs
Recent events in the region using Michael Reid's interdisciplinary work Forgotten Continent: The Battle for Latin America's Soul as a point of departure. Sources include essays, newspapers, magazines and films from several countries. Tools to formulate assessment of the contemporary situation and to undertake independent research projects. Topics include: populism, economic reform, regional integration, and cultural trends.
3-5 units, Aut (Hoyos, H)

OSPSANTG 67. 21st Century Chilean Literature
Analysis and discussion of prominent figures in the contemporary Chilean literary scene, primordially: Roberto Bolaño, Diamela Eltit, Alberto Fuguet, and Pedro Lemebel. In coordination with events at local bookstores and other cultural venues. Topics: post-dictatorship, neoliberalism, exile, urban fiction, popular culture, and gender discourses. GER:DB-Hum
3-5 units, Aut (Hoyos, H)

OSPSANTG 68. The Emergence of Nations in Latin America
Major themes of 19th-century Latin American history, including independence from Spain, the emergence of nation states, and the development of a new social, political, and economic order. GER:DB-SocSci
4-5 units, Aut (Jaksic, I), Spr (Jaksic, I)

OSPSANTG 85. Marine Ecology of Chile and the South Pacific
Relationships among physical processes in the ocean, biological productivity, and the exploitation of resources by high-thropic-level predators including human beings. Characterization of ecological patterns; identification of processes operating on marine systems. Open ocean ecosystems, intertidal and benthic regions of the world¿s oceans, and ecological research developed along

coastal regions, focusing on Chile¿s 4,000 km coastline. GER: DB-NatSci

5 units, Spr (Palma, A)

OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago

Advanced. Writing as craft and process: brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Non-Spanish majors or minors may choose topics related to their studies. Prerequisite: SPANLANG 13C, 13R, 13S, 23B, or equivalent.

3-5 units, Aut (Bobbert, A), Win (Rivano, P), Spr (Bobbert, A)

OSPSANTG 104X. Modernization and Culture in Latin America

Intellectual and cultural expressions of Latin America against the background of modernization viewed as a constant tension between rationalization and subjectification, change and identity preservation, and the logic of development or economic expansion and the logic of the culture. Readings include Morande, Cultura y modernización en América Latina and Sarlo, Una modernidad periférica. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Subercaseaux, B)

OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century

Chile's strides towards becoming a developed country have engendered high levels of alienation and disaffection among significant sectors of the population. The roots of this apparent paradox of modernization, focusing on newly emerging actors in the Chilean political scene: Mapuche organizations, women's groups, the environmental movement, and new features of the established ones like trade unions and human rights activists. GER:DB-SocSci

5 units, Spr (Correa, G)

OSPSANTG 118X. Artistic Expression in Latin America

Elite, mass-media, and popular cultural changes in Chile under conditions of economic and political liberalization. The reception of cultural meanings from the center of the world social system (U.S., EU, and Japan), reformulation to respond to local conditions, and export in the shape of cultural artifacts. Innovative elements rooted in the regional and local culture. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Albornoz, C)

OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies

The Chilean economy in five stages, taking into account: the international economic position of Chile; internal economic structures closely related to the inherited historical conditions and to the changing international economic position of the country; and the economic strategies prevalent during the period and the concrete development policies conducted by government authorities. GER:DB-SocSci

5 units, Spr (Staff, 1)

OSPSANTG 129X. Latin America in the International System

Latin America's role in world politics, with emphasis on the history of and models for explaining U.S.-Latin American relations. Latin America's evolving relationship in the international system. GER:DB-SocSci

4-5 units, Win (Staff, 1)

OSPSANTG 130X. The Chilean Economy in Comparative Perspective

Introduction to the main debates and approaches developed to understand and analyze the economies of Latin America. Recent processes of transition to market economies. Common characteristics among countries of the region; the differences and special traits of individual countries. Historical, analytical, and empirical perspectives on topics at the center of controversies and specific policy problems over several decades. Recommended: ECON 1, 51, and 52. GER:DB-SocSci

5 units, Aut (Aninat, C), Win (Aninat, C)

OSPSANTG 141X. Politics and Culture in Chile

The relationship between politics and culture in Chile during the 20th century, reflecting on the effects of such relationships on esthetics and identity. The possibility that, in Chile, culture has been pulled by politics and social praxis, a condition that has created a deficit in cultural thickness. The oligarchic regime around 1920, the welfare state around 1940, projects of social transformation around 1970, dictatorship around 1980, women writers and Mapuche poetry in contemporary Chile. GER:DB-Hum, EC-GlobalCom

5 units, Spr (Subercaseaux, B)

OSPSANTG 196A. Universidad de Chile: Humanities I

(Staff)

4 units, Spr (Staff, 1)

OSPSANTG 196B. Universidad de Chile: Humanities II

4 units, Spr (Staff, 1)

OSPSANTG 196C. Universidad de Chile: Social Sciences I

4 units, Spr (Staff, 1)

OSPSANTG 196D. Universidad de Chile: Social Sciences II

4 units, Spr (Staff, 1)

OSPSANTG 196E. Universidad de Chile: Sciences

4 units, Spr (Staff, 1)

OSPSANTG 196F. Universidad de Chile: Sports

1 unit, Spr (Staff, 1)

OSPSANTG 196J. Pontificia Universidad de Chile: Humanities I

4 units, Spr (Staff, 1)

OSPSANTG 196K. Pontificia Universidad de Chile: Humanities II

4 units, Spr (Staff, 1)

OSPSANTG 196L. Pontificia Universidad de Chile: Social Sciences I

4 units, Spr (Staff, 1)

OSPSANTG 196M. Pontificia Universidad de Chile: Social Sciences II

4 units, Spr (Staff, 1)

OSPSANTG 196N. Pontificia Universidad Catolica de Chile: Sciences

4 units, Spr (Staff, 1)

OSPSANTG 196Q. Pontificia Universidad de Chile: Sports

1 unit, Spr (Staff, 1)

OSPSANTG 196R. Pontificia Universidad Catolica de Chile:: Engineering I

4 units, Spr (Staff)

OSPSANTG 196S. Pontificia Universidad Catolica de Chile: Engineering II

Student selection from courses at Pontificia Universidad Católica de Chile.

4 units, Spr (Staff)

OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective

The dynamics of the Chilean transition. Topics: challenges faced by democratic governments in the 90s framed by the legacy of military rule, 1973-90; political culture; institutional traditions of democracy; and the Chilean process within the broader context of Latin American political development. GER:DB-SocSci

5 units, Aut (Micco, S)

PATHOLOGY (PATH) COURSES

UNDERGRADUATE COURSES IN PATHOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PATH 101. Cancer Biology

(Same as CBIO 101) Experimental approaches to understanding the origins, diagnosis, and treatment of cancer. Focus on key experiments and discoveries with emphasis on genetics, molecular biology, and cell biology. Topics include carcinogens, tumor virology, oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, invasion and metastasis, cancer genomics, cancer epidemiology, and cancer therapies. Discussion sections based on primary research articles that describe key experiments in the field. Satisfies Central Menu Areas 1 or 2 for Bio majors. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor.

4 units, Win (Lipsick, J)

PATH 103Q. Lymphocyte Migration
(Stanford Introductory Seminar) Preference to sophomores. How lymphocytes leave the blood stream and enter tissues to participate in immune surveillance and the development of inflammation. Known as lymphocyte migration, this process involves a complex series of adhesion, activation and diapedesis events. The cellular mechanisms involved in lymphocyte migration, including lymphocyte adhesion molecules that interact with their counter-receptors on endothelial cells, and molecules, including cytokines and chemokines, that attract or activate lymphocytes. The roles of these molecules in the development of human diseases such as asthma, type 1 diabetes, and multiple sclerosis.

1 unit, Spr (Staff)

PATH 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN PATHOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PATH 206. Epigenetics
(Same as BIO 156, BIO 256, GENE 206) For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in Drosophila in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42 , or GENE 203, or consent of instructor.

2 units, Spr (Lipsick, J; Gozani, O), alternate years, not given next year

PATH 210. Stem Cells in Development and Disease
Molecular and cellular mechanisms underlying the basic self-renewal and differentiation properties of stem cells in multiple tissues and organisms. How abnormal stem cell behavior may contribute to diseases such as cancer. How to manipulate stem cell behavior in vitro or in vivo for therapeutic purposes. Classical papers and recent literatures in the field of stem cell biology. Open to graduate, medical, and advanced undergraduate students. Prerequisite: consent of instructor.

1-2 units, Aut (Lu, B)

PATH 213. Gross Autopsy Pathology Laboratory
Examine/discuss unfixed dissected organs from current autopsies and correlate morphologic findings with the clinical history. Students view postmortem examinations and may participate (in a small group) in one postmortem examination with the assistance of residents and staff, and present the case to the class. Class scheduling is flexible. Additional unit for participation in a postmortem examination. Class may not be repeated. Prerequisite: HHD221.

2-3 units, Aut (Regula, D), Win (Regula, D)

PATH 218. Computational Analysis of Biological Images
(Same as GENE 218) Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy.

2 units, Spr (Staff)

PATH 233. The Biology of Small Modulatory RNAs
(Same as GENE 233, MI 233) Open to graduate and medical students. How recent discoveries of miRNA, RNA interference, and short interfering RNAs reveal potentially widespread gene regulatory mechanisms mediated by small modulatory RNAs during animal and plant development. Required paper proposing novel research.

2 units, Aut (Chen, C; Fire, A)

PATH 234. Fundamentals of RNA Biology
(Same as GENE 234, MI 234) For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students.

2 units, alternate years, not given this year

PATH 240. Clinical Studies in Pathology I
Broad exposure to the practice of pathology in an academic medical center. Students are assigned a faculty mentor and work closely with pathology residents, fellows and faculty. Two months are spent in surgical pathology where students help examine surgical resection specimens and biopsies and participate in making a final diagnosis. One month is spent in autopsy pathology where students perform autopsy prosections and formulate final anatomic diagnoses under the supervision of faculty. May be combined with Clinical Studies in Pathology II, and two additional quarters of PATH 399, Directed Research, to fulfill a 12 month Post-Sophomore year Fellowship in Pathology. Prerequisite: MD candidate; instructor consent.

3-9 units, Aut (Connolly, A; Higgins, J), Win (Connolly, A; Higgins, J), Spr (Higgins, J; Connolly, A), Sum (Natkunam, Y; Higgins, J)

PATH 241. Clinical Studies in Pathology II
In-depth exposure to the practice of pathology for students who have completed Clinical Studies in Pathology I. Students are assigned a faculty mentor and work closely with pathology residents, fellows and faculty. Two months are spent in surgical pathology where students help examine surgical resection specimens and biopsies and participate in making a final diagnosis. One month is spent in autopsy pathology where students perform autopsy prosections and formulate final anatomic diagnoses under the supervision of faculty. Additional time may be spent observing in sub-specialty areas of pathology that include dermatopatholgy, neuropathology, renal pathology, lymph node pathology or cytology. May be combined with Clinical Studies in Pathology I and two additional quarters of PATH 399, Directed Research, to fulfill a 12-month Post-Sophomore year Fellowship in Pathology. Prerequisite: consent of instructor and successful completion of Clinical Studies in Pathology I (PATH 240).

3-9 units, Aut (Connolly, A; Higgins, J), Win (Connolly, A; Higgins, J), Spr (Higgins, J; Connolly, A), Sum (Higgins, J; Natkunam, Y)

PATH 280. Early Clinical Experience in Pathology
Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PATH 296. Stem Cell Biology and Regenerative Medicine
(Same as DBIO 296) For graduate and medical students. Embryonic and adult stem cells, including origin, regulation, self-renewal, differentiation, fate, and relationship to cancer; biological mechanisms and methods to translate findings to therapeutic applications. Medical students must enroll for 5 units; graduate students may choose to take only the basic science part for 3 units. Prerequisites: DBIO 201 and 210, or consent of instructor.

3-5 units, Win (Weissman, I; Nusse, R; Fuller, M)

PATH 299. Directed Reading in Pathology
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PATH 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PATH 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Opportunities at the molecular, cellular, and clinicopathologic levels. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHILOSOPHY (PHIL) COURSES

UNDERGRADUATE COURSES IN PHILOSOPHY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PHIL 1. Introduction to Philosophy
Is there one truth or many? Does science tell us everything there is to know? Can our minds be purely physical? Do we have free will? Is faith rational? Should we always be rational? What is the meaning of life? Are there moral truths? What are truth, reality, rationality, and knowledge? How can such questions be answered? Intensive introduction to theories and techniques in philosophy from various contemporary traditions. GER:DB-Hum

5 units, Win (Hussain, N)

PHIL 2. Introduction to Moral Philosophy
(Same as ETHICSOC 20) What is the basis of moral judgment? What makes right actions right and wrong actions wrong? What makes a state of affairs good or worth promoting? What is it to have a good or virtuous character? Answers to classic questions in ethics through the works of traditional and contemporary authors. Fulfills the Philosophy ethical reasoning requirement. GER:DB-Hum

5 units, Aut (Schapiro, T)

PHIL 8N. Free Will and Responsibility
(Stanford Introductory Seminar) Preference to freshmen. In what sense are people free agents? Is freedom compatible with being fully a part of the same natural causal order that includes other physical and biological systems? What assumptions about freedom are made when people are held accountable morally and/or legally? When people are held accountable, and so responsible, can they also be seen as part of the natural, causal order? Or is there a deep incompatibility between these two ways of understanding ourselves? What assumptions about freedom are made when people deliberate about what to do? Are these assumptions in conflict with seeing oneself as part of the natural, causal order? Sources include recent and contemporary philosophical research. GER:DB-Hum

4 units, Win (Bratman, M)

PHIL 10N. Traveling Through Time
(Stanford Introductory Seminar) Preference to freshmen. Is time travel possible? People do it every day, at the rate of one minute per minute. Relativity theory suggests a sense in which one could travel to the distant future. But could one travel to the past? If so, why aren't there any time travelers around? If not, is that because of some law of physics or because the very idea of time travel is incoherent? Can any sense be made of the idea of changing the past? What would happen if one tried to prevent one's parents from having children? Sources inlcude classic and contemporary work in the physics and philosophy of time, as well as case studies in fiction and film. Guest speakers.

3 units, Spr (Burgess, A)

PHIL 11N. Skepticism
(Stanford Introductory Seminar) Preference to freshmen. Historical and contemporary philosophical perspectives on the limits of human knowledge of a mind-independent world and causal laws of nature. The nature and possibility of a priori knowledge. GER:DB-Hum

3 units, Aut (De Pierris, G)

PHIL 20S. Introduction to Moral Philosophy
What makes right actions right and wrong actions wrong? Must right actions promote some further good? What is the role of consequences in the evaluation of actions as right or good? Focus is on traditional attempts to account for what determines which actions are right, what is worth promoting, and what kind of person one ought to be. Readings from primarily historical figures such as Aristotle, Hume, Kant, Mill, and others.

3 units, Sum (Cheng-Guajardo, L)

PHIL 22. Ethics in Theory and Practice
(Same as ETHICSOC 10) Weekly talks by Stanford faculty on important questions of ethics that arise in private and public life. These questions arise in all disciplines and are central to many of the main problems confronting humanity today. Such questions include: what is our obligation to future generations? are there any human rights? what is the appropriate role of religion in politics? is capital punishment ever justified? what are the ethical obligations of a researcher? should the university teach moral values? what principles of justice should govern the distribution of K-12 education? Class meets Fridays from noon to 1:05. Format is an informal talk of about 35- 40 minutes, followed by discussion.

1 unit, Aut (Reich, R), Win (Reich, R), Spr (Reich, R)

PHIL 23L. Love and Friendship
People as different as Jesus Christ and Justin Timberlake think that love is crucial to living the good life. But what is love? What part should it play in people's lives? Is it just one value among many? Questions about the nature of love, the role it plays in moral philosophy, and its effect on individual autonomy. Readings from contemporary and historical sources.

2 units, not given this year

PHIL 23N. Neuroscience and the Self
The Self: Fiction or reality? Bundle of perceptions? Pragmatic role-concept? Fleeting moment of consciousness? Social invention? Narrative construct? Various philosophical conceptions of the self will be explored with a particular focus on the notion of the `narrative self.¿ Literature from neuroscience, psychology and philosophy will be considered.

2 units, not given this year

PHIL 23T. Intellectual trust in oneself and others
Most people have many false beliefs. Yet, one routinely relies on one's own beliefs and on the views of others. Does that mean that one takes oneself to be exceptionally good at forming true beliefs, and exceptionally good at detecting false beliefs in others? When is it justified to place intellectual trust in oneself and in others?

2 units, not given this year

PHIL 42. Philosophy through Theater: Choice and Chance
Dramatic literature as a window into philosophical work on freedom of the will and indeterminism. Students participate in the production of original one-act plays. GER:DB-Hum

4 units, not given this year

PHIL 43S. Happiness: Positive Psychology and Philosophy
The connection between research in positive psychology to determine what happiness is and the conditions under which human beings are happy with issues in moral philosophy regarding whether we should aim at happiness or think of it as a good. The assumptions about happiness made by positive psychologists. The philosophical insight into the question of how people should live that is gained by looking at the empirical results provide by psychologists.

3 units, not given this year

PHIL 50. Introductory Logic
Propositional and predicate logic; emphasis is on translating English sentences into logical symbols and constructing derivations of valid arguments. GER:DB-Math

4 units, Aut (Duarte, S), Spr (Staff)

PHIL 50S. Introductory Logic
Propositional and predicate logic. Themes include: translations of English sentences into logical symbols; semantics of and proof rules for propositional and predicate logic. Emphasis is on evaluating arguments with the syntax and semantics of contemporary logic. Special attention to the properties of the languages studied.

3 units, Sum (Angelides, A)

PHIL 60. Introduction to Philosophy of Science
(Same as HPS 60) 20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerbend, and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions. GER:DB-Hum

5 units, Spr (Ryckman, T)

PHIL 61. Science, Religion, and the Birth of Modern Philosophy
(Same as HPS 61) Galileo's defense of the Copernican world-system that initiated the scientific revolution of the 17th century, led to conflict between science and religion, and influenced the development of modern philosophy. Readings focus on Galileo and Descartes. GER:DB-Hum

5 units, not given this year

PHIL 63S. Bioethics
What is Bioethics? What are the major ethical controversies that bioethics investigate? What are the philosophical bases of bioethical reasoning? Overview of the field of bioethics, including the issues bioethicists examine and the philosophical tools they use to answer bioethical questions. Opportunities for students to investigate in detail three current controversies in bioethics: medical decisions relating to the beginning of life, the enhancement of life, and the end of life.
3 units, Sum (Scharding, T)

PHIL 71H. Philosophy and the Real World
Introduction to the humanities as an applied discipline; how literary and philosophical ideas illuminate and change how people live their lives as individuals and members of society. Focus is on short texts that illustrate how literary and philosophical ideas arise from social problems and attempt to confront those problems. Methods and approaches: how to read such texts; how to make arguments about them; how such texts shed light on contemporary situations.
2 units, not given this year

PHIL 72. Contemporary Moral Problems
(Same as ETHICSOC 185M) As individuals and as members of societies, we make choices that can be evaluated from a moral point of view. What choices should we make, and how should we justify these choices? For example, can we justify buying expensive sunglasses or MP3 players when the money could instead be given to provide others with basic nutrition? Does a preference for the taste of meat over that of other proteins justify killing animals? Focus is on our obligations to aid, and to avoid harming. Topics include aid and its allocation, abortion, animal rights and euthanasia. GER:EC-EthicReas
4 units, Win (Staff)

PHIL 76. Introduction to Global Justice
(Same as ETHICSOC 136R, INTNLREL 136R, POLISCI 136R, POLISCI 336) Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.
5 units, Spr (Oberman, K)

PHIL 80. Mind, Matter, and Meaning
Central topics in philosophy emphasizing development of analytical writing skills. What are human beings? Are human beings free? How do human minds and bodies interact? What does it all mean? Prerequisite: introductory philosophy course. GER:DB-Hum, WIM
5 units, Aut (Burgess, A), Spr (Crimmins, M)

PHIL 81. Philosophy and Literature
(Same as CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENGEN 181, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum
4-5 units, Win (Anderson, L; Landy, J)

PHIL 90A. The Philosophy of John Perry
John Perry is among the most influential philosophers of the last several decades, making important contributions to the philosophy of language, metaphysics, and the philosophy of mind. Focus on Perry¿s work on indexicality, belief reports, reference, pragmatics, identity, personal identity, modality, and consciousness. Perry¿s work in these areas will be studied in conjunction with that of some key figures in the surrounding literatures, including Kaplan, Lewis, Stalnaker, Kripke, and Chalmers.
4 units, Aut (Giberman, D)

PHIL 90B. The Ethics of War
(Same as ETHICSOC 175M) Issues both in contemporary just war theory and political philosophy. Relevant questions include: Can conscription ever be justified? If not, is there anything wrong with targeting poor people as part of efforts to recruit a 'volunteer' military? If, during war itself, combatants act in ways prohibited by the moral requirements governing war's conduct, then does it make any moral difference whether they were acting as ordered? And how do we identify these moral requirements in the first place? For example, what distinguishes a legitimate target from an illegitimate one? What determines whether military action is disproportionate? What, if anything, is morally distinctive about terrorism? Explores the complexities behind these questions and others, with a view to evaluating the potential answers to them.
4 units, Win (Halliday, D)

PHIL 90C. Predicting the Future: Puzzles of Induction
Can we know that the future is likely to resemble the past? Do we have reason to believe that the Sun is even remotely likely to rise again tomorrow? Are we rationally justified in accepting the confident predictions of science and commonsense, based on well-observed regularities? Consider several paradoxes of induction (that is, extrapolation from observed to unobserved), including those raised by Hume, Hempel, and Goodman, the Doomsday and Sleeping Beauty paradoxes, as well as some attempts to solve or cope with them.
4 units, Spr (Elstein, D)

PHIL 100. Greek Philosophy
Greek philosophical thought, covering Socrates, Plato, Aristotle, and the Hellenistic schools (the Epicureans, the Stoics, and the Skeptics). Topics: the nature of the soul, virtue and happiness, knowledge, and reality. (Bobonich) GER:DB-Hum
4 units, Win (Duarte, S)

PHIL 101. Introduction to Medieval Philosophy
(Same as PHIL 201) Classics of Western philosophy by Augustine, Boethius, Anselm, Abelard, Aquinas, and Ockham. Explore the puzzles facing someone seeking to lead a good life and to understand herself and her world. A theory of will and human motivation, a theory of ethics based on the agent's intention, and a theory of divine omniscience and omnipotence consistent with divine goodness and human freedom. Works include On Free Choice, The Consolation of Philosophy, Ethics, Summa theologiae, and the Connection of the Virtues. GER:DB-Hum, EC-EthicReas
4 units, Spr (Wood, R)

PHIL 101A. Medieval Religious Philosophy
(Same as RELIGST 167) (Same as PHIL 101A.) Survey of medieval philosophy, focusing on God, world and words. A pervasive assumption about the structure of the world, that it reflected the categories of God's mind and emerged from an act of divine speech, gave impetus to the interest in the nature of language and its relation to the world. Scripture served as one kind of divine communication to human beings, and ""The Book of the World"" as another. The problem of universals, the question of how words relate to God, epistemology, theories of reference, semiotics, are some of the topics discussed. Readings from Augustine, Anselm, Aquinas, Scotus, and Ockham, etc. GER:DB-Hum
4 units, Aut (Gelber, H)

PHIL 102. Modern Philosophy, Descartes to Kant
Major figures in early modern philosophy in epistemology, metaphysics, and philosophy of mind. Writings by Descartes, Locke, Leibniz, Berkeley, Hume, and Kant. GER:DB-Hum
4 units, Aut (Wood, A)

PHIL 103. 19th-Century Philosophy
Focus is on ethics and the philosophy of history. Works include Mill's Utilitarianism, Hegel's The Philosophy of World History, Marx's Economic and Philosophic Manuscripts, Kierkegaard's The Sickness Unto Death, and Nietzsche's On the Genealogy of Morals. GER:DB-Hum
4 units, Spr (Scotland-Stewart, L)

PHIL 106. Ancient Skepticism
(Same as PHIL 206) The ancient Pyrrhonian skeptics who think that for any claim there is no more reason to assert it than deny it and that a life without any beliefs is the best route to happiness. Some ancient opponents of the Pyrrhonian skeptics and some relations between ancient and modern skepticism. GER:DB-Hum
4 units, not given this year

PHIL 107. Plato's Metaphysics and Epistemology
(Same as PHIL 207) Examine Plato's views on the nature of reality and knowledge by reading the relevant parts of dialogues such as the Parmenides, the Phaedo, the Philebus, and the Republic. GER:DB-Hum
4 units, Aut (Bobonich, C)

PHIL 110. Plato
(Same as PHIL 210) Plato's Republic. GER:DB-Hum
4 units, not given this year

PHIL 111. Aristotle and Contemporary Ethics
(Same as PHIL 211) Aristotle's Nicomachean Ethics, focusing on virtue, happiness, pleasure, practical reasoning, and particularism. Sources include the Eudemian Ethics, contemporary philosophers who have taken many of these topics up again, and contemporary material such as that by Anscombe, Foot, Hursthouse, Korsgaard, and McDowell. GER:DB-Hum
4 units, not given this year

PHIL 113. Hellenistic Philosophy
(Same as PHIL 213) Epicureans, skeptics, and stoics on epistemology, ethics, metaphysics, and psychology. GER:DB-Hum
4 units, not given this year

PHIL 115. Problems in Medieval Philosophy: Islamic Aristotelianism and Western Scholasticism
(Same as PHIL 215) Islamic Aristotelianism and western scholasticism: the western world adopted Aristotle's metaphysics and natural philosophy as the foundation of its educational system and scholarly life between 1210 and 1255. Christian Europe was thereby following the example set by Islam in Spain and the Near East. Today some people believe that this development was independent, and others think that the scholastics copied even their methods from Arabic philosophers. Historical evaluation of those claims. GER:DB-Hum
3-5 units, not given this year

PHIL 117. Descartes
(Same as PHIL 217) (Formerly 121/221.) Descartes's philosophical writings on rules for the direction of the mind, method, innate ideas and ideas of the senses, mind, God, eternal truths, and the material world. GER:DB-Hum
4 units, Aut (De Pierris, G)

PHIL 118. British Empiricism, 1660s-1730s
(Same as PHIL 218) GER:DB-Hum
4 units, not given this year

PHIL 119. Rationalists
(Same as PHIL 219) (Formerly 143/243.) Developments in 17th-century continental philosophy. Descartes's views on mind, necessity, and knowledge. Spinoza and Leibniz emphazing their own doctrines and their criticism of their predecessors. Prerequisite: 102. GER:DB-Hum
4 units, not given this year

PHIL 120A. The Leibniz-Clarke Correspondence
(Same as PHIL 220A) Correspondence on metaphysics, theology, and science. GER:DB-Hum
4 units, Win (De Pierris, G)

PHIL 122. Hume
(Same as PHIL 222) (Formerly 120/220; graduate students enroll in 222.) Hume's theoretical philosophy, in particular, skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self. GER:DB-Hum
4 units, not given this year

PHIL 124. Topics in Early Modern Philosophy
Philosophical views of the highly influential rationalist philosophers Benedict (or Baruch) Spinoza (1632-1677) and G. W. Leibniz (1646-1716). Topics to be treated include: the nature of God and the question of his providential care for human beings, the concept of substance and its extension, the ontological relation of finite beings to God, the mental and its relation to the corporeal, and the nature of human freedom. GER:DB-Hum
4 units, Spr (Duarte, S)

PHIL 125. Kant's First Critique
(Same as PHIL 225) (Graduate students register for 225.) The founding work of Kant's critical philosophy emphasizing his contributions to metaphysics and epistemology. His attempts to limit metaphysics to the objects of experience. Prerequisite: course dealing with systematic issues in metaphysics or epistemology, or with the history of modern philosophy. GER:DB-Hum
4 units, Win (Wood, A)

PHIL 126B. Kant's Ethical Theory
(Same as PHIL 226B) (Graduate students register for 226B.) Kant's moral philosophy based primarily on the Groundwork of Metaphysics of Morals, Critique of Practical Reason, and The Metaphysics of Morals. GER:DB-Hum
4 units, Spr (Wood, A)

PHIL 127A. Kant's Value Theory
(Same as PHIL 227A) (Graduate students register for 227A.) The role of autonomy, principled rational self-governance, in Kant's account of the norms to which human beings are answerable as moral agents, citizens, empirical inquirers, and religious believers. Relations between moral values (goodness, rightness) and aesthetic values (beauty, sublimity). GER:DB-Hum
4 units, not given this year

PHIL 127B. Kant's Anthropology and Philosophy of History
(Same as PHIL 227B) Kant's conception of anthropology or human nature, based on his philosophy of history, which influenced and anticipated 18th- and 19th-century philosophers of history such as Herder, Fichte, Hegel, and Marx. Texts include Idea for a Universal History, Conjectural Beginning of Human History, and Anthropology from a Pragmatic Point of View. Topics include: Kant's pragmatic approach to the study of human nature; the difficulty of human self knowledge; the role of regulative and teleological principles in studying human history; and Kant's theory of race.
4 units, not given this year

PHIL 128. Fichte's Ethics
(Same as PHIL 228) (Graduate students register for 228.) The founder of the German Idealist movement who adopted but revised Kant's project of transcendental philosophy basing it on the principle of awareness of free self-activity. The awareness of other selves and of ethical relations to them as a necessary condition for self-awareness. His writings from 1793-98 emphasizing the place of intersubjectivity in his theory of experience. GER:DB-Hum
4 units, Win (Staff)

PHIL 130. Hegel
(Same as PHIL 230) (Formerly 122/222; graduate students register for 230.) Introduction to Hegel's philosophy, emphasizing his moral and political philosophy, through study of his last major work (1821). May be repeated for credit. Prerequisite: course in the history of modern philosophy. GER:DB-Hum
4 units, not given this year

PHIL 134. Phenomenology and Intersubjectivity
(Same as PHIL 234) (Graduate students register for 234.) Readings from Husserl, Stein, Heidegger, Sartre, and Merleau-Ponty on subjects related to awareness of others. Topics include solipsism, collective experience, empathy, and objectification of the other. GER:DB-Hum
4 units, not given this year

PHIL 135. Existentialism
(Same as PHIL 235) (Formerly 132/232.) Focus is on the existentialist preoccupation with human freedom. What constitutes authentic individuality? What is one's relation to the divine? How can one live a meaningful life? What is the significance of death? A rethinking of the traditional problem of freedom and determinism in readings from Rousseau, Kierkegaard, and Nietzsche, and the extension of these ideas by Sartre, Beauvoir, and Camus, including their social and political consequences in light of 20th-century fascism and feminism. GER:DB-Hum
4 units, Win (Scotland-Stewart, L)

PHIL 136. History of Analytic Philosophy
(Same as PHIL 236) (Formerly 147/247; graduate students register for 236.) Theories of knowledge in Frege, Carnap, and Quine. Emphasis is on conceptions of analyticity and treatment of logic and mathematics. Prerequisite: 50 and one course numbered 150-165 or 181-90. GER:DB-Hum
4 units, not given this year

PHIL 137. Wittgenstein
(Same as PHIL 237) (Graduate students register for 237.) The main themes and claims in Wittgenstein's later work concentrating on his views about meaning, mind, knowledge, the nature of phi-

losophical perplexity, and the nature of philosophical progress in his Philosophical Investigations. Emphasis is on the relationship between the novel arguments of the Investigations and its ways of writing up the results of philosophical questioning. GER:DB-Hum

4 units, Spr (Hills, D)

PHIL 138. Recent European Philosophy: Between Nature and History

(Same as PHIL 238) A critical introduction to the novel understandings of time, language, and cultural power developed by 20th-century continental thinkers, with close attention to work by Heidegger, Saussure, Benjamin, and Foucault. GER:DB-Hum

4 units, not given this year

PHIL 143. Quine

(Same as PHIL 243) (Formerly 183/283; graduate students register for 243.) The philosophy of Quine: meaning and communication; analyticity, modality, reference, and ontology; theory and evidence; naturalism; mind and the mental. GER:DB-Hum

4 units, not given this year

PHIL 150. Basic Concepts in Mathematical Logic

(Same as PHIL 250) (Formerly 159.) The concepts and techniques used in mathematical logic, primarily through the study of the language of first order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. GER:DB-Math

4 units, Aut (Barker-Plummer, D)

PHIL 150X. Basic Concepts in Mathematical Logic

Equivalent to the second half of 150. Students attend the first meeting of 150 and rejoin the class on October 30. Prerequisite: CS 103A or X, or PHIL 50.

2 units, Aut (Barker-Plummer, D)

PHIL 151. First-Order Logic

(Same as PHIL 251) (Formerly 160A.) The syntax and semantics of sentential and first-order logic. Concepts of model theory. Gödel's completeness theorem and its consequences: the Löwenheim-Skolem theorem and the compactness theorem. Prerequisite: 150 or consent of instructor. GER:DB-Math

4 units, Win (Mumma, J)

PHIL 152. Computability and Logic

(Same as PHIL 252) Approaches to effective computation: recursive functions, register machines, and programming styles. Proof of their equivalence, discussion of Church's thesis. Elementary recursion theory. These techniques used to prove Gödel's incompleteness theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 151. GER:DB-Math

4 units, Spr (Sommer, R)

PHIL 153. Feminist Theories and Methods Across the Disciplines

(Same as FEMST 103, FEMST 203, PHIL 253) The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research. GER:EC-Gender

4-5 units, Win (Longino, H)

PHIL 154. Modal Logic

(Same as PHIL 254) (Graduate students register for 254.) Syntax and semantics of modal logic, and technical results like completeness and correspondence theory. Applications to philosophy and computer science. Prerequisite: 150 or preferably 151. GER:DB-Math

4 units, Spr (van Benthem, J)

PHIL 155. General Interest Topics in Mathematical Logic

Introduction to formalization using language of logic and to problems of philosophical logic and computer science that can be handled this way. Propositional calculus, Sudoku puzzles, resolution rule, problem P=NP. Possible worlds, modal logic with emphasis on individuation problems. May be repeated for credit.

4 units, Aut (Mints, G)

PHIL 157. Topics in Philosophy of Logic

(Same as PHIL 257) (Graduate students register for 257.) Disputed foundational issues in logic; the question of what the subject matter and boundaries of logic are, such as whether what is called second-order logic should be counted as logic. What is the proper notion of logical consequence? May be repeated for credit. Pre- or corequisite: 151, or consent of instructor.

3 units, not given this year

PHIL 160A. Newtonian Revolution

(Same as PHIL 260A) (Graduate students register for 260A.) 17th-century efforts in science including by Kepler, Galileo, Descartes, and Huygens, that formed the background for and posed the problems addressed in Newton¿s Principia. GER:DB-Hum

4 units, not given this year

PHIL 160B. Newtonian Revolution

(Same as PHIL 260B) (Graduate students register for 260B.) Newton¿s Principia in its historical context, emphasizing how it produced a revolution in the conduct of empirical research and in standards of evidence in science. GER:DB-Hum

4 units, not given this year

PHIL 162. Philosophy of Mathematics

(Same as MATH 162, PHIL 262) (Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor. GER:DB-Math

4 units, not given this year

PHIL 163. Significant Figures in Philosophy of Science

(Same as PHIL 263) (Graduate students register for 263.) Directed study of two or more thinkers, past or present, who have made a lasting impact on contemporary philosophy of science. Subjects last year were Henri Poincaré, Pierre Duhem, and Gaston Bachelard. GER:DB-Hum

4 units, not given this year

PHIL 163H. The History of Scientific Methods, Pythagoras to Popper

(Same as HPS 154) History of scientific methods and associated science from ancient Greece to the 20th century. Case studies include Pythagoras, Plato, and Euclid; Aristotle; medieval science; scientific Renaissance of the 1540s; methodological clashes involving the Church, Galileo, Bacon, and Descartes; Newton; Faraday; Darwin; rise of statistical methods; beginnings of modern physics; Popper. The mutual influences of method and practice. What does and does not qualify as science. Recommended: background in history, philosophy, or a technical field such as mathematics, science, or engineering. GER:DB-Hum

4 units, Aut (McCaskey, J)

PHIL 164. Central Topics in the Philosophy of Science: Theory and Evidence

(Same as PHIL 264) (Graduate students register for 264.) The relation of theory to evidence and prediction, problems of induction, empirical under-determination of theory by evidence, and theory choice. Hypothetico-deductive, Bayesian, pragmatic, and inference to the best explanation models of explanation. The semantic approach to theories. GER:DB-Hum

4 units, Spr (Ryckman, T)

PHIL 164A. Central Topics in Philosophy of Science: Causation

(Same as PHIL 264A) (Graduate Students register for 264A.) Establishing causes in science, engineering, and medicine versus establishing them in Anglo-American law, considered in the context of Hume and Mill on causation. May be repeated for credit.

4 units, not given this year

PHIL 165. Philosophy of Physics

(Same as PHIL 265) (Graduate students register for 265.) Central topic alternates annually between space-time theories and philosophical issues in quantum mechanics. Topics last year: absolute and relational theories of space, time, and motion. Newton¿s critique of Descartes and debate with Leibniz. The principle of relativity and space-time formulations of Aristotelian, Galilean, and relativity physics. Mach¿s principle and the theory of general relativity. Einstein¿s struggles with the principle of general covariance. Space-time substantivalism, and the meaning of background independence. May be repeated for credit if content is different. GER:DB-Hum

4 units, Win (Ryckman, T)

PHIL 166. Probability: Ten Great Ideas About Chance

(Same as PHIL 266, STATS 167, STATS 267) Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance;

Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116. GER:DB-Math

4 units, not given this year

PHIL 167A. Philosophy of Biology

(Same as PHIL 267A) (Graduate students register for 267A.) Evolutionary theory and in particular, on characterizing natural selection and how it operates. We examine debates about fitness, whether selection is a cause or force, the levels at which selection operates, and whether cultural evolution is a Darwinian process. GER:DB-Hum

2-4 units, not given this year

PHIL 167B. Philosophy, Biology, and Behavior

(Same as PHIL 267B) (Graduate students register for 267B.) Continuation of 167A/267A. Further philosophical study of key theoretical ideas in biology, focusing on problems involving explanation of behavior. Topics: evolutionary versus proximate causal explanations of behavior; genetic and other determinisms; and classification and measurement of behavior. Prerequisites: 167A; or one PHIL course and either one BIO course or Human Biology core; or equivalent with consent of instructor. GER:DB-Hum

4 units, Aut (Longino, H)

PHIL 167C. Associative Theories of Mind and Brain

(Same as PHIL 267C) After a historical survey of associative theories from Hume to William James, current versions will be analyzed including the important early ideas of Karl Lashley. Emphasis will be on the computational power of associative networks and their realization in the brain. GER:DB-Hum

4 units, Win (Suppes, P)

PHIL 168. Theories of Truth

(Same as PHIL 268) (Graduate students register for 268.) The correspondence, coherence, pragmatist and deflationary theories of truth. Tarski's semantic conception of truth and hierarchical truth definitions. The problems posed by the liar paradox for non-hierarchical theories. Formal theories of truth proposed since the 70s to deal with these problems.

4 units, not given this year

PHIL 169. Evolution of the Social Contract

(Same as PHIL 269) Explore naturalizing the social contract. Classroom presentations and term papers. Texts: Binmore - Natural Justice Skyrms - Evolution of the Social Contract.

4 units, Spr (Skyrms, B)

PHIL 170. Ethical Theory

(Same as ETHICSOC 170) Major strands in contemporary ethical theory. Readings include Bentham, Mill, Kant, and contemporary authors. GER:DB-Hum, EC-EthicReas

4 units, Spr (Schapiro, T)

PHIL 170B. Metaphor

(Same as PHIL 270B) Think and talk about two things at once: two different subject matters are mingled to rich and unpredictable effect. Close critical study of the main modern accounts of metaphors nature and interest, drawing on the work of writers, linguists, philosophers, and literary critics. Attention to how understanding, appreciation, and pleasure connect with one another in the experience of metaphor. Consideration of the possibility that metaphor or something very like it can occur in nonverbal media: gesture, dance, painting, music. GER:DB-Hum

4 units, Spr (Hills, D)

PHIL 171. Justice

(Same as ETHICSOC 171, IPS 208, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas

4-5 units, Aut (Cohen, J)

PHIL 172. History of Modern Ethics

(Same as PHIL 272) Major strands in the history of modern, pre-Kantian moral philosophy. Emphasis is on the dialogue between empiricists and rationalists on the subject of the relationship between the natural and the normative. Authors include Frances Hutcheson, David Hume, Adam Smith, Samuel Clarke, and Richard Price. GER:DB-Hum

4 units, not given this year

PHIL 172B. Recent Ethical Theory

(Same as PHIL 272B) Study the works of several prominent contemporary moral philosophers. Possible authors include: Scanlon, Darwall, Nagel, Williams, Blackburn, Gibbard, Korsgaard. Prerequisite: students should have taken an introduction to moral philosophy (Phil. 20, Phil. 170 or equivalent). GER:DB-Hum

4 units, Win (Schapiro, T)

PHIL 173A. Aesthetics: Metaphor across the Arts

What if a metaphor is an instructively compact work of art, or if finding a metaphor apt is an instructively simple case of finding something aesthetically valuable? What does this reveal about the nature of art and language? Introduction to the philosophical study of art and aesthetic value, organized around metaphor. Contemporary accounts of metaphor as a verbal device. Arguments for the existence of nonverbal metaphor in nonliterary arts. The power and appeal of metaphors drawn from art, art criticism, theoretical inquiry, and everyday life. GER:DB-Hum

4 units, not given this year

PHIL 173B. Metaethics

(Same as PHIL 273B) (Graduate students register for 273B.) Can moral and ethical values be justified or is it just a matter of opinion? Is there a difference between facts and values? Are there any moral truths? Does it matter if there are not? Focus is not on which things or actions are valuable or morally right, but what is value or rightness itself. Contemporary metaethics. Prerequisites: 80, 181, and an ethics course. GER:DB-Hum

4 units, Win (Hussain, N)

PHIL 174. Freedom and the Practical Standpoint

(Same as PHIL 274) (Graduate students register for 274.) Confronted with the question of how to act, people think of themselves as freely determining their own conduct. Natural science poses a challenge to this by explaining all events, including human actions, in terms of causal processes. Are people justified in thinking of themselves as free? Major philosophical approaches to this question: incompatibilism, compatibilism, and the two-standpoint view. GER:DB-Hum

4 units, not given this year

PHIL 174A. Moral Limits of the Market

(Same as ETHICSOC 174A, PHIL 274A) Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases. GER:DB-Hum

4 units, not given this year

PHIL 175. Philosophy of Law

(Same as PHIL 275) Philosophical foundations of law and the legal system. The justifiability of patterns of assigning legal responsibility within criminal law. Prerequisite: PHIL 80 and one additional PHIL course. GER:DB-Hum

4 units, Win (Bratman, M)

PHIL 175A. Ethics and Politics of Public Service

(Same as ETHICSOC 133, HUMBIO 178, PHIL 275A, POLISCI 133, PUBLPOL 103D) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford. GER:DB-SocSci

5 units, not given this year

PHIL 175M. Two Ethical Theories and Being a Person
(Same as PHIL 275M) The distinction between the ethics of being a person and the ethics of rules as opposed to the distinction between Kantian ethics and utilitarianism or consequentialism consequentialism. Comparison of these two types of ethics with respect to their relationship to agency and being a good person. Relations between Western ethics and those of other continents. GER:DB-Hum

4 units, not given this year

PHIL 176. Political Philosophy: The Social Contract Tradition
(Same as PHIL 276) (Graduate students register for 276.) Why and under what conditions do human beings need political institutions? What makes them legitimate or illegitimate? What is the nature, source, and extent of the obligation to obey the legitimate ones, and how should people alter or overthrow the others? Answers by political theorists of the early modern period: Hobbes, Locke, Rousseau, and Kant. GER:DB-Hum

4 units, not given this year

PHIL 176A. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, CLASSHIS 333, PHIL 276A, POLISCI 230A, POLISCI 330A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. GER:DB-Hum

4-5 units, Win (Ober, J)

PHIL 176B. The Economic Individual in the Behavioral Sciences
(Same as PHIL 276B) (Graduate students register for 276B.)

4 units, not given this year

PHIL 177. Philosophical Issues Concerning Race and Racism
(Same as POLISCI 136) Concepts of race, race consciousness, and racism, and their connections. What is race and what is its role in racism? How should ethnic and racial identities be viewed to secure the conditions in which humanity can be seen as a single moral community whose members have equal respect? What laws, values, and institutions best embody the balance among competing goals of group loyalty, opposition to racism, and common humanity? Philosophical writings on freedom and equality, human rights, pluralism, and affirmative action. Historical accounts of group exclusion. GER:DB-Hum, EC-AmerCul

4 units, not given this year

PHIL 177M. Human Rights and Moral Questions
(Same as ETHICSOC 177M, ETHICSOC 277M, PHIL 277M) The proliferation of human rights in the discourse of international justice has raised questions in both moral and legal theory such as: What are human rights? How should they be conceptualized? Who ought to bear the duties associated with them? Can their protection justify military interventions into sovereign states? Course focus is on topics in moral and legal theory surrounding human rights including: the question of what these rights are; the various substantive moral justifications for the protection of human rights; the moral issues raised by the dominance of human rights in international law and relations; can any rights be universal? How are these rights to be framed in the light of crosscultural values and claims about cultural dominance? The connections between these questions.

5 units, Aut (Thomas, J)

PHIL 178. Ethics in Society Honors Seminar
(Same as ETHICSOC 190) For students planning honors in Ethics in Society. Methods of research. Students present issues of public and personal morality; topics chosen with advice of instructor.

3 units, Win (Reich, R)

PHIL 178A. The Ethics of Environmental Choices
(Same as EARTHSYS 178, EARTHSYS 278, PHIL 278A) (Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology. GER:DB-Hum

4 units, not given this year

PHIL 178M. Environmental Justice
(Same as ETHICSOC 178M, ETHICSOC 278M, PHIL 278M, POLISCI 134L) Normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are the obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

4 units, Win (Staff)

PHIL 179S. Moral Psychology, Reasons for Action, and Moral Theory
(Same as PHIL 279S) What sorts of considerations does an ethical agent take to be good reasons for action? Work in moral psychology to illuminate the theory of practical reasons, and the theory of practical reasons to test the prospects for systematic moral theory. Can any systematic moral theory be reconciled with the moral psychology of ordinary, morally respectable agents? Reading include Bernard Williams, Rosalind Hursthouse, Peter Railton, T.M. Scanlon, and Barbara Herman.

4 units, not given this year

PHIL 180. Metaphysics
(Same as PHIL 280) Traditional philosophical riddles involving the notion of existence including: the ontological argument for the existence of God; the problem of intuitively true, negative existential statements; the sorites paradox; and the question of why there is anything at all. Conceptual tools philosophers use to address these questions, from nonexistent objects to possible worlds. Metametaphysics. GER:DB-Hum

4 units, Win (Burgess, A)

PHIL 180A. Realism, Anti-Realism, Irrealism, Quasi-Realism
(Same as PHIL 280A) Realism and its opponents as options across a variety of different domains: natural science, mathematics, ethics, and aesthetics. Clarify the various conceptions that fall under these terms and outline the reasons for and against adopting realism for the various domains. Highlight the general issues involved. Prerequisites: 80, 181 GER:DB-Hum

4 units, not given this year

PHIL 181. Philosophy of Language
(Same as PHIL 281) The study of conceptual questions about language as a focus of contemporary philosophy for its inherent interest and because philosophers see questions about language as behind perennial questions in other areas of philosophy including epistemology, philosophy of science, metaphysics, and ethics. Key concepts and debates about the notions of meaning, truth, reference, and language use, with relations to psycholinguistics and formal semantics. Readings from philosophers such as Frege, Russell, Wittgenstein, Grice, and Kripke. Prerequisites: 80 and background in logic. GER:DB-Hum

4 units, Aut (Crimmins, M)

PHIL 182. Truth
(Same as PHIL 282) Philosophical debates about the place in human lives and the value to human beings of truth and its pursuit. The nature and significance of truth-involving virtues such as accuracy, sincerity, and candor. GER:DB-Hum

4 units, not given this year

PHIL 184. Theory of Knowledge
(Same as PHIL 284) Competing theories of epistemic justification (foundationalism, coherentism, and externalism) against the background of radical scepticism. Readings from contemporary sources. Prerequisite: 80 or consent of instructor. GER:DB-Hum

4 units, Spr (Lawlor, K)

PHIL 184B. Philosophy of the Body
How essential is the body to people's conception of themselves as individuals and as human beings? What role does embodiment play in shaping cognitive capacities? How much or what kind of somatic awareness is required for agency? Embodiment theories of cognition. Readings from Plato, Descartes, Nietzsche, Merleau-Ponty, Parfit, novelist Michel Houellebecq, and contemporary philosophy of mind and cognitive science. GER:DB-Hum

4 units, not given this year

PHIL 184F. Feminist Theories of Knowledge
(Same as FEMST 166, PHIL 284F) Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power. GER:DB-Hum, EC-Gender

4 units, not given this year

PHIL 184P. Probability and Epistemology
Confirmation theory and various ways of trying to understand the concept of evidence. Discuss a series of issues in epistemology including probabilism (the view that you should assign degrees of belief to various propositions), conditionalization, confirmational holism, reliabilism and justification, and disagreement. GER:DB-Hum

4 units, not given this year

PHIL 185. Memory
Structure, content, functional role, and epistemic authority of human memories. Sources include philosophical and psychological literature from different schools and historical periods.

4 units, Aut (Hills, D)

PHIL 186. Philosophy of Mind
(Same as PHIL 286) (Graduate students register for 286.) Debates concerning the nature of mental states, their relation to physical states of the human body, how they acquire their content, how people come to know about them in themselves and others, and the roles they play in the explanation of human conduct. GER:DB-Hum

4 units, Spr (Taylor, K)

PHIL 187. Philosophy of Action
(Same as PHIL 287) (Graduate students register for 287.) What is it to be an agent? Is there a philosophically defensible contrast between being an agent and being a locus of causal forces to which one is subject? What is it to act purposively? What is intention? What is it to act intentionally? What is it to act for a reason? Are the reasons for which one acts causes of one's action? What is it to act autonomously? Readings include Davidson and Frankfurt. Prerequisite: 80. GER:DB-Hum

4 units, Spr (Bratman, M)

PHIL 188. Personal Identity
Does one persist through time the way that a skyscraper persists through space, by having different parts at different locations? Or is a person wholly present at every moment of life, in something more like the way that an elevator is present in each place as it travels up to the top floor? What criteria determine whether one is now the same person as some unique person located at some time in the past? Is the continuity of memories or other mental states sufficient for survival? Can one survive the loss or destruction of the body? Does a person really exist for more than just the present moment? How do different answers to these questions bear on moral, personal, and professional obligations? What kinds of considerations could help to answer these questions? Readings include survey, historical, and contemporary material. GER:DB-Hum

4 units, Spr (Giberman, D)

PHIL 189. Examples of Free Will
(Same as PHIL 289) Examples drawn from three domains: choice, computation, and conflict of norms. Conceptually, a distinction is made between examples that are predictable and those that are not, but skepticism about making a sharp distinction between determinism and indeterminism is defended. GER:DB-Hum

4 units, not given this year

PHIL 190. Introduction to Cognitive and Information Sciences
(Same as LINGUIST 144, PSYCH 132, SYMSYS 100) The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major. GER:DB-SocSci

4 units, Spr (McClelland, J; van Benthem, J)

PHIL 193H. The Art of the Movies: Story, Drama, and Image
A philosophical study of how movies coordinate and transform elements they borrow from older arts of literary narrative, live theater, and graphic illustration. Examples from the career of Alfred Hitchcock. GER:DB-Hum

4 units, not given this year

PHIL 193W. Nietzsche, Doestoevsky, and Sartre
Literary works in which philosophical ideas and issues are put forward, such as prose poems, novels, and plays. Ideas and issues and the dramatic or narrative structures through which they are presented. Texts include: Nietzsche, Thus Spoke Zarathustra; Dostoevsky, The Brothers Karamazov; and Sartre, Nausea and No Exit. GER:DB-Hum

4 units, not given this year

PHIL 194A. Empiricism and the Philosophy of Mind
Priority to majors. 20th-century analytic and early modern philosophy of mind and epistemology. Main text is Wilfrid Sellars's Empiricism and the Philosophy of Mind; source materials and commentary. Enrollment limited to 12.

4 units, not given this year

PHIL 194B. The Ethics of Belief
Priority to majors. Are beliefs subject to moral evaluation? Can it be right or wrong to believe or disbelieve something? Are people morally required to believe only that for which there is sufficient evidence; or can the good consequences of believing something justify the belief, irrespective of the evidence? Contemporary and historical sources. Enrollment limited to 12.

4 units, not given this year

PHIL 194C. Time and Free Will
Classic and contemporary reading on free will, with special attention to the consequence argument for incompatibilism, and issues involving causation and time. GER:DB-Hum

4 units, Aut (Perry, J)

PHIL 194E. Beauty and Other Forms of Value
The nature and importance of beauty and of our capacity to discern it and respond to it, as discussed by philosophers and artists from various traditions and historical periods. Attempts to think out the relations between beauty and ethical values (such as goodness) on the one hand and cognitive values (such as truth) on the other. Fulfills capstone seminar requirement for the Philosophy and Literature tracks. GER:DB-Hum

4 units, Win (Hills, D)

PHIL 194N. Philosophical Issues in Cognitive Science
Philosophers generally do not perform systematic empirical observations or construct computational models. But philosophy remains important to cognitive science because it deals with fundamental issues that underlie the experimental and computational approach to mind. Abstract questions such as the nature of representation and computation. Relation of mind and body and methodological questions such as the nature of explanations found in cognitive science. Normative questions about how people should think as well as with descriptive ones about how they do. In addition to the theoretical goal of understanding human thinking, cognitive science can have the practical goal of improving it, which requires normative reflection on what we want thinking to be. Philosophy of mind does not have a distinct method, but should share with the best theoretical work in other fields a concern with empirical results. GER:DB-Hum

4 units, Spr (Crimmins, M)

PHIL 194P. Naming and Necessity
Saul Kripke's lectures on reference, modal metaphysics, and the mind/body problem. GER:DB-Hum

4 units, not given this year

PHIL 194R. Epistemic Paradoxes
Paradoxes that arise from concepts of knowledge and rational belief, such as the skeptical paradox, the preface paradox, and Moore¿s paradox. Can one lose knowledge without forgetting anything? Can one change one's mind in a reasonable way without gaining new evidence? GER:DB-Hum

4 units, not given this year

PHIL 195A. Unity of Science
Primarily for seniors.

4-5 units, not given this year

PHIL 195B. Donor Seminar: Practical Reasoning
Primarily for seniors. Relationships among action, deliberation, reasons, and rationality. On what basis do people decide what to do? What norms or rules structure reasoning? What constitutes rationality?

4 units, not given this year

PHIL 196. Tutorial, Senior Year
(Staff)
5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHIL 197. Individual Work, Undergraduate
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHIL 198. The Dualist
Weekly meeting of the editorial board of The Dualist, a national journal of undergraduate work in philosophy. Open to all undergraduates. May be taken 1-3 quarters. (AU) (Potochnik, Yap)
1 unit, Aut (Kahn, S), Win (Glezer, T), Spr (Kahn, S)

PHIL 199. Seminar for Prospective Honors Students
Open to juniors intending to do honors in philosophy. Methods of research in philosophy. Topics and strategies for completing honors project. May be repeated for credit.
2 units, Spr (Miyake, T)

PHIL 249. Evidence and Evolution
(Same as PHIL 349) The logic behind the science. The concept of evidence and how it is used in science with regards to testing claims in evolutionary biology and using tools from probability theory, Bayesian, likelihoodist, and frequentist ideas. Questions about evidence that arise in connection with evolutionary theory. Creationism and intelligent design. Questions that arise in connection with testing hypotheses about adaptation and natural selection and hypotheses about phylogenetic relationships.
3-5 units, not given this year

PHIL 265C. Philosophy of Physics: Probability and Relativity
Conceptual puzzles in formulating probability concepts to be invariant in the sense of the Lorentz transformation of special relativity. Problems arise in both classical and quantum physics.
4 units, Spr (Suppes, P)

PHIL 277M. Human Rights and Moral Questions
(Same as ETHICSOC 177M, ETHICSOC 277M, PHIL 177M) The proliferation of human rights in the discourse of international justice has raised questions in both moral and legal theory such as: What are human rights? How should they be conceptualized? Who ought to bear the duties associated with them? Can their protection justify military interventions into sovereign states? Course focus is on topics in moral and legal theory surrounding human rights including: the question of what these rights are; the various substantive moral justifications for the protection of human rights; the moral issues raised by the dominance of human rights in international law and relations; can any rights be universal? How are these rights to be framed in the light of crosscultural values and claims about cultural dominance? The connections between these questions.
5 units, Aut (Thomas, J)

PHIL 278M. Environmental Justice
(Same as ETHICSOC 178M, ETHICSOC 278M, PHIL 178M, POLISCI 134L) Explores the normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.
4 units, Win (Staff)

GRADUATE COURSES IN PHILOSOPHY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PHIL 201. Introduction to Medieval Philosophy
(Same as PHIL 101) Classics of Western philosophy by Augustine, Boethius, Anselm, Abelard, Aquinas, and Ockham. Explore the puzzles facing someone seeking to lead a good life and to understand herself and her world. A theory of will and human motivation, a theory of ethics based on the agent's intention, and a theory of divine omniscience and omnipotence consistent with divine goodness and human freedom. Works include On Free Choice, The Consolation of Philosophy, Ethics, Summa theologiae, and the Connection of the Virtues.
4 units, Spr (Wood, R)

PHIL 206. Ancient Skepticism
(Same as PHIL 106) The ancient Pyrrhonian skeptics who think that for any claim there is no more reason to assert it than deny it and that a life without any beliefs is the best route to happiness. Some ancient opponents of the Pyrrhonian skeptics and some relations between ancient and modern skepticism.
4 units, not given this year

PHIL 207. Plato's Metaphysics and Epistemology
(Same as PHIL 107) Examine Plato's views on the nature of reality and knowledge by reading the relevant parts of dialogues such as the Parmenides, the Phaedo, the Philebus, and the Republic.
4 units, Aut (Bobonich, C)

PHIL 210. Plato
(Same as PHIL 110) Plato's Republic.
4 units, not given this year

PHIL 211. Aristotle and Contemporary Ethics
(Same as PHIL 111) Aristotle's Nicomachean Ethics, focusing on virtue, happiness, pleasure, practical reasoning, and particularism. Sources include the Eudemian Ethics, contemporary philosophers who have taken many of these topics up again, and contemporary material such as that by Anscombe, Foot, Hursthouse, Korsgaard, and McDowell.
4 units, not given this year

PHIL 213. Hellenistic Philosophy
(Same as PHIL 113) Epicureans, skeptics, and stoics on epistemology, ethics, metaphysics, and psychology.
4 units, not given this year

PHIL 215. Problems in Medieval Philosophy: Islamic Aristotelianism and Western Scholasticism
(Same as PHIL 115) Islamic Aristotelianism and Western Scholasticism: The Western World adopted Aristotle's metaphysics and natural philosophy as the foundation of its educational system and scholarly life between 1210 and 1255. Christian Europe was thereby following the example set by Islam in Spain and the Near East. Today some people believe that this development was independent, and others think that the Scholastics copied even their methods from Arabic philosophers. Historical evaluation of those claims.
3-5 units, not given this year

PHIL 217. Descartes
(Same as PHIL 117) (Formerly 121/221.) Descartes's philosophical writings on rules for the direction of the mind, method, innate ideas and ideas of the senses, mind, God, eternal truths, and the material world.
4 units, Aut (De Pierris, G)

PHIL 218. British Empiricism, 1660s-1730s
(Same as PHIL 118)
4 units, not given this year

PHIL 219. Rationalists
(Same as PHIL 119) (Formerly 143/243.) Developments in 17th-century continental philosophy. Descartes's views on mind, necessity, and knowledge. Spinoza and Leibniz emphazing their own doctrines and their criticism of their predecessors. Prerequisite: 102.
4 units, not given this year

PHIL 220A. The Leibniz-Clarke Correspondence
(Same as PHIL 120A) Correspondence on metaphysics, theology, and science.
4 units, Win (De Pierris, G)

PHIL 222. Hume
(Same as PHIL 122) (Formerly 120/220; graduate students enroll in 222.) Hume's theoretical philosophy, in particular, skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self.
4 units, not given this year

PHIL 224. Kant's Philosophy of Physical Science
Kant's Metaphysical Foundations of Natural Science (1786), published between the first (1781) and second (1787) editions of the Critique of Pure Reason, in the scientific and philosophical context provided by Newtonian natural philosophy and the Leibnizean tradition. The place of this work in the development of Kant's thought. Prerequisite: acquaintance with either Kant's theoretical philosophy or the contemporaneous scientific context, principally Newton, Leibniz, and Euler.
4 units, not given this year

PHIL 224A. Mathematics in Kant's Philosophy
Recent work in Kant's philosophy of mathematics, examined with a view to the role of mathematics, both pure and applied, within Kant's philosophy more generally. Emphasis on the schematism chapter of the Critique of Pure Reason. Prerequisite: acquaintance with Kant's theoretical philosophy and the Critique of Pure Reason.
4 units, not given this year

PHIL 225. Kant's First Critique
(Same as PHIL 125) (Graduate students register for 225.) The founding work of Kant's critical philosophy emphasizing his contributions to metaphysics and epistemology. His attempts to limit metaphysics to the objects of experience. Prerequisite: course dealing with systematic issues in metaphysics or epistemology, or with the history of modern philosophy.
4 units, Win (Wood, A)

PHIL 226B. Kant's Ethical Theory
(Same as PHIL 126B) (Graduate students register for 226B.) Kant's moral philosophy based primarily on the Groundwork of Metaphysics of Morals, Critique of Practical Reason, and The Metaphysics of Morals.
4 units, Spr (Wood, A)

PHIL 227A. Kant's Value Theory
(Same as PHIL 127A) (Graduate students register for 227A.) The role of autonomy, principled rational self-governance, in Kant's account of the norms to which human beings are answerable as moral agents, citizens, empirical inquirers, and religious believers. Relations between moral values (goodness, rightness) and aesthetic values (beauty, sublimity).
4 units, not given this year

PHIL 227B. Kant's Anthropology and Philosophy of History
(Same as PHIL 127B) Kant's conception of anthropology or human nature, based on his philosophy of history, which influenced and anticipated 18th- and 19th-century philosophers of history such as Herder, Fichte, Hegel, and Marx. Texts include Idea for a Universal History, Conjectural Beginning of Human History, and Anthropology from a Pragmatic Point of View. Topics include: Kant's pragmatic approach to the study of human nature; the difficulty of human self knowledge; the role of regulative and teleological principles in studying human history; and Kant's theory of race.
4 units, not given this year

PHIL 228. Fichte's Ethics
(Same as PHIL 128) (Graduate students register for 228.) The founder of the German Idealist movement who adopted but revised Kant's project of transcendental philosophy basing it on the principle of awareness of free self-activity. The awareness of other selves and of ethical relations to them as a necessary condition for self-awareness. His writings from 1793-98 emphasizing the place of intersubjectivity in his theory of experience.
4 units, Win (Staff)

PHIL 230. Hegel
(Same as PHIL 130) (Formerly 122/222; graduate students register for 230.) Introduction to Hegel's philosophy, emphasizing his moral and political philosophy, through study of his last major work (1821). May be repeated for credit. Prerequisite: course in the history of modern philosophy.
4 units, not given this year

PHIL 233. Husserl
Husserl's phenomenology. Main themes in his philosophy and their interconnections, including consciousness, perception, intersubjectivity, lifeworld, ethics, mathematics and the sciences, and time and space. Works in English translation.
4 units, not given this year

PHIL 234. Phenomenology and Intersubjectivity
(Same as PHIL 134) (Graduate students register for 234.) Readings from Husserl, Stein, Heidegger, Sartre, and Merleau-Ponty on subjects related to awareness of others. Topics include solipsism, collective experience, empathy, and objectification of the other.
4 units, not given this year

PHIL 235. Existentialism
(Same as PHIL 135) (Formerly 132/232.) Focus is on the existentialist preoccupation with human freedom. What constitutes authentic individuality? What is one's relation to the divine? How can one live a meaningful life? What is the significance of death? A rethinking of the traditional problem of freedom and determinism in readings from Rousseau, Kierkegaard, and Nietzsche, and the extension of these ideas by Sartre, Beauvoir, and Camus, including their social and political consequences in light of 20th-century fascism and feminism.
4 units, Win (Scotland-Stewart, L)

PHIL 236. History of Analytic Philosophy
(Same as PHIL 136) (Formerly 147/247; graduate students register for 236.) Theories of knowledge in Frege, Carnap, and Quine. Emphasis is on conceptions of analyticity and treatment of logic and mathematics. Prerequisite: 50 and one course numbered 150-165 or 181-90.
4 units, not given this year

PHIL 237. Wittgenstein
(Same as PHIL 137) (Graduate students register for 237.) The main themes and claims in Wittgenstein's later work concentrating on his views about meaning, mind, knowledge, the nature of philosophical perplexity, and the nature of philosophical progress in his Philosophical Investigations. Emphasis is on the relationship between the novel arguments of the Investigations and its ways of writing up the results of philosophical questioning.
4 units, Spr (Hills, D)

PHIL 238. Recent European Philosophy: Between Nature and History
(Same as PHIL 138) A critical introduction to the novel understandings of time, language, and cultural power developed by 20th-century continental thinkers, with close attention to work by Heidegger, Saussure, Benjamin, and Foucault.
4 units, not given this year

PHIL 239. Teaching Methods in Philosophy
For Ph.D. students in their first or second year who are or are about to be teaching assistants for the department. May be repeated for credit.
1-4 units, Aut (Holliday, W), Spr (Holliday, W)

PHIL 240. Individual Work for Graduate Students
May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHIL 241. Dissertation Development Seminar
Required of second-year Philosophy Ph.D. students; restricted to Stanford Philosophy Ph.D. students. Prerequisite: consent of instructor.
1-4 units, Sum (Bobonich, C)

PHIL 242. The Philosophical and Educational Thought of John Dewey
(Same as EDUC 304) Dewey's pragmatic philosophy and educational thought; his debt to Darwin, Hegel, Peirce, and James; his educational writings including Democracy and Education; and his call for a revolution in philosophy in Reconstruction in Philosophy. (SSPEP)
4 units, not given this year

PHIL 243. Quine
(Same as PHIL 143) (Formerly 183/283; graduate students register for 243.) The philosophy of Quine: meaning and communication; analyticity, modality, reference, and ontology; theory and evidence; naturalism; mind and the mental.
4 units, not given this year

PHIL 248. Medieval Latin Paleography
The history of medieval scripts and medieval abbreviation. Dating and placing Latin European medieval manuscripts. Editing medieval texts in philosophy, psychology, physics, and theology. Class project: an anonymous commentary on Aristotle's Ethics preserved in a Florentine manuscript.
3-5 units, Win (Staff)

PHIL 250. Basic Concepts in Mathematical Logic
(Same as PHIL 150) (Formerly 159.) The concepts and techniques used in mathematical logic, primarily through the study of the language of first order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability.
4 units, Aut (Barker-Plummer, D)

PHIL 251. First-Order Logic
(Same as PHIL 151) (Formerly 160A.) The syntax and semantics of sentential and first-order logic. Concepts of model theory. Gödel's completeness theorem and its consequences: the Löwenheim-Skolem theorem and the compactness theorem. Prerequisite: 150 or consent of instructor.
4 units, Win (Mumma, J)

PHIL 252. Computability and Logic
(Same as PHIL 152) Approaches to effective computation: recursive functions, register machines, and programming styles. Proof of their equivalence, discussion of Church's thesis. Elementary recursion theory. These techniques used to prove Gödel's incompleteness theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 151.
4 units, Spr (Sommer, R)

PHIL 253. Feminist Theories and Methods Across the Disciplines
(Same as FEMST 103, FEMST 203, PHIL 153) The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research.
4-5 units, Win (Longino, H)

PHIL 254. Modal Logic
(Same as PHIL 154) (Graduate students register for 254.) Syntax and semantics of modal logic, and technical results like completeness and correspondence theory. Applications to philosophy and computer science. Prerequisite: 150 or preferably 151.
4 units, Spr (van Benthem, J)

PHIL 257. Topics in Philosophy of Logic
(Same as PHIL 157) (Graduate students register for 257.) Disputed foundational issues in logic; the question of what the subject matter and boundaries of logic are, such as whether what is called second-order logic should be counted as logic. What is the proper notion of logical consequence? May be repeated for credit. Pre- or corequisite: 151, or consent of instructor.
3 units, not given this year

PHIL 258. Minds and Machines
Readings on arguments concerning mechanical models of the mind including Turing machine models to which Gödel's incompleteness theorems are relevant, and connectionist (neural net) models. Prerequisites: 151 (formerly 160A), 152, or equivalents. Recommended: 389. (Feferman)
4 units, not given this year

PHIL 260A. Newtonian Revolution
(Same as PHIL 160A) (Graduate students register for 260A.) 17th-century efforts in science including by Kepler, Galileo, Descartes, and Huygens, that formed the background for and posed the problems addressed in Newton¿s Principia.
4 units, not given this year

PHIL 260B. Newtonian Revolution
(Same as PHIL 160B) (Graduate students register for 260B.) Newton¿s Principia in its historical context, emphasizing how it produced a revolution in the conduct of empirical research and in standards of evidence in science.
4 units, not given this year

PHIL 262. Philosophy of Mathematics
(Same as MATH 162, PHIL 162) (Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor.
4 units, not given this year

PHIL 263. Significant Figures in Philosophy of Science
(Same as PHIL 163) (Graduate students register for 263.) Directed study of two or more thinkers, past or present, who have made a lasting impact on contemporary philosophy of science. Subjects last year were Henri Poincaré, Pierre Duhem, and Gaston Bachelard.
4 units, not given this year

PHIL 264. Central Topics in the Philosophy of Science: Theory and Evidence
(Same as PHIL 164) (Graduate students register for 264.) The relation of theory to evidence and prediction, problems of induction, empirical under-determination of theory by evidence, and theory choice. Hypothetico-deductive, Bayesian, pragmatic, and inference to the best explanation models of explanation. The semantic approach to theories.
4 units, Spr (Ryckman, T)

PHIL 264A. Central Topics in Philosophy of Science: Causation
(Same as PHIL 164A) (Graduate Students register for 264A.) Establishing causes in science, engineering, and medicine versus establishing them in Anglo-American law, considered in the context of Hume and Mill on causation. May be repeated for credit.
4 units, not given this year

PHIL 265. Philosophy of Physics
(Same as PHIL 165) (Graduate students register for 265.) Central topic alternates annually between space-time theories and philosophical issues in quantum mechanics. Topics last year: absolute and relational theories of space, time, and motion. Newton¿s critique of Descartes and debate with Leibniz. The principle of relativity and space-time formulations of Aristotelian, Galilean, and relativity physics. Mach¿s principle and the theory of general relativity. Einstein¿s struggles with the principle of general covariance. Space-time substantivalism, and the meaning of background independence. May be repeated for credit if content is different.
4 units, Win (Ryckman, T)

PHIL 266. Probability: Ten Great Ideas About Chance
(Same as PHIL 166, STATS 167, STATS 267) Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.
4 units, not given this year

PHIL 267A. Philosophy of Biology
(Same as PHIL 167A) (Graduate students register for 267A.) Evolutionary theory and in particular, on characterizing natural selection and how it operates. We examine debates about fitness, whether selection is a cause or force, the levels at which selection operates, and whether cultural evolution is a Darwinian process.
2-4 units, not given this year

PHIL 267B. Philosophy, Biology, and Behavior
(Same as PHIL 167B) (Graduate students register for 267B.) Continuation of 167A/267A. Further philosophical study of key theoretical ideas in biology, focusing on problems involving explanation of behavior. Topics: evolutionary versus proximate causal explanations of behavior; genetic and other determinisms; and classification and measurement of behavior. Prerequisites: 167A; or one PHIL course and either one BIO course or Human Biology core; or equivalent with consent of instructor.
4 units, Aut (Longino, H)

PHIL 267C. Associative Theories of Mind and Brain
(Same as PHIL 167C) After a historical survey of associative theories from Hume to William James, current versions will be analyzed including the important early ideas of Karl Lashley. Emphasis will be on the computational power of associative networks and their realization in the brain.
4 units, Win (Suppes, P)

PHIL 268. Theories of Truth
(Same as PHIL 168) (Graduate students register for 268.) The correspondence, coherence, pragmatist and deflationary theories of

truth. Tarski's semantic conception of truth and hierarchical truth definitions. The problems posed by the liar paradox for non-hierarchical theories. Formal theories of truth proposed since the 70s to deal with these problems.

4 units, not given this year

PHIL 269. Evolution of the Social Contract

(Same as PHIL 169) Naturalizing the social contract. Texts: Binmore, Natural Justice; Skyrms, Evolution of the Social Contract.

4 units, Spr (Skyrms, B)

PHIL 270B. Metaphor

(Same as PHIL 170B) Think and talk about two things at once: two different subject matters are mingled to rich and unpredictable effect. Close critical study of the main modern accounts of metaphors nature and interest, drawing on the work of writers, linguists, philosophers, and literary critics. Attention to how understanding, appreciation, and pleasure connect with one another in the experience of metaphor. Consideration of the possibility that metaphor or something very like it can occur in nonverbal media: gesture, dance, painting, music.

4 units, Spr (Hills, D)

PHIL 271. Justice

(Same as ETHICSOC 171, IPS 208, PHIL 171, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality.

4-5 units, Aut (Cohen, J)

PHIL 272. History of Modern Ethics

(Same as PHIL 172) Major strands in the history of modern, pre-Kantian moral philosophy. Emphasis is on the dialogue between empiricists and rationalists on the subject of the relationship between the natural and the normative. Authors include Frances Hutcheson, David Hume, Adam Smith, Samuel Clarke, and Richard Price.

4 units, not given this year

PHIL 272B. Recent Ethical Theory

(Same as PHIL 172B) Study the works of several prominent contemporary moral philosophers. Possible authors include: Scanlon, Darwall, Nagel, Williams, Blackburn, Gibbard, Korsgaard. Prerequisite: students should have taken an introduction to moral philosophy (Phil. 20, Phil. 170 or equivalent).

4 units, Win (Schapiro, T)

PHIL 273B. Metaethics

(Same as PHIL 173B) (Graduate students register for 273B.) Can moral and ethical values be justified or is it just a matter of opinion? Is there a difference between facts and values? Are there any moral truths? Does it matter if there are not? Focus is not on which things or actions are valuable or morally right, but what is value or rightness itself. Contemporary metaethics. Prerequisites: 80, 181, and an ethics course.

4 units, Win (Hussain, N)

PHIL 274. Freedom and the Practical Standpoint

(Same as PHIL 174) (Graduate students register for 274.) Confronted with the question of how to act, people think of themselves as freely determining their own conduct. Natural science poses a challenge to this by explaining all events, including human actions, in terms of causal processes. Are people justified in thinking of themselves as free? Major philosophical approaches to this question: incompatibilism, compatibilism, and the two-standpoint view.

4 units, not given this year

PHIL 274A. Moral Limits of the Market

(Same as ETHICSOC 174A, PHIL 174A) Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases.

4 units, not given this year

PHIL 275. Philosophy of Law

(Same as PHIL 175) Philosophical foundations of law and the legal system. The justifiability of patterns of assigning legal responsibility within criminal law. Prerequisite: PHIL 80 and one additional PHIL course.

4 units, Win (Bratman, M)

PHIL 275A. Ethics and Politics of Public Service

(Same as ETHICSOC 133, HUMBIO 178, PHIL 175A, POLISCI 133, PUBLPOL 103D) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford.

5 units, not given this year

PHIL 275M. Two Ethical Theories and Being a Person

(Same as PHIL 175M) The distinction between the ethics of being a person and the ethics of rules as opposed to the distinction between Kantian ethics and utilitarianism or consequentialism consequentialism. Comparison of these two types of ethics with respect to their relationship to agency and being a good person. Relations between Western ethics and those of other continents.

4 units, not given this year

PHIL 276. Political Philosophy: The Social Contract Tradition

(Same as PHIL 176) (Graduate students register for 276.) Why and under what conditions do human beings need political institutions? What makes them legitimate or illegitimate? What is the nature, source, and extent of the obligation to obey the legitimate ones, and how should people alter or overthrow the others? Answers by political theorists of the early modern period: Hobbes, Locke, Rousseau, and Kant.

4 units, not given this year

PHIL 276A. Classical Seminar: Origins of Political Thought

(Same as CLASSHIS 133, CLASSHIS 333, PHIL 176A, POLISCI 230A, POLISCI 330A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.

4-5 units, Win (Ober, J)

PHIL 276B. The Economic Individual in the Behavioral Sciences

(Same as PHIL 176B) (Graduate students register for 276B.)

4 units, not given this year

PHIL 278A. The Ethics of Environmental Choices

(Same as EARTHSYS 178, EARTHSYS 278, PHIL 178A) (Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

4 units, not given this year

PHIL 279. Collectivities

(Same as POLISCI 336J) Issues about the nature of collective action, shared intention, and cooperation, the role of sociality in the nature of mind, problems of preference and judgment aggregation, and, quite generally, different ways of thinking about the relationship of I to we. Enrollment limited to 30.

4 units, not given this year

PHIL 279S. Moral Psychology, Reasons for Action, and Moral Theory

(Same as PHIL 179S) What sorts of considerations does an ethical agent take to be good reasons for action? Work in moral psychology to illuminate the theory of practical reasons, and the theory of practical reasons to test the prospects for systematic moral theory. Can any systematic moral theory be reconciled with the moral psychology of ordinary, morally respectable agents? Reading include Bernard Williams, Rosalind Hursthouse, Peter Railton, T.M. Scanlon, and Barbara Herman.

4 units, not given this year

PHIL 280. Metaphysics
(Same as PHIL 180) Traditional philosophical riddles involving the notion of existence including: the ontological argument for the existence of God; the problem of intuitively true, negative existential statements; the sorites paradox; and the question of why there is anything at all. Conceptual tools philosophers use to address these questions, from nonexistent objects to possible worlds. Meta-metaphysics.
4 units, Win (Burgess, A)

PHIL 280A. Realism, Anti-Realism, Irrealism, Quasi-Realism
(Same as PHIL 180A) Realism and its opponents as options across a variety of different domains: natural science, mathematics, ethics, and aesthetics. Clarify the various conceptions that fall under these terms and outline the reasons for and against adopting realism for the various domains. Highlight the general issues involved. Prerequisites: 80, 181
4 units, not given this year

PHIL 281. Philosophy of Language
(Same as PHIL 181) The study of conceptual questions about language as a focus of contemporary philosophy for its inherent interest and because philosophers see questions about language as behind perennial questions in other areas of philosophy including epistemology, philosophy of science, metaphysics, and ethics. Key concepts and debates about the notions of meaning, truth, reference, and language use, with relations to psycholinguistics and formal semantics. Readings from philosophers such as Frege, Russell, Wittgenstein, Grice, and Kripke. Prerequisites: 80 and background in logic.
4 units, Aut (Crimmins, M)

PHIL 282. Truth
(Same as PHIL 182) Philosophical debates about the place in human lives and the value to human beings of truth and its pursuit. The nature and significance of truth-involving virtues such as accuracy, sincerity, and candor.
4 units, not given this year

PHIL 284. Theory of Knowledge
(Same as PHIL 184) Competing theories of epistemic justification (foundationalism, coherentism, and externalism) against the background of radical scepticism. Readings from contemporary sources. Prerequisite: 80 or consent of instructor.
4 units, Spr (Lawlor, K)

PHIL 284F. Feminist Theories of Knowledge
(Same as FEMST 166, PHIL 184F) Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power.
4 units, not given this year

PHIL 286. Philosophy of Mind
(Same as PHIL 186) (Graduate students register for 286.) Debates concerning the nature of mental states, their relation to physical states of the human body, how they acquire their content, how people come to know about them in themselves and others, and the roles they play in the explanation of human conduct.
4 units, Spr (Taylor, K)

PHIL 287. Philosophy of Action
(Same as PHIL 187) (Graduate students register for 287.) What is it to be an agent? Is there a philosophically defensible contrast between being an agent and being a locus of causal forces to which one is subject? What is it to act purposively? What is intention? What is it to act intentionally? What is it to act for a reason? Are the reasons for which one acts causes of one's action? What is it to act autonomously? Readings include Davidson and Frankfurt. Prerequisite: 80.
4 units, Spr (Bratman, M)

PHIL 289. Examples of Free Will
(Same as PHIL 189) Examples drawn from three domains: choice, computation, and conflict of norms. Conceptually, a distinction is made between examples that are predictable and those that are not, but skepticism about making a sharp distinction between determinism and indeterminism is defended.
4 units, not given this year

PHIL 300. Proseminar
Topically focused seminar. Required of all first year Philosophy PhD students
4 units, Aut (Taylor, K)

PHIL 312. Aristotle's Psychology
De Anima and parts of Parva Naturalia.
4 units, not given this year

PHIL 314. Practical Reasoning in Plato and Aristotle
It is often said that the greatest difference between Plato's ethics and those of Aristotle is that the latter thinks that practical and theoretical reason are distinct, but the former does not. We shall read some of both Plato and Aristotle and ask whether the above claim is true and then consider what the implications the differences between their views of practical reason have for the rest of their ethics.
2-4 units, not given this year

PHIL 317. Aristotle's Politics
Examine the fundamentals of Aristotle's political philosophy by reading the Politics as well relevant parts of some of his other ethical and political works.
4 units, Win (Bobonich, C)

PHIL 318. Aristotle's Ethics
Topics in Aristotle's ethical theory and related parts of his psychology.
4 units, not given this year

PHIL 319. Aristotles Metaphysics
Aristotle's views about substance and the nature and possibility of metaphysics. Focus is on Categories and Metaphysics Book Zeta.
3 units, not given this year

PHIL 321. Leibniz's Metaphysics
Leibniz's metaphysical views during his so-called ""mature period"" (early 1680s to 1716). Topics will include Leibniz's conception of substance, his alleged idealism, his doctrine of possible worlds and his doctrine of pre-established harmony. Reading of the Discourse on Metaphysics (1686) and the correspondence with Arnauld (1686-1690).
4 units, Spr (Duarte, S)

PHIL 322. Hume
Hume's theoretical philosophy emphasizing skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self.
2-4 units, Win (De Pierris, G)

PHIL 323. Kant's Criticism of Metaphysics
Motivations and strategies of Kant's criticisms of traditional metaphysics in the Critique of Pure Reason. Leibnizian and Wolffian versions of the concept containment theory of truth and the Wolffian ideal of a conceptual system of metaphysical knowledge. Kant's analytic/synthetic distinction, focusing on its place in the rejection of metaphysics and in arguments about the ideas of reason in the transcendental dialectic. Prerequisite: course on the first Critique, or consent of instructor.
4 units, not given this year

PHIL 332. Nietzsche
Preference to doctoral students. Nietzsche's later works emphasizing The Gay Science, Beyond Good and Evil, and On the Genealogy of Morals. The shape of Nietzsche's philosophical and literary projects, and his core doctrines such as eternal recurrence, will to power, and perspectivism. Problems such as the proper regulation of belief, and the roles of science, morality, art, and illusion in life.
2-4 units, not given this year

PHIL 334. Habermas
Does Habermas have a distinctive account of normativity and normative judgements?
3-5 units, not given this year

PHIL 335. Topics in Aesthetics
May be repeated for credit.
4 units, not given this year

PHIL 340. Time and Free Will
Free will and the consequence argument of Peter van Inwagen and others. Focus is on the principle that one cannot change the past and the problem of backtracking conditionals, and less on the problem raised by determinismon. Hypotheses less drastic than determinism support backtrackers; given the backtracker, would some-

one¿s not having done something require that he change the past? Issues related to time, change, the phenomenology of agency, and McTaggart's argument about the reality of time.

3-5 units, not given this year

PHIL 348. Evolution of Signals

Evolutionary and learning dynamics applied to simple models of signaling, emergence of information and inference. Text: Skyrms, Signals: Evolution, Learning and Information; and articles.

4 units, Spr (Skyrms, B)

PHIL 349. Evidence and Evolution

(Same as PHIL 249) The logic behind the science. The concept of evidence and how it is used in science with regards to testing claims in evolutionary biology and using tools from probability theory, Bayesian, likelihoodist, and frequentist ideas. Questions about evidence that arise in connection with evolutionary theory. Creationism and intelligent design. Questions that arise in connection with testing hypotheses about adaptation and natural selection and hypotheses about phylogenetic relationships.

3-5 units, not given this year

PHIL 350A. Model Theory

Language and models of the first order, predicate calculus, complete and decidable theories. Fraisse-Ehrenfeucht games. Preservation theorems. Prerequisites: 150,151, or equivalent.

3 units, not given this year

PHIL 350B. Model Theory B

(Same as MATH 290B) Decidable theories. Model-theoretic background. Arithmetic of addition, real closed and algebraically closed fields, weak second order arithmetic, theories of terms, theories of arrays, temporal logic. Combining decision procedures. May be repeated for credit. Prerequisite: 151,152 or equivalents.

1-3 units, not given this year

PHIL 351A. Recursion Theory

Theory of recursive functions and recursively enumerable sets. Register machines, Turing machines, and alternative approaches. Gödel's incompleteness theorems. Recursively unsolvable problems in mathematics and logic. Introduction to higher recursion theory. The theory of combinators and the lambda calculus. Prerequisites: 151, 152, and 161, or equivalents.

3 units, not given this year

PHIL 351B. Proof Mining

Uses of proof theory in analysis and number theory. Proof mining: extraction of bounds from non-effective proofs. May be repeated for credit. Prerequisite: 151,152 or equivalents, and a calculus course.

1-3 units, not given this year

PHIL 352A. Set Theory

(Same as MATH 292A) The basics of axiomatic set theory; the systems of Zermelo-Fraenkel and Bernays-Gödel. Topics: cardinal and ordinal numbers, the cumulative hierarchy and the role of the axiom of choice. Models of set theory, including the constructible sets and models constructed by the method of forcing. Consistency and independence results for the axiom of choice, the continuum hypothesis, and other unsettled mathematical and set-theoretical problems. Prerequisites: PHIL151 and MATH 161, or equivalents.

3 units, Win (Mints, G)

PHIL 353A. Proof Theory

(Same as MATH 293A) Gentzen's natural deduction and sequential calculi for first-order propositional and predicate logics. Normalization and cut-elimination procedures. Relationships with computational lambda calculi and automated deduction. Prerequisites: 151, 152, and 161, or equivalents.

3 units, not given this year

PHIL 353B. Proof Theory B

Consistency ordinal as a measure of the strength of a mathematical theory. The open problem of describing the ordinal of mathematical analysis (second order arithmetic). Present state of the problem and approaches to a solution. Prerequisites: Phil 151,152 or equivalents

3 units, Spr (Mints, G)

PHIL 353C. Functional Interpretations

Finite-type arithmetic. Gödel's functional interpretation and Kreisel's modified realizability. Systems based on classical logic. Spector's extension by bar-recursive functionals. Kohlenbach's monotone interpretation and the bounded functional interpretation. The elimination of weak Kônig's lemma. Uniform boundedness. A look at Tao's hard/soft analysis distinction.

4 units, not given this year

PHIL 354. Topics in Logic

Epsilon-calculus. Syntacs and semantics of first-order epsilon-calculus. Hilbert's epsilon substitution method. Recent progress and open problems. May be repeated for credit. Prerequisite: 151,152 or equivalents

1-3 units, not given this year

PHIL 355. Logic and Social Choice

Topics in the intersection of social choice theory and formal logic. Voting paradoxes, impossibility theorems and strategic manipulation, logical modeling of voting procedures, preference versus judgment aggregation, role of language in social choice, and metatheory of social choice. May be repeated for credit. Prerequisite: 151 or consent of instructor.

4 units, not given this year

PHIL 356. Applications of Modal Logic

Applications of modal logic to knowledge and belief, and actions and norms. Models of belief revision to develop a dynamic doxastic logic. A workable modeling of events and actions to build a dynamic deontic logic on that foundation.

3 units, not given this year

PHIL 358. Rational Agency and Intelligent Interaction

(Same as CS 222) For advanced undergraduates, and M.S. and beginning Ph.D. students. Logic-based methods for knowledge representation, information change, and games in artificial intelligence and philosophy. Topics: knowledge, certainty, and belief; time and action; belief dynamics; preference and social choice; games; and desire and intention. Prerequisite: propositional and first-order logic.

3 units, Spr (Shoham, Y)

PHIL 359. Advanced Modal Logic

Mathematical analysis of modal systems, including bisimulation and expressive power, correspondence theory, algebraic duality, completeness and incompleteness, and extended modal logics, up to guarded fragments of first-order logic, fixed-point logics, and second-order logic. Prerequisite: 151, 154/254, or equivalent background.

4 units, Spr (van Benthem, J)

PHIL 360. Core Seminar in Philosophy of Science

Limited to first- and second-year Philosophy Ph.D. students.

4 units, not given this year

PHIL 365. Seminar in Philosophy of Science: Time

4 units, not given this year

PHIL 366. Evolution and Communication

Topics include information bottlenecks, signaling networks, information processing, invention of new signals, teamwork, evolution of complex signals, teamwork. Sources include signaling games invented by David Lewis and generalizations thereof, using evolutionary and learning dynamics.

4 units, not given this year

PHIL 370. Core Seminar in Ethics

Limited to first- and second-year students in the Philosophy Ph.D. program.

4 units, not given this year

PHIL 371D. Graduate Seminar on Equality

(Same as POLISCI 431L) This seminar will focus on ideas of equality of opportunity, with readings from political theory, as well as American constitutional law, political science, economics, and sociology. The readings will address four main questions: What is equality of opportunity? Why is equality of opportunity an important requirement of justice? What are the principal sources of inequalities of opportunity? And how might those inequalities be remedied? Readings from: Hayek, Rawls, Dworkin, Okin, Roemer, Tawney, Bourdieu, Barry, Jencks, Mazumder, Alstott, McLanahan, and Heckman.

5 units, Win (Cohen, J)

PHIL 372. Topics in Kantian Ethics
Selected topics in ethics, considering both Kant's texts and recent writings by Kant interpreters and moral philosophers in the Kantian tradition. Among the topics covered will be: Practical reason, personal relationships, duties to oneself, evil, right and politics, lying, constructivism in ethics.
4 units, not given this year

PHIL 372D. Graduate Seminar: John Rawls's Political Philosophy
(Same as POLISCI 332) Leading ideas in A Theory of Justice, Political Liberalism, and The Law of Peoples.
5 units, not given this year

PHIL 372E. Graduate Seminar on Moral Psychology
Recent philosophical works on desire, intention, the motivation of action, valuing, and reasons for action. Readings: Williams, Korsgaard, Smith, Blackburn, Velleman, Stampe, Frankfurt.
3-5 units, Win (Schapiro, T)

PHIL 372P. Practical Concepts in Practical Philosophy
Some philosophers argue that practical thinking and practical philosophy require the use of distinctively practical concepts, concepts that in some way originate in the practical or first-person standpoint. Examine and assess various versions of this claim. Readings from Korsgaard, Bok, Gibbard, Nagel, and others.
2-4 units, not given this year

PHIL 373. Moral Psychology: The Concept of Inclination
The weight placed by Kantian and rationalist moral theories on the distinction between inclination and reason. The concept of inclination as that which inclines but does not determine how people act. How are inclinations related to the people who hold them? Are they expressions of values, or more like internal weather? What is their nature? What does it mean to act from inclination? Are actions on inclination unchosen or just badly chosen? Historical and contemporary sources.
4 units, not given this year

PHIL 374. Caring and Practical Reasoning
What is it to care about something; how is caring related to desiring, emotions, and having policies; what is the relationship between caring and the will; why do people care about things; can attention to caring help explain the phenomenon of silencing reasons? Readings from contemporary literature, including Frankfurt, Watson, Bratman, Scanlon, Williams, Helm, and Kolodny. May be repeated for credit.
4 units, not given this year

PHIL 374C. Democracy and the Constitution
(Same as POLISCI 438)
5 units, Aut (Cohen, J)

PHIL 376. Agency and Personal Identity
How philosophical theories of agency interact with philosophical accounts of personal identity. Readings include David Velleman and Harry Frankfurt.
4 units, not given this year

PHIL 378. Amartya Sen's capability theory
Amartya Sen's pioneering work attempts to open up economics to missing informational and evaluative dimensions. Sen's capability approach and its implications for the study of economics, gender, and justice. Different ways that the capability approach has been developed, in particular by Martha Nussbaum, but also by other political philosophers.
4 units, Spr (Satz, D)

PHIL 379. Graduate Seminar in Metaethics
Theories about the meaning of ethical terms and the content of ethical judgements. Do these theories fit with best accounts of human agency and practical deliberation? Readings from recent literature. Prerequisites: 173B/273B, 181, 187/287 or equivalent.
2-4 units, Spr (Hussain, N)

PHIL 380. Core Seminar in Metaphysics and Epistemology
Limited to first- and second-year students in the Philosophy Ph.D. program.
4 units, not given this year

PHIL 381. Core Seminar in Philosophy of Language
Limited to first- and second-year students in the Philosophy Ph.D. program.
4 units, not given this year

PHIL 382. Seminar on Reference
Philosophical issues concerning the relationship between linguistic expressions and the objects to which they refer. Is it possible to get one unified theory of reference for different kinds of referring expressions such as proper names, pronouns, demonstratives, and other kinds of indexicals? Unsolved problems and desiderata for a theory of reference?
4 units, not given this year

PHIL 382A. Pragmatics and Reference
Grice's theory of conversational implicatures, relevance theory and other contemporary pragmatic theories, focusing on issues involving singular reference, pragmatic intrusion, and the semantics/pragmatics interface. The approach that Kepa Korta and Perry call critical pragmatics.
4 units, not given this year

PHIL 383. Philosophy of Mind Seminar
May be repeated for credit.
2-4 units, not given this year

PHIL 384. Seminar in Metaphysics and Epistemology
May be repeated for credit.
4 units, not given this year

PHIL 385. Pragmatics and Reference
How could a meaningful, declarative sentence fail to say anything true or false? Focus is on Huw Price's Facts and the Function of Truth.
4 units, Win (Perry, J)

PHIL 385B. Topics in Metaphysics and Epistemology: Vaguenes
Contemporary proposals for how and whether to explain and accommodate vagueness in reality and in representation.Theories of mental and linguistic representation that struggle to explain imprecise representation, and metaphysical theories of the ultimate structure of reality that are threatened with incoherence if worldly boundaries are vague. May be repeated for credit.
4 units, not given this year

PHIL 385C. Topics in Philosophy of Language: The Frege-Russell Problems
Various approaches to the difficulties for semantic theories raised by the behavior of propositional attitude sentences. How, if Superman and Clark are the same person, can Lois have different beliefs about them? Classic treatments of the issues including Frege, Russell, Quine, Davidson, and Kripke. Contemporary debates about the most promising approaches, including naive Russellianism and unarticulated constituent accounts.
2-4 units, not given this year

PHIL 385D. Topics in Philosophy of Language
4 units, Aut (Crimmins, M)

PHIL 385M. The Metaphysics of Meaning
4 units, Spr (Burgess, A)

PHIL 386B. Husserl and Adam Smith
Readings from Husserl and others in the phenomenological tradition, and recent work on intentionality and consciousness by philosophers and cognitive scientists.
4 units, not given this year

PHIL 386C. Subjectivity
Continuation of 386B.
4 units, not given this year

PHIL 387. Practical Rationality
Contemporary research on practical reason, practical rationality and reasons for action. May be repeated for credit
4 units, Aut (Bratman, M)

PHIL 387C. Consistency and Coherence
Some philosophers think that attitudes like belief and intention are subject to consistency and coherence requirements. Are there such general purpose cogency requirements on attitudes? If so, what is their nature and strength? What grounds these requirements; for instance, does the point or purpose of a belief or an intention ground consistency and coherence requirements on that attitude? How are such requirements on belief related to requirements on intention? How does the answer to such questions bear on understanding of the interrelations between theoretical and practical rationality?
2-4 units, not given this year

PHIL 387S. Practical Reasons and Practical Reasoning
Attempts to develop alternatives to Humean, instrumentalist conceptions of practical reasoning, and alternatives to Humean, noncognitivist views of practical reasons. Readings include Aurel Kolnai, Bernard Williams, David Wiggins, Joseph Raz, Michael Bratman, Elijah Millgram, and T.M. Scanlon.
4 units, not given this year

PHIL 388. Normativity
May be repeated for credit.
2-4 units, not given this year

PHIL 389. Advanced Topics in Epistemology
Skepticism and contextualism, epistemic closure, and problems generated by closure.
3-5 units, Aut (Lawlor, K)

PHIL 391. Research Seminar in Logic and the Foundations of Mathematics
(Same as MATH 391) Contemporary work. May be repeated a total of three times for credit.
1-3 units, Aut (Mints, G; Feferman, S), Win (Mints, G; Feferman, S), Spr (Staff)

PHIL 450. Thesis
(Staff)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHIL 470. Proseminar in Moral Psychology
Restricted to Philosophy doctoral students. May be repeated for credit.
4 units, not given this year

PHIL 500. Advanced Dissertation Seminar
Presentation of dissertation work in progress by seminar participants. May be repeated for credit.
1 unit, Aut (Lawlor, K), Win (Lawlor, K), Spr (Lawlor, K)

PHIL 801. TGR Project
0 units, Sum (Staff)

PHIL 802. TGR Dissertation
(Staff)
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS (PHYSICS) COURSES

UNDERGRADUATE COURSES IN PHYSICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PHYSICS 15. The Nature of the Universe
The structure, origin, and evolution of the major components of the Universe: planets, stars, and galaxies. Emphasis is on the formation of the Sun and planets, the evolution of stars, and the structure and content of the Milky Way galaxy. Topics: cosmic enigmas (dark matter, black holes, pulsars, x-ray sources), star birth and death, and the origins of and search for life in the solar system and beyond. GER:DB-NatSci
3 units, Aut (Madejski, G), Sum (Staff)

PHYSICS 16. Cosmic Horizons
The origin and evolution of the universe and its contents: stars, galaxies, quasars. The overall structure of the cosmos and the physical laws that govern matter, space, and time. Topics include the evolution of the cosmos from the origin of the elements and the formation of stars and galaxies, exotic astronomical objects (black holes, quasars, supernovae, and gamma ray bursts), dark matter, inflationary cosmology, and the fate of the cosmos. GER:DB-NatSci
3 units, not given this year

PHYSICS 17. Black Holes
Newton's and Einstein's theories of gravitation and their relationship to the predicted properties of black holes. Their formation and detection, and role in galaxies and high-energy jets. Hawking radiation and aspects of quantum gravity. GER:DB-NatSci
3 units, Spr (Michelson, P)

PHYSICS 18N. Revolution in Concepts of the Cosmos
(Stanford Introductory Seminar) Preference to freshmen. The evolution of concepts of the cosmos and its origin, from the Copernican heliocentric model to the current view based on Hubble's discovery of expansion of the Universe. Recent cosmological observations and the relevance of laboratory experiments in particle physics. One night of observations at the Stanford Observatory. GER:DB-NatSci
3 units, Win (Roodman, A)

PHYSICS 19. How Things Work: An Introduction to Physics
The principles of physics through familiar objects and phenomena, including airplanes, engines, refrigerators, lightning, radio, TV, microwave ovens, and fluorescent lights. Estimates of real quantities from simple calculations. Prerequisite: high school algebra and trigonometry. GER:DB-NatSci
3 units, not given this year

PHYSICS 21. Mechanics and Heat
For biology, social science, and premedical students. Introduction to Newtonian mechanics, fluid mechanics, theory of heat. Prerequisite: high school algebra and trigonometry; calculus not required. GER:DB-NatSci
3 units, Aut (Michelson, P)

PHYSICS 21S. Mechanics and Heat w/ laboratory
Equivalent to 21 and 22. GER:DB-NatSci
4 units, Sum (Fisher, G)

PHYSICS 22. Mechanics and Heat Laboratory
Pre- or corequisite: 21.
1 unit, Aut (Michelson, P)

PHYSICS 23. Electricity and Optics
Electric charges and currents, magnetism, induced currents; wave motion, interference, diffraction, geometrical optics. Prerequisite: 21. GER:DB-NatSci
3 units, Win (Manoharan, H)

PHYSICS 24. Electricity and Optics Laboratory
Guided hands-on exploration of concepts in electricity and magnetism, circuits and optics with an emphasis on student predictions, observations and explanations. Introduction to multimeters and oscilloscopes. Pre- or corequisite: 23.
1 unit, Win (Manoharan, H)

PHYSICS 25. Modern Physics
Introduction to modern physics. Relativity, quantum mechanics, atomic theory, radioactivity, nuclear reactions, nuclear structure, high energy physics, elementary particles, astrophysics, stellar evolution, and the big bang. Prerequisite: 23 or consent of instructor. GER:DB-NatSci
3 units, Spr (Linde, A)

PHYSICS 25S. Modern Physics with Laboratory
Equivalent to 25 and 26. GER:DB-NatSci
4 units, Sum (Fisher, G)

PHYSICS 26. Modern Physics Laboratory
Guided hands-on and simulation-based exploration of concepts in modern physics, including special relativity, quantum mechanics and nuclear physics with an emphasis on student predictions, observations and explanations. Pre- or corequisite: 25.
1 unit, Spr (Linde, A)

PHYSICS 28. Mechanics, Heat, and Electricity
For biology, social science, and premedical students. The sequence 28 and 29 fulfills, in ten weeks, the one-year college physics requirement with lab of most medical schools. Topics: Newtonian mechanics, fluid mechanics, theory of heat, electric charges, and currents. Calculus is used as a language and developed as needed. Prerequisite: high school algebra and trigonometry. GER:DB-NatSci
6 units, Sum (Fisher, G)

PHYSICS 29. Electricity and Magnetism, Optics, Modern Physics
Magnetism, induced currents; wave motion, optics; relativity, quantum mechanics, atomic theory, radioactivity, nuclear structure and reactions, elementary particles, astrophysics, and cosmology. Prerequisite: 28. GER:DB-NatSci
6 units, Sum (Fisher, G)

PHYSICS 41. Mechanics
Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum; conservation laws; rigid bodies; mechanical oscillations and waves. Discussions based on use of calculus. Corequisite: MATH 19 or 41, or consent of instructor. GER:DB-NatSci
4 units, Win (Church, S)

PHYSICS 41N. Mechanics: Insights, Applications, and Advances
Preference to freshman. Additional topics for students in PHYSICS 41 such as tidal forces, gyroscopic effects, fractal dimensions, and chaos. Corequisite: 41 or advanced placement.
1 unit, not given this year

PHYSICS 42. Classical Mechanics Laboratory
Hand-on exploration of concepts in classical mechanics: Newton's laws, conservation laws, rotational motion. Introduction to laboratory techniques, experimental equipment and data analysis. Pre- or corequisite: 41
1 unit, Win (Church, S)

PHYSICS 43. Electricity and Magnetism
Electrostatics, Coulomb's law, electric fields and fluxes, electric potential, properties of conductors, Gauss's law, capacitors and resistors, DC circuits; magnetic forces and fields, Biot-Savart law, Faraday's law, Ampere's law, inductors, transformers, AC circuits, motors and generators, electric power, Galilean transformation of electric and magnetic fields, Maxwell's equations; limited coverage of electromagnetic fields and special relativity. Prerequisites: 41 or equivialent, and MATH 19 or 41. Corequisite: MATH 20 or 42, or consent of instructor. GER:DB-NatSci
4 units, Spr (Fisher, I)

PHYSICS 43N. Understanding Electromagnetic Phenomena
(Stanford Introductory Seminar) Preference to freshmen. Expands on the material presented in 43; applications of concepts in electricity and magnetism to everyday phenomena and to topics in current physics research. Corequisite: 43 or advanced placement.
1 unit, Spr (Laughlin, R)

PHYSICS 44. Electricity and Magnetism Lab
Hands-on exploration of concepts in electricity and magnetism and circuits. Introduction to multimeters, function generators, oscilloscopes, and graphing techniques. Pre- or corequisite: 43.
1 unit, Spr (Fisher, I)

PHYSICS 45. Light and Heat
Reflection and refraction, lenses and lens systems; polarization, interference, and diffraction; temperature, properties of matter and thermodynamics, introduction to kinetic theory of matter. Prerequisites: 41 or equivalent, and MATH 19 or 41, or consent of instructor. GER:DB-NatSci
4 units, Aut (Gratta, G), Sum (Nanavati, C)

PHYSICS 45N. Advanced Topics in Light and Heat
(Stanford Introductory Seminar) Preference to freshmen. Expands on the subject matter presented in 45 to include optics and thermodynamics in everyday life, and applications from modern physics and astrophysics. Corequisite: 45 or advanced placement.
1 unit, Aut (Romani, R)

PHYSICS 46. Light and Heat Laboratory
Hands-on exploration of concepts in geometrical optics, wave optics and thermodynamics. Pre- or corequisite: 45.
1 unit, Aut (Gratta, G), Sum (Nanavati, C)

PHYSICS 50. Astronomy Laboratory and Observational Astronomy
Introduction to observational astronomy emphasizing the use of optical telescopes. Observations of stars, nebulae, and galaxies in laboratory sessions with 16- and 24-inch telescopes at the Stanford Observatory. Meets one evening per week from dusk until well after dark at the Stanford Observatory. No previous physics required. Limited enrollment. Lab. GER:DB-NatSci
3 units, Aut (Cabrera, B), Sum (Beck, J)

PHYSICS 59. Current Research Topics
Recommended for prospective Physics majors. Presentations of current research topics by faculty with research interests related to physics, often including tours of experimental laboratories where the research is conducted.
1 unit, Aut (Staff, 1)

PHYSICS 61. Mechanics and Special Relativity
(First in a three-part series: 61, 63, 65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Special theory of relativity and Newtonian mechanics with multi- variable calculus. Postulates of special relativity, simultaneity, time dilation, length contraction, the Lorentz transformation, causality, and relativistic mechanics. Central forces, contact forces, linear restoring forces. Momentum transport, work, energy, collisions. Angular momentum, torque, moment of inertia in three dimensions. Damped and forced harmonic oscillators. Recommended prerequisites: Mastery of mechanics at the level of AP Physics C and AP Calculus B/C or equivalent. Recommended corequisite: MATH 51. GER:DB-NatSci
4 units, Aut (Moler, K)

PHYSICS 62. Classical Mechanics Laboratory
Introduction to laboratory techniques, experiment design, data collection and analysis simulations, and correlating observations with theory. Labs emphasize discovery with open-ended questions and hands-on exploration of concepts developed in PHYSICS 61 including Newton's laws, conservation laws, rotational motion. Pre-or corequisite 61
1 unit, Aut (Moler, K)

PHYSICS 63. Electricity, Magnetism, and Waves
(Second in a three-part series: 61, 63 ,65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Electricity, magnetism and waves with some description of optics. Electrostatics and Gauss' law. Electric potential, electric field, conductors, image charges. Other theorems of vector calculus. Electric currents, DC circuits. Moving charges, magnetic field, Ampere's law. Solenoids, transformers, induction, AC circuits, resonance. Relativistic point of view for moving charges. Displacement current, Maxwell equations. Electromagnetic waves, dielectrics. Diffraction, interference, refraction, reflection, polarization. Prerequisite: PHYSICS 61 and MATH 51; Pre- or corequisite: MATH 52. GER:DB-NatSci
4 units, Win (Graham, P)

PHYSICS 64. Electricity, Magnetism and Optics Laboratory
Introduction to multimeters, breadboards, function generators and oscilloscopes. Emphasis on student-developed design of experimental procedure and data analysis for topics covered in PHYSICS 63: electricity, magnetism, circuits, and optics. Pre- or corequisite: 63
1 unit, Win (Graham, P)

PHYSICS 65. Quantum and Thermal Physics
(Third in a three-part series: 61, 63, 65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Introduction to quantum mechanics: matter waves, atomic structure, Schrödinger's equation. Thermodynamics and statistical mechanics: entropy and heat, Boltzmann statistics, quantum statistics. Prerequisites: PHYSICS 61 & 63. Pre- or corequisite: MATH 53. GER:DB-NatSci
4 units, Spr (Romani, R)

PHYSICS 67. Introduction to Laboratory Physics
Methods of experimental design, data collection and analysis, statistics, and curve fitting in a laboratory setting. Experiments drawn from electronics, optics, heat, and modern physics. Lecture plus laboratory format. Required for 60 series Physics and Engineering Physics majors; recommended, in place of PHYSICS 44, for 40 series students who intend to major in Physics or Engineering Physics. Pre- or corequisite: 65 or 43.
2 units, Spr (Pam, R)

PHYSICS 70. Foundations of Modern Physics
Required for Physics majors who completed the 40 series, or the PHYSICS 60 series prior to 2005-06. Special relativity, the experimental basis of quantum theory, atomic structure, quantization of light, matter waves, Schrödinger equation. Prerequisites: 41, 43. Corequisite: 45. Recommended: prior or concurrent registration in MATH 53. GER:DB-NatSci
4 units, Aut (Kasevich, M)

PHYSICS 80N. The Technical Aspects of Photography
(Stanford Introductory Seminar) Preference to freshmen and sophomores with some background in photography. How cameras record photographic images on film and electronically. Technical photographic processes to use cameras effectively. Camera types and their advantages, how lenses work and their limitations, camera shutters, light meters and the proper exposure of film, film types, depth of focus, control of the focal plane and perspective, and special strategies for macro and night photography. View

cameras and range finder technical cameras. Students take photographs around campus. Prerequisite: high school physics.

3 units, Spr (Osheroff, D)

PHYSICS 83N. Physics in the 21st Century

(Stanford Introductory Seminar) Preference to freshmen. Current topics at the frontier of modern physics. Topics include subatomic particles and the standard model, symmetries in nature, extra dimensions of space, string theory, supersymmetry, the big bang theory of the origin of the universe, black holes, dark matter, and dark energy of the universe. Why the sun shines. Cosmology and inflation. GER:DB-NatSci

3 units, Aut (Kallosh, R)

PHYSICS 87N. The Physics of One: Nanoscale Science and Technology

Preference to freshmen. Contemporary interdisciplinary research in nanoscience and nanotechnology; the manipulation of nature's fundamental building blocks. Accomplishments and questions engendered by knowledge at the discrete limit of matter. Prerequisite: high school physics. GER:DB-NatSci

3 units, not given this year

PHYSICS 100. Introduction to Observational and Laboratory Astronomy

For physical science or engineering students. Emphasis is on the quantitative measurement of astronomical parameters such as distance, temperature, mass, composition of stars, galaxies, and quasars. Observation using the 0.4m and 0.6m telescopes at the Stanford Observatory. Limited enrollment. Prerequisites: one year of college physics; prior or concurrent registration in 65, or 70; and consent of instructor. GER:DB-NatSci

4 units, Spr (Allen, S)

PHYSICS 105. Intermediate Physics Laboratory I: Analog Electronics

Analog electronics including Ohm's law, passive circuits and transistor and op amp circuits, emphasizing practical circuit design skills to prepare undergraduates for laboratory research. Short design project. Minimal use of math and physics, no electronics experience assumed beyond introductory physics. Prerequisite: PHYSICS 43 or 63.

3 units, Aut (Pam, R)

PHYSICS 107. Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis

Experiments on lasers, Gaussian optics, and atom-light interaction, with emphasis on data and error analysis techniques. Students describe a subset of experiments in scientific paper format. Prerequisites: completion of 40 or 60 series, and 70 and 105. Recommended: 130, prior or concurrent enrollment in 120. WIM

4 units, Win (Kasevich, M)

PHYSICS 108. Intermediate Physics Laboratory III: Project

Small student groups plan, design, build, and carry out a single experimental project in low-temperature physics. Prerequisites 105, 107.

3 units, Win (Osheroff, D), Spr (Kuo, C)

PHYSICS 110. Intermediate Mechanics

Lagrangian and Hamiltonian mechanics. Principle of least action, Galilean relativity, Lagrangian mechanical systems, Euler-Lagrange equations. Central potential, Kepler's problem, planetary motion. Scattering problems, disintegration, Rutherford scattering cross section. Harmonic motion in the presence of rapidly oscillating field. Poisson's brackets, canonical transformations, Liouville's theorem, Hamilton-Jacoby equation. Prerequisites: 41 or 61, and MATH 53

4 units, Spr (Funk, S)

PHYSICS 112. Mathematical Methods of Physics

Theory of complex variables, complex functions, and complex analysis. Fourier series and Fourier transforms. Special functions such as Laguerre, Legendre, and Hermite polynomials, and Bessel functions. The uses of Green's functions. Covers material of MATH 106 and 132 most pertinent to Physics majors. Prerequisites: MATH 50 or 50H series, and MATH 131P or MATH 173.

4 units, Win (Kallosh, R)

PHYSICS 113. Computational Physics

Numerical methods for solving problems in mechanics, electromagnetism, quantum mechanics, and statistical mechanics. Methods include numerical integration; solutions of ordinary and partial differential equations; solutions of the diffusion equation, Laplace's equation and Poisson's equation with relaxation methods; statistical methods including Monte Carlo techniques; matrix methods and eigenvalue problems. Short introduction to MatLab, used for class examples; class projects may be programmed in any language such as C. Prerequisites: MATH 53, prior or concurrent registration in 110, 121. Previous programming experience not required.

4 units, Spr (Cabrera, B)

PHYSICS 120. Intermediate Electricity and Magnetism I

(First in a two-part series: 120,121.) Vector analysis. Electrostatic fields, including boundary-value problems and multipole expansion. Dielectrics, static and variable magnetic fields, magnetic materials. Maxwell's equations. Prerequisites: PHYSICS 43 or 63; MATH 52 and 53. Pre- or corequisite: MATH 131P or MATH 173. Recommended corequisite: PHYSICS 112.

4 units, Win (Kahn, S)

PHYSICS 121. Intermediate Electricity and Magnetism

(Second in a two-part series: 120,121.) Conservation laws and electromagnetic waves, Poynting's theorem, tensor formulation, potentials and fields. Plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadruple radiation. Special relativity and transformation between electric and magnetic fields. Prerequisites: PHYSICS 120 and MATH 131P or MATH 173; Recommended: PHYSICS 112.

4 units, Spr (Hewett, J)

PHYSICS 130. Quantum Mechanics

(First in a two part series: 130,131.) The origins of quantum mechanics and wave mechanics. Schrödinger equation and solutions for one-dimensional systems. Commutation relations. Generalized uncertainty principle. Time-energy uncertainty principle. Separation of variables and solutions for three-dimensional systems, application to hydrogen atom. Spherically symmetric potentials and angular momentum eigenstates. Spin angular momentum. Prerequisites: PHYSICS 65 or 70, and 110. Pre- or corequisites: PHYSICS 120, 121, and MATH 131P or MATH 173.

4 units, Aut (Burchat, P)

PHYSICS 131. Quantum Mechanics II

(Second in a two-part series: 130,131.) Addition of angular momentum. Identical particles; Fermi and Bose statistics. Time-independent perturbation theory. Fine structure, the Zeeman effect and hyperfine splitting in the hydrogen atom. Variational principle. Prerequisite: PHYSICS 130. Pre- or corequisites: PHYSICS 120, 121, and MATH 131P or MATH 173.

4 units, Win (Bucksbaum, P)

PHYSICS 134. Advanced Topics in Quantum Mechanics

Time-dependent perturbation theory. Scattering theory, partial wave expansion, Born approximation. Additional topics may include WKB approximation; structure of multi-electron atoms (Hartree-Fock); nature of quantum measurement, EPR paradox and Bell's inequality; relativistic quantum mechanics (Dirac equation); quantum information science. Prerequisites: PHYSICS 130, 131.

4 units, Spr (Burchat, P)

PHYSICS 152A. Introduction to Particle Physics I

(Same as PHYSICS 252A) Elementary particles and the fundamental forces. Quarks and leptons. The mediators of the electromagnetic, weak and strong interactions. Interaction of particles with matter; particle acceleration, and detection techniques. Symmetries and conservation laws. Bound states. Decay rates. Cross sections. Feynman diagrams. Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics and for chromodynamics. Prerequisite: 130. Pre- or corequisite: 131.

3 units, Win (Burchat, P)

PHYSICS 152B. Introduction to Particle Physics II

(Same as PHYSICS 252B) Discoveries and observations in experimental particle physics and relation to theoretical developments. Asymptotic freedom. Charged and neutral weak interactions. Electroweak unification. Weak isospin. Gauge theories, spontaneous symmetry breaking and the Higgs mechanism. Quark and lepton mixing. CP violation. Neutrino oscillations. Prerequisites: 152 or 152A, 130, 131.

3 units, Spr (Gratta, G)

PHYSICS 160. Introduction to Stellar and Galactic Astrophysics
Observed characteristics of stars and the Milky Way galaxy. Physical processes in stars and matter under extreme conditions. Structure and evolution of stars from birth to death. White dwarfs, planetary nebulae, supernovae, neutron stars, pulsars, binary stars, x-ray stars, and black holes. Galactic structure, interstellar medium, molecular clouds, HI and HII regions, star formation, and element abundances. Prerequisites: 40 or 60 series, and 70.
3 units, Win (Romani, R)

PHYSICS 161. Introduction to Extragalactic Astrophysics and Cosmology
Observations of the distances and compositions of objects on cosmic scales: galaxies, galaxy clusters, quasars, and diffuse matter at high red shift. Big bang cosmology, physical processes in the early universe, the origin of matter and the elements, inflation, and creation of structure in the Universe. Observational evidence for dark matter and dark energy. Future of the Universe. Prerequisites: calculus and college physics at the level of the 40 or 60 series, and 70.
3 units, Spr (Wechsler, R)

PHYSICS 169A. Independent Study in Astrophysics and Honors Thesis: Selection of the Problem
Description of the problem, its background, work planned in the subsequent two quarters, and development of the theoretical apparatus or initial interpretation of the problem.
1-9 units, Aut (Staff)

PHYSICS 169B. Independent Study in Astrophysics and Honors Thesis: Continuation of Project
Substantial completion of the required computations or data analysis for the research project selected.
1-9 units, Win (Staff)

PHYSICS 169C. Independent Study in Astrophysics and Honors Thesis: Completion of Project
Completion of research and writing of a paper presenting methods used and results.
1-9 units, Spr (Staff)

PHYSICS 170. Thermodynamics, Kinetic Theory, and Statistical Mechanics I
(First in a two-part series: 170,171.) Basic probability and statistics for random processes such as random walks. The derivation of laws of thermodynamics from basic postulates; the determination of the relationship between atomic substructure and macroscopic behavior of matter. Temperature; equations of state, heat, internal energy, equipartition; entropy, Gibbs paradox; equilibrium and reversibility, heat engines; applications to various properties of matter; absolute zero and low temperature phenomena. Distribution functions, fluctuations, the partition function for classical and quantum systems, irreversible processes. Pre- or corequisite: PHYSICS 130.
4 units, Aut (Kachru, S)

PHYSICS 171. Thermodynamics, Kinetic Theory, and Statistical Mechanics II
(Second in a two-part series: 170,171.) Maxwell-Boltzmann distribution, Debye model and phonons. Transport phenomena, fluctuations, equilibrium between phases, phase changes, Bose-Einstein condensation, and the electron gas. Cooperative phenomena including ferromagnetism, the Ising model, and lattice gas. Irreversible processes. Prerequisite: PHYSICS 170. Pre- or corequisite: PHYSICS 131.
4 units, Win (Zhang, S)

PHYSICS 172. Solid State Physics
Crystal structures and bonding in solids. X-ray diffraction. Lattice dynamics and thermal properties. Electronic structure of solids; transport properties of metals; quantum oscillations; charge density waves. Properties and applications of semiconductors. Phenomenology and microscopic theory of superconductivity. Prerequisites: 170, 171.
3 units, Spr (Manoharan, H)

PHYSICS 190. Independent Study
Undergraduate research in experimental or theoretical physics under the supervision of a faculty member. Prerequisites: superior work as an undergraduate Physics major and consent of instructor.
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS 204A. Seminar in Theoretical Physics
Topics of recent interest may include cosmology, black hole physics, and strong-weak coupling duality transformations. May be repeated for credit.
3 units, Aut (Susskind, L)

PHYSICS 204B. Seminar in Theoretical Physics
Topics including quantum computing, Berry phase, and quantum Hall effect. May be repeated for credit.
3 units, Win (Doniach, S)

PHYSICS 205. Undergraduate Honors Research
Experimental or theoretical project and thesis in Physics under supervision of a faculty member. Planning of the thesis project is recommended to begin as early as middle of the junior year. Successful completion of an senior thesis requires a minimum of 3 graded units of this course completed during the senior year along with the other formal thesis requirements. Prerequisites: superior work in Physics as an undergraduate major and approval of the thesis application.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN PHYSICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PHYSICS 210. Advanced Particle Mechanics
The Lagrangian and Hamiltonian dynamics of particles. Beyond small oscillations. Phase portraits, Hamilton-Jacoby theory, action-angle variables, adiabatic invariance. Nonlinear dynamical systems, continuous and discrete. Behavior near the fixed points, stability of solutions, attractors, chaotic motion. Transition to continuum mechanics. Prerequisite: 110 or equivalent.
3 units, Aut (Peskin, M)

PHYSICS 211. Continuum Mechanics
Elasticity, fluids, turbulence, waves, gas dynamics, shocks, and MHD plasmas. Examples from everyday phenomena, geophysics, and astrophysics.
3 units, Win (Blandford, R)

PHYSICS 212. Statistical Mechanics
Principles, ensembles, statistical equilibrium. Thermodynamic functions, ideal and near-ideal gases. Fluctuations. Mean-field description of phase-transitions and associated critical exponents. One-dimensional Ising model and other exact solutions. Renormalization and scaling relations. Prerequisites: 130, 131, 171, or equivalents.
3 units, Spr (Susskind, L)

PHYSICS 216. Back of the Envelope Physics
Techniques such as scaling and dimensional analysis, useful to make order-of-magnitude estimates of physical effects in different settings. Goals are to promote a synthesis of physics through solving problems, some not included in a standard curriculum. Applications include properties of materials, fluid mechanics, geophysics, astrophysics, and cosmology. Prerequisites: undergraduate mechanics, statistical mechanics, electricity and magnetism, and quantum mechanics.
3 units, Aut (Zhang, S)

PHYSICS 220. Classical Electrodynamics I
Special relativity: The principles of relativity, Lorentz transformations, four vectors and tensors, relativistic mechanics and the principle of least action. Lagrangian formulation, charges in electromagnetic fields, gauge invariance, the electromagnetic field tensor, covariant equations of electrodynamics and mechanics, four-current and continuity equation. Noether's theorem and conservation laws, Poynting's theorem, stress-energy tensor. Constant electromagnetic fields: conductors and dielectrics, magnetic media, electric and magnetic forces, and energy. Electromagnetic waves: Plane and monochromatic waves, spectral resolution, polarization, electromagnetic properties of matter, dispersion relations, wave guides and cavities. Prerequisites: PHYSICS 121 and 210, or equivalent; MATH 106 or 116, and 132 or equivalent.
3 units, Win (Kapitulnik, A)

PHYSICS 221. Classical Electrodynamics II
Electromagnetic waves in dielectric and conducting materials, causality and analyticity, negative index of refraction and metamaterials. Waveguides and cavities, nonlinear solitons and optical fibers. Maxwell's equations in fluids: hydromagnetics, bulk and

surface plasmons, plasmonics. Non-relativistic radiation: dipole and quadrupole radiation, scattering and diffraction. Spherical solutions for vector wave equation. Energy loss of moving particles in a medium, Cherenkov radiation. Relativistic radiation: Liénard-Wiechert potential, angular and frequency distribution, synchrotron radiation. Prerequisites: PHYSICS 220; MATH 106 or 116, and 132 or equivalent.

3 units, Spr (Senatore, L)

PHYSICS 230. Quantum Mechanics

Fundamental concepts. Introduction to Hilbert spaces and Dirac's notation. Postulates applied to simple systems, including those with periodic structure. Symmetry operations and gauge transformation. The path integral formulation of quantum statistical mechanics. Problems related to measurement theory. The quantum theory of angular momenta and central potential problems. Prerequisite: 131 or equivalent.

3 units, Aut (Shenker, S)

PHYSICS 231. Quantum Mechanics

Basis for higher level courses on atomic solid state and particle physics. Wigner-Eckart theorem and addition of angular momenta. Approximation methods for time-independent and time-dependent perturbations. Semiclassical and quantum theory of radiation, second quantization of radiation and matter fields. Systems of identical particles and many electron atoms and molecules. Prerequisite: 230.

3 units, Win (Shenker, S)

PHYSICS 232. Quantum Mechanics

Special topics. Elementary excitations in solids (the free electron gas, electronic band structure, phonons). Elementary scattering theory (Born approximation, partial wave analyses, resonance scattering). Relativistic single-particle equations. Dirac equation applied to central potentials, relativistic corrections, and nonrelativistic limits.

3 units, Spr (Shenker, S)

PHYSICS 240. Introduction to the Physics of Energy

Energy as a consumable. Forms and interconvertability. World joule budget. Equivalents in rivers, oil pipelines and nuclear weapons. Quantum mechanics of fire, batteries and fuel cells. Hydrocarbon and hydrogen synthesis. Fundamental limits to mechanical, electrical and magnetic strengths of materials. Flywheels, capacitors and high pressure tanks. Principles of AC and DC power transmission. Impossibility of pure electricity storage. Surge and peaking. Solar constant. Photovoltaic and thermal solar conversion. Physical limits on agriculture.

3 units, Aut (Laughlin, R)

PHYSICS 241. Introduction to Nuclear Energy

Radioactivity. Elementary nuclear processes. Energetics of fission and fusion. Cross-sections and resonances. Fissionable and fertile isotopes. Neutron budgets. Light water, heavy water and graphite reactors. World nuclear energy production. World reserves of uranium and thorium. Plutonium, reprocessing and proliferation. Half lives of fission decay products and actinides made by neutron capture. Nuclear waste. Three Mile Island and Chernobyl. Molten sodium breeders. Generation-IV reactors. Inertial confinement and magnetic fusion. Laser compression. Fast neutron production and fission-fusion hybrids. Prerequisites: strong undergraduate chemistry and physics. Recommended: PHYSICS 240 and 252A. Qualified undergraduates encouraged to enroll, with consent of instructor.

3 units, Win (Laughlin, R)

PHYSICS 252A. Introduction to Particle Physics I

(Same as PHYSICS 152A) Elementary particles and the fundamental forces. Quarks and leptons. The mediators of the electromagnetic, weak and strong interactions. Interaction of particles with matter; particle acceleration, and detection techniques. Symmetries and conservation laws. Bound states. Decay rates. Cross sections. Feynman diagrams. Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics and for chromodynamics. Prerequisite: 130. Pre- or corequisite: 131.

3 units, Win (Burchat, P)

PHYSICS 252B. Introduction to Particle Physics II

(Same as PHYSICS 152B) Discoveries and observations in experimental particle physics and relation to theoretical developments. Asymptotic freedom. Charged and neutral weak interactions. Electroweak unification. Weak isospin. Gauge theories, spontaneous symmetry breaking and the Higgs mechanism. Quark and lepton mixing. CP violation. Neutrino oscillations. Prerequisites: 152 or 152A, 130, 131.

3 units, Spr (Gratta, G)

PHYSICS 260. Introduction to Astrophysics and Cosmology

The observed properties and theoretical models of stars, galaxies, and the universe. Physical processes for production of radiation from cosmic sources. Observations of cosmic microwave background radiation. Newtonian and general relativistic models of the universe. Physics of the early universe, nucleosynthesis, baryogenesis, nature of dark matter and dark energy and inflation. Prerequisites: 110, 121, and 171, or equivalents.

3 units, Aut (Petrosian, V)

PHYSICS 262. Introduction to Gravitation

Introduction to general relativity. Curvature, energy-momentum tensor, Einstein field equations. Weak field limit of general relativity. Black holes, relativistic stars, gravitational waves, cosmology. Prerequisite: 121 or equivalent including special relativity.

3 units, Spr (Kallosh, R)

PHYSICS 275. Electrons in Nanostructures

The behavior of electrons in metals or semiconductors at length scales below 1 micron, smaller than familiar macroscopic objects but larger than atoms. Ballistic transport, Coulomb blockade, localization, quantum mechanical interference, and persistent currents. Topics may include quantum Hall systems, graphen, spin transport, spin-orbit coupling in nanostructures, magnetic tunnel junctions, Kondo systems, and 1-dimensional systems. Readings focus on the experimental research literature, and recent texts and reviews. Prerequisite: undergraduate quantum mechanics and solid state physics.

3 units, alternate years, not given this year

PHYSICS 290. Research Activities at Stanford

Required of first-year Physics graduate students; suggested for junior or senior Physics majors for 1 unit. Review of research activities in the department and elsewhere at Stanford at a level suitable for entering graduate students.

1-3 units, Aut (Graham, P)

PHYSICS 291. Practical Training

Opportunity for practical training in industrial labs. Arranged by student with the research adviser's approval. A brief summary of activities is required, approved by the research adviser.

3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS 293. Literature of Physics

Study of the literature of any special topic. Preparation, presentation of reports. If taken under the supervision of a faculty member outside the department, approval of the Physics chair required. Prerequisites: 25 units of college physics, consent of instructor.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS 294. Teaching of Physics Seminar

Required of all first-year Physics graduate students, plus other Teaching Assistants who are teaching Physics courses for the first time. Weekly seminar/discussions. Techniques for teaching physics, especially through interactive engagement. Review of Physics Education Research results. Simulated teaching situations. In-class observations and practice teaching.

1 unit, Aut (Pam, R)

PHYSICS 301. Astrophysics Laboratory

Open to all graduate students with a calculus-based physics background and some laboratory experience. Students make and analyze observations using telescopes at the Stanford Student Observatory. Topics include navigating the night sky, the physics of stars and galaxies, telescope instrumentation and operation, quantitative error analysis, and effective scientific communication. The course also introduces a number of hot topics in astrophysics and cosmology. Limited enrollment.

3 units, Spr (Allen, S)

PHYSICS 321. Laser Spectroscopy

Theoretical concepts and experimental techniques. Absorption, dispersion, Kramers-Kronig relations, line-shapes. Classical and laser linear spectroscopy. Semiclassical theory of laser atom interaction: time-dependent perturbation theory, density matrix, optical Bloch equations, coherent pulse propagation, multiphoton transitions. High-resolution nonlinear laser spectroscopy: saturation spectroscopy, polarization spectroscopy, two-photon and multipho-

ton spectroscopy, optical Ramsey spectroscopy. Phase conjugation. Four-wave mixing, harmonic generation. Coherent Raman spectroscopy, quantum beats, ultra-sensitive detection. Prerequisite: 230. Recommended: 231.

3 units, Spr (Kasevich, M)

PHYSICS 323. Laser Cooling and Trapping

Principles of laser cooling and atom trapping. Optical forces on atoms, forms of laser cooling, atom optics and atom interferometry, ultra-cold collisions, and introduction to Bose condensation of dilute gases. Emphasis is on the development of the general formalisms that treat these topics. Applications of the cooling and trapping techniques: atomic clocks, internal sensors, measurements that address high-energy physics questions, many-body effects, polymer science, and biology. Prerequisite: 231 or equivalent.

3 units, not given this year

PHYSICS 330. Quantum Field Theory

Quantization of scalar and Dirac fields. Introduction to supersymmetry. Feynman diagrams. Quantum electrodynamics. Elementary electrodynamic processes: Compton scattering; e+e- annihilation. Loop diagrams and electron (g-2). Prerequisites: 130, 131, or equivalents.

3 units, Aut (Devereaux, T)

PHYSICS 331. Quantum Field Theory

Functional integral methods. Local gauge invariance and Yang-Mills fields. Asymptotic freedom. Spontaneous symmetry breaking and the Higgs mechanism. Unified models of weak and electromagnetic interactions. Prerequisite: 330.

3 units, Win (Silverstein, E)

PHYSICS 332. Quantum Field Theory

Theory of renormalization. The renormalization group and applications to the theory of phase transitions. Renormalization of Yang-Mills theories. Applications of the renormalization group of quantum chromodynamics. Perturbation theory anomalies. Applications to particle phenomenology. Prerequisite: PHYSICS 330.

3 units, Spr (Wacker, J)

PHYSICS 351. Standard Model of Particle Physics

Symmetries, group theory, gauge invariance, Lagrangian of the Standard Model, flavor group, flavor-changing neutral currents, CKM quark mixing matrix, GIM mechanism, rare processes, neutrino masses, seesaw mechanism, QCD confinement and chiral symmetry breaking, instantons, strong CP problem, QCD axion. Prerequisite: Physics 330; Physics 331 and 332 recommended.

3 units, Win (Dimopoulos, S)

PHYSICS 360. Physics of Astrophysics

Theoretical concepts and tools for modern astrophysics. Radiation transfer equations; emission, scattering, and absorption mechanisms: Compton, synchrotron and bremsstrahlung processes; photoionization and line emission. Equations of state of ideal, interacting, and degenerate gasses. Application to astrophysical sources such as HII regions, supernova remnants, cluster of galaxies, and compact sources such as accretion disks, X-ray, gamma-ray, and radio sources. Prerequisites: 121, 171 or equivalent.

3 units, Win (Petrosian, V)

PHYSICS 361. Stellar and Galactic Astrophysics

Astronomical data on stars, star clusters, interstellar medium, and the Milky Way galaxy. Theory of stellar structure; hydrostatic equilibrium, radiation balance, and energy production. Stellar formation, Jean's mass, and protostars. Evolution of stars to the main sequence and beyond to red giants, white dwarfs, neutron stars, and black holes. Supernovae and compact sources. Structure of the Milky Way: disk and spiral arms; dark matter and the halo mass; central bulge or bar; and black hole. Prerequisite: 221 or equivalent. Recommended: 260, 360.

3 units, Spr (Blandford, R)

PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology

Observational data on the content and activities of galaxies, the content of the Universe, cosmic microwave background radiation, gravitational lensing, and dark matter. Models of the origin, structure, and evolution of the Universe based on the theory of general relativity. Test of the models and the nature of dark matter and dark energy. Physics of the early Universe, inflation, baryosynthesis, nucleosynthesis, and galaxy formation. Prerequisites: PHYSICS 210, 211, and 260 or 360.

3 units, not given this year

PHYSICS 363. Solar and Solar-Terrestrial Physics

Structure, mechanisms, and properties of the Sun's interior and atmosphere. Tools for solar observations; magnetic fields and polarimetry. Solar oscillations and helioseismology. Differential rotation and turbulent convection. Solar MHD, Alfven and magneto-acoustic waves. Solar cycle and dynamo. Magnetic energy release, reconnection, particle acceleration. Solar activity, sunspots, flares, coronal mass ejections; UV, X-ray, and high-energy particle emissions. The interaction of the solar wind with Earth's magnetosphere and its terrestrial effects; space weather. Prerequisite: 221 or equivalent.

3 units, not given this year

PHYSICS 364. Advanced Gravitation

Introduction to quantum fields in curved space-times, with applications to phenomena in cosmology and quantum gravity. Free scalar fields in curved space-time; quantum fields in an expanding universe; de Sitter space and fluctuations in inflationary cosmology; the Unruh effect; Hawking radiation and black hole thermodynamics. Recommended: 330, some familiarity with general relativity.

3 units, Win (Kachru, S)

PHYSICS 370. Theory of Many-Particle Systems

Application of quantum field theory to the nonrelativistic, many-body problem, including methods of temperature-dependent Green's functions and canonical transformations. Theory of finite-temperature, interacting Bose and Fermi systems with applications to superfluidity, superconductivity, and electron gas. Prerequisite: 232.

3 units, Aut (Staff)

PHYSICS 372. Condensed Matter Theory I

Fermi liquid theory, many-body perturbation theory, response function, functional integrals, interaction of electrons with impurities. Prerequisite: APPPHYS 273 or equivalent.

3 units, not given this year

PHYSICS 373. Condensed Matter Theory II

Superfluidity and superconductivity. Quantum magnetism. Prerequisite: 372.

3 units, alternate years, not given this year

PHYSICS 376. Superfluidity and Superconductivity

Introduction to superfluid He: two-fluid model, phonons, and rotons, Feynman description, vortices, Bogoliubov theory. Phenomenology of superconductors: London description, Ginzburg-Landau model, type-I vs. type-II materials, Josephson effects, thin films, Kosterlitz-Thouless behavior, electron-phonon coupling. BCS theory: bulk systems, tunneling, strong-coupling materials, dirty and gapless superconductivity, fluctuation effects, Ginzburg criterion. Recommended: APPPHYS 272, 273, or equivalents.

3 units, Spr (Staff)

PHYSICS 450. Primordial Cosmology

Early universe cosmology. Overview of the thermal history of the universe, big bang nucleosynthesis, and the physics of recombination and the CMB. Inflationary cosmology and generation of density pertubations. Ultraviolet sensitivity of inflation and its CMB predictions to Planck-suppressed operators, mechanisms for inflation in the context of string theory, and their observational signatures. Wilsonian naturalness arguments and shift symmetries; axion inflation in field theory and string theory as a case study. Overview of the relevant upcoming measurements from satellite and ground-based detectors. Recommended prerequisites : PHYSICS 262, 330, 331, 332

3 units, Aut (Silverstein, E)

PHYSICS 451. Eternal Inflation

The observational success of inflation, the existence of, and fine tuning of the cosmological constant, and the large landscape of string theories, all point to an eternally inflating multiverse, in which our local universe was produced by a tunneling event from an earlier more energetic vacuum. The course will cover Coleman DeLuccia tunneling, possible observational signals, and the search for a theoretical framework including the so-called ""measure problem."" Prerequisites: PHYSICS 330, 331, 332, 351

3 units, Win (Susskind, L)

PHYSICS 452. Physics Beyond the Standard Model

Grand unification, gauge coupling unification, proton decay; naturalness and the hierarchy problem; technicolor; the supersymmetric Standard Model, supersymmetric unification, SUSY dark matter, SUSY flavor problem; large extra dimensions and TeV scale grav-

ity; the cosmological constant problem, Weinberg's solution and the landscape, atomic principle and split supersymmetry; decaying dark matter as a probe of unification; axiverse and black hole superradiance. Prerequisites: PHYSICS 330, 331, 332, 351.

3 units, Spr (Dimopoulos, S)

PHYSICS 463. Special Topics in Astrophysics: Theoretical Cosmology

The application of general relativity to physical phenomena associated with spinning black holes and neutron stars to provide illustrations and tests of the theory of strong field gravity. Topics include: stationary axisymmetric metrics and stellar structure, orbits and rays, accretion disks, stellar companions, electromagnetic effects, gravitational radiation. Emphasis is on developing practical calculational techniques. Prerequisite: PHYSICS 262 or equivalent.

3 units, not given this year

PHYSICS 490. Research

Open only to Physics graduate students, with consent of instructor. Work is in experimental or theoretical problems in research, as distinguished from independent study of a non-research character in 190 and 293.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PHYSICS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLITICAL SCIENCE (POLISCI) COURSES

UNDERGRADUATE COURSES IN POLITICAL SCIENCE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

POLISCI 1. Introduction to International Relations

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth. GER:DB-SocSci

5 units, Aut (Tomz, M)

POLISCI 1Z. Introduction to International Relations

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth. GER:DB-SocSci

5 units, Sum (Tomz, M)

POLISCI 2. Introduction to American National Government and Politics

(Same as AMSTUD 2) The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. The major areas of public policy in the current practice of the ideal of democracy. GER:DB-SocSci

5 units, Win (Fiorina, M; Frisby, T)

POLISCI 3P. Justice

(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas

4-5 units, Aut (Cohen, J)

POLISCI 4. Introduction to Comparing Political Systems

Politics in major regime types including democratic, authoritarian, and communist; how types of politics affect economic development and state/society relations. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Rodden, J)

POLISCI 24N. The Politics of Communication

(Stanford Introductory Seminar) Preference to freshmen. How elected officials present and explain their work to constituents and how this communication shapes American politics. Elected officials use press releases, newsletters, press conferences, and public events to connect with their constituents. While almost none of this communication is formally required, it can have important consequences on what elected officials do in office and how constituents perceive their representatives' activities. The strategies elected officials use when communicating with constituents and the consequences of these strategies on the process of representation.

5 units, Win (Grimmer, J)

POLISCI 24Q. Law and Order

(Stanford Introductory Seminar) Preference to sophomores. The role of law in promoting social order. What is the rule of law? How does it differ from the rule of men? What institutions best support the rule of law? Is a state needed to ensure that laws are enforced? Should victims be allowed to avenge wrongs? What is the relationship between justice and mercy?

3 units, Aut (Rutten, A)

POLISCI 25N. The U.S. Congress in Historical and Comparative Perspective

(Stanford Introductory Seminar) Preference to freshmen. The development of legislatures from their medieval European origins to the present, with emphasis on the case of the U.S. Congress. The early role played by assemblies in placing limits on royal power, especially via the power of the purse. The U.S. Congress' contemporary performance; how that performance is affected by procedural legacies from the past that affect most democratic legislatures worldwide.

5 units, Spr (Cox, G)

POLISCI 42Q. The Rwandan Genocide

(Stanford Introductory Seminar) Between April and July of 1994 more than 800,000 Rwandans, mostly Tutsi but also moderate Hutus, were killed in the most rapid genocide the world has ever known. The percentage of Rwandans killed in a single day of the genocide was ten times greater than the percentage of Americans killed in the entire Vietnam war. What could bring humans to plan and carry out such an orgy of violence? Could it have been prevented? Why did the United States or any other major power not intervene to stop the killing? To what extent should the United Nations be held accountable for the failure to end the genocide? What were the consequences of the genocide for the region of Central Africa? How did international actors respond to the challenges of reconstructing Rwanda after the killings? What has happened to the perpetrators of the genocide? This course surveys scholarly and journalistic accounts of the genocide to seek answers to these questions. This seminar will

5 units, Spr (Stedman, S)

POLISCI 43N. Oil, Regime Change, and Conflict

(Stanford Introductory Seminar) Preference to sophomores. Relationships among dependence on oil export, democratization and authoritarian rule, and rising conflict. Case studies including Venezuela, Nigeria, Iran, Iraq, Chad, and Indonesia. The resource curse: the impact of oil on a country's political economy. The relationship between such economic dependence and regime type. Why oil exporting countries are more prone to conflict and civil war than other countries. Research paper.

5 units, Win (Karl, T)

POLISCI 44N. Everyday Political Life in the Authoritarian Middle East

(Stanford Introductory Seminar) Preference to freshmen. How individuals respond to state policy, use informal channels to influence politics, are subject to forms of repression, and challenge authoritarian government through Islamic and other types of organizations. Focus is on Egypt, Iraq, Syria, Yemen, and Iran.

5 units, Aut (Blaydes, L)

POLISCI 48N. Muslim Integration into France

(Stanford Introductory Seminar) Preference to freshmen. The specter of Islamized societies haunts Europe. Fears of a fifth column of terrorism and a challenge by a population of religious fanatics to a largely secularized continent are recurrent in political dialogue from Spain to Austria. Are these worries a result of everyday xenophobia common to situations of foreign immigration or whether certain immigrants from the Middle East, Turkey, South Asia and

Asia and Africa face special challenges due to their Islamic heritage? Sources include survey and experimental data from France, claims made about this immigrant population, readings in French political discourse and the European political context. Final paper that compares analysis of the data and claims in the literature.

5 units, Aut (Laitin, D)

POLISCI 110A. Theory and Practice in International Relations

Major approaches to understanding international politics including realism, liberalism, and constructivism, and their utility in explaining events and issues over the last century including the WWI and WWII, the Cold War, trade and globalization, and transnational terrorism. GER:DB-SocSci

5 units, not given this year

POLISCI 110B. Strategy, War, and Politics

Traditional and modern theories on the causes of war and sources of peace. Contrasting explanations for the origins of WW I and II; alternative theories of deterrence in the nuclear age; the causes of war in the Persian Gulf, ethnic conflicts, and terrorism in the post-Cold War era. GER:DB-SocSci

5 units, not given this year

POLISCI 110C. America and the World Economy

(Same as POLISCI 110X) (Students not taking this course for WIM, register for 110X.) American foreign economic policy. Issues: the evolution of American tariff and trade policy, the development of mechanisms for international monetary management, and American foreign investment policy reflected in the changing political goals pursued by American central decision makers. Prerequisite: 1 or equivalent. GER:DB-SocSci

5 units, not given this year

POLISCI 110D. War and Peace in American Foreign Policy

(Same as POLISCI 110Y) (Students not taking this course for WIM, register for 110Y.) The causes of war in American foreign policy. Issues: international and domestic sources of war and peace; war and the American political system; war, intervention, and peace making in the post-Cold War period. GER:DB-SocSci, DB-SocSci, WIM

5 units, Spr (Schultz, K)

POLISCI 110X. America and the World Economy

(Same as POLISCI 110C) (Students not taking this course for WIM, register for 110X.) American foreign economic policy. Issues: the evolution of American tariff and trade policy, the development of mechanisms for international monetary management, and American foreign investment policy reflected in the changing political goals pursued by American central decision makers. Prerequisite: 1 or equivalent. GER:DB-SocSci

5 units, not given this year

POLISCI 110Y. War and Peace in American Foreign Policy

(Same as POLISCI 110D) (Students not taking this course for WIM, register for 110Y.) The causes of war in American foreign policy. Issues: international and domestic sources of war and peace; war and the American political system; war, intervention, and peace making in the post-Cold War period. GER:DB-SocSci, DB-SocSci

5 units, Spr (Schultz, K)

POLISCI 111. Peace Studies

(Same as PSYCH 165) Interdisciplinary. The challenges of pursuing peace in a world with many conflicts and rising regional, ethnic, and religious antagonisms. Historical, social, psychological, and moral perspectives. Contributions of academic disciplines to the study of peace. Students explore a conflict and offer contributions to the building of peace. Limited enrollment. GER:DB-SocSci

5 units, not given this year

POLISCI 113F. The United Nations and Global Governance

The role of international institutions and organizations in the areas of health, environment, security, trade, development, and human rights. Evaluation, accountability, participation, legitimacy, and autonomy. GER:DB-SocSci

5 units, not given this year

POLISCI 114D. Democracy, Development, and the Rule of Law

(Same as IPS 230, INTNLREL 114D, POLISCI 314D) Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts. GER:DB-SocSci

5 units, Aut (Diamond, L; Stoner-Weiss, K)

POLISCI 114S. International Security in a Changing World

(Same as IPS 241) The major international and regional security problems in the modern world. Interdisciplinary faculty lecture on the political and technical issues involved in nuclear proliferation, terrorism and homeland security, civil wars and insurgencies, and future great power rivalries. GER:DB-SocSci

5 units, Win (Sagan, S; Cuellar, M)

POLISCI 116. History of Nuclear Weapons

(Same as HISTORY 103E) The development of nuclear weapons and policies. How existing nuclear powers have managed their relations with each other. How nuclear war has been avoided so far and whether it can be avoided in the future. GER:DB-SocSci

5 units, not given this year

POLISCI 118P. U.S. Relations in Iran

The evolution of relations between the U.S. and Iran. The years after WW II when the U.S. became more involved in Iran. Relations after the victory of the Islamic republic. The current state of affairs and the prospects for the future. Emphasis is on original documents of U.S. diplomacy (White House, State Department, and the U.S. Embassy in Iran). Research paper.

5 units, Aut (Milani, A)

POLISCI 119Z. Modern Terrorism and Counter-Terrorism Strategies

The nature and characteristics of the terrorism phenomenon and the modus operandi of international terrorist organizations, including al-Qaeda and its proxies. The main concepts of counter-terrorism strategies. Focus is on: the definition of terrorism; terrorism as a means of political violence; the suicide attack phenomenon; terrorism and psychological warfare; media and public opinion; terrorism and public resilience; state sponsored terrorism; and the challenge of countering the motivations and the operational capabilities of the terrorists.

5 units, Sum (Ganor, B)

POLISCI 120A. American Political Sociology and Public Opinion: Who We Are and What We Believe

First of team-taught, intermediate-level, three-part sequence designed to introduce students to topics in American politics and government. The sociology of the U.S. and the political beliefs and values of Americans. Students may enroll for one, two, or three quarters, but the course is cumulative so maximum benefit results from enrollment in the entire sequence. Recommended: 2. GER:DB-SocSci

5 units, not given this year

POLISCI 120B. Campaigns, Voting, Media, and Elections

(Same as COMM 162, COMM 262) The theory and practice of American campaigns and elections. The behavior of the key players (candidates, parties, journalists, and voters) in terms of the institutional arrangements and political incentives that confront them. Current and recent election campaigns as laboratories for testing generalizations about campaign strategy and voter behavior. The academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. Issues of electoral reform and their more long-term consequences for governance and the political process. GER:DB-SocSci

4-5 units, Aut (Iyengar, S)

POLISCI 120C. American Political Institutions: Congress, the Executive Branch, and the Courts

How politicians, once elected, work together to govern America. The roles of the President, Congress, and Courts in making and enforcing laws. Focus is on the impact of constitutional rules on the incentives of each branch, and on how they influence law. WIM GER:DB-SocSci, DB-SocSci

5 units, Spr (Grimmer, J)

POLISCI 121. Urban Politics

(Same as PUBLPOL 133, URBANST 111) The major actors, institutions, processes, and policies of sub-state government in the U.S., emphasizing city general-purpose governments through a

comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite: POLISCI 2 or consent of instructor. GER:DB-SocSci

5 units, Aut (Gale, D)

POLISCI 122. Introduction to American Law

(Same as AMSTUD 179, LAWGEN 106, PUBLPOL 302A) For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general. GER:DB-SocSci

3-5 units, Aut (Friedman, L)

POLISCI 123. Politics and Public Policy

(Same as PUBLPOL 101, PUBLPOL 201) How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria. Prerequisite: POLISCI 2 (or equivalent for Public Policy majors). GER:DB-SocSci

5 units, Spr (Frisby, T)

POLISCI 123Z. United States Foreign Policy

The post-Cold War era focusing on foreign policy during the George W. Bush presidency: the war on terror; the wars in Iraq and Afghanistan; and the policy of preemption. Current challenges facing the U.S. from new global, economic, political, and security competition; the impact of domestic politics and institutional conflict on American foreign policy making; and possible directions.

5 units, Sum (Dorfman, G)

POLISCI 124R. The Federal System: Judicial Politics and Constitutional Law

The impact of constitutional rules on policy making in the U.S. with a focus on structural issues such as separation of powers and federalism. Topics such as: the role of unelected judges in a democracy; the rule of law; and the constitutionality of the war in Iraq. Prerequisites: POLISCI 2 or equivalent, and sophomore standing. GER:DB-SocSci, DB-SocSci, WIM

5 units, Win (Rutten, A)

POLISCI 124S. Civil Liberties: Judicial Politics and Constitutional Law

The role and participation of courts, primarily the U.S. Supreme Court, in public policy making and the political system. Judicial activity in civil liberty areas (religious liberty, free expression, race and sex discrimination, political participation, and rights of persons accused of crime). Prerequisites: 2 or equivalent, and sophomore standing. GER:DB-SocSci

5 units, Spr (Rutten, A)

POLISCI 125S. Chicano/Latino Politics

(Same as CHICANST 125S) The political position of Latinos and Latinas in the U.S.. Focus is on Mexican Americans, with attention to Cuban Americans, Puerto Ricans, and other groups. The history of each group in the American polity; their political circumstances with respect to the electoral process, the policy process, and government; the extent to which the demographic category Latino is meaningful; and group identity and solidarity among Americans of Latin American ancestry. Topics include immigration, education, affirmative action, language policy, and environmental justice.

5 units, Aut (Michelson, M)

POLISCI 128S. The Constitution: A Short History

(Same as HISTORY 57) A broad survey of the Constitution, from its Revolutionary origins to the contemporary disputes over interpretation. Topics include the invention of the written constitution and interpretative canons; the origins of judicial review; the Civil War and Reconstruction as constitutional crises; the era of substantive due process; the rights revolution; and the Constitution in wartime. GER:EC-AmerCul

5 units, not given this year

POLISCI 130B. History of Political Thought II: Early Modern Political Thought, 1500-1700

(Same as POLISCI 330B) The development of constitutionalism, Renaissance humanism and the Reformation, and changing relationships between church and states. Emphasis is on the relationships among political thought, institutional frameworks, and immediate political problems and conflicts. The usefulness of the history of political thought to political science. GER:DB-Hum

5 units, not given this year

POLISCI 132S. Theories of Civil Society, Philanthropy, and the Nonprofit Sector

(Same as ETHICSOC 132X, POLISCI 132X, POLISCI 332S) Students taking this course for a WIM, register for PoliSci 132S. The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? Readings in political philosophy, political sociology, and public policy.

5 units, Spr (Sievers, B; Reich, R)

POLISCI 132X. Theories of Civil Society, Philanthropy, and the Nonprofit Sector

(Same as ETHICSOC 132X, POLISCI 132S, POLISCI 332S) Students taking this course for a WIM, register for PoliSci 132S. The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? Readings in political philosophy, political sociology, and public policy.

5 units, Spr (Sievers, B; Reich, R)

POLISCI 133. Ethics and Politics of Public Service

(Same as ETHICSOC 133, HUMBIO 178, PHIL 175A, PHIL 275A, PUBLPOL 103D) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford. GER:DB-SocSci

5 units, not given this year

POLISCI 134. Democracy and the Communication of Consent

(Same as COMM 136, COMM 236) (Graduate students register for COMM 236.) Focus is on competing theories of democracy and the forms of communication they presuppose, combining normative and empirical issues, and historical and contemporary sources. Topics include representation, public opinion, mass media, small group processes, direct democracy, the role of information, and the prospects for deliberative democracy. GER:DB-SocSci

4-5 units, not given this year

POLISCI 134L. Environmental Justice

(Same as ETHICSOC 178M, ETHICSOC 278M, PHIL 178M, PHIL 278M) Explores the normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

4 units, Win (Staff)

POLISCI 136. Philosophical Issues Concerning Race and Racism

(Same as PHIL 177) Concepts of race, race consciousness, and racism, and their connections. What is race and what is its role in racism? How should ethnic and racial identities be viewed to secure the conditions in which humanity can be seen as a single moral community whose members have equal respect? What laws, values, and institutions best embody the balance among competing goals of group loyalty, opposition to racism, and common humanity? Philosophical writings on freedom and equality, human rights,

pluralism, and affirmative action. Historical accounts of group exclusion. GER:DB-Hum, EC-AmerCul

4 units, not given this year

POLISCI 136R. Introduction to Global Justice

(Same as ETHICSOC 136R, INTNLREL 136R, PHIL 76, POLISCI 336) Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

5 units, Spr (Oberman, K)

POLISCI 136S. Justice

(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas

4-5 units, Aut (Cohen, J)

POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century

(Same as EDUC 261X, ETHICSOC 137R, POLISCI 337R) Focus is on theories of justice. How the core ideals of freedom, equality, and security animate theories which John Rawls considers the first virtue of social institutions. Topics include the U.S. Constitution as a legal framework for the operation of these ideals, civil rights legislation and litigation as the arena of tensions between those ideals, and how ideas of justice function both at home and abroad to impact civil liberties in today's war on terror.

5 units, Win (Reich, R; Steyer, J; Karlan, P)

POLISCI 140. Political Economy of Development

Emphasis is on the interplay between political economic processes, and national and international factors from Latin America, Africa, and Asia. Do governments provide the foundations for economic development? The role of the state in solving problems of violence and capital accumulation. GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

POLISCI 140C. The Comparative Political Economy of Post-Communist Transitions

Dominant theoretical perspectives of comparative democratization and marketization; focus is on the political economy of transition in Eastern Europe and Eurasia while comparing similar processes in Latin America and Asia. Topics include: meanings of democracy, synergy between democracies and markets, causes of the collapse of communism, paths to political liberalization and democracy, civil society, constitutions, parliaments, presidents, the rule of law, electoral systems, market requirements, strategies of reform, the Russian experience of market building, exporting democracy and the market, and foreign aid and assistance.

5 units, Win (Stoner-Weiss, K)

POLISCI 140L. China in World Politics

(Same as POLISCI 340L) The implications of the rise of China in contemporary world politics and for American foreign policy, including issues such as arms and nuclear proliferation, regional security arrangements, international trade and investment, human rights, environmental problems, and the Taiwan and Tibet questions. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Miller, L)

POLISCI 142B. British Politics

The impact on the world's oldest democracy of major changes in policies, politics, and the institution of government made over the last two decades by Margaret Thatcher and Tony Blair. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Dorfman, G)

POLISCI 142Z. Politics in the Name of Identity

How national, ethnic, religious, racial, tribal, and regional identities have been politicized. How identity is used as a motive, cause, or justification for peaceful or violent political actions. Issues such as suicide bombers, the U.S. immigration bill, and ethnic cleansing. Case studies. GER:DB-SocSci

5 units, not given this year

POLISCI 147. Comparative Democratic Development

Social, cultural, political, economic, and international factors affecting the development and consolidation of democracy in historical and comparative perspective. Individual country experiences with democracy, democratization, and regime performance. Emphasis is on the third wave of democratization over the past three decades and contemporary possibilities for democratic change. (Diamond) GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

POLISCI 148. Chinese Politics: The Transformation and the Era of Reform

(Same as POLISCI 348) Overview of the reforms in China since 1978 that have made its economy one of the fastest growing in the world yet it still has the Chinese Communist Party at the helm wielding one party rule. Key questions addressed include the following: What has been the process and challenges of reform that have reshaped China¿s economic landscape? What are the political consequences of these dramatic economic changes? Why has the CCP remained strong while other communist regimes have failed? Markets have spread but what is the role of the state? What are the opportunities for political participation and prospects for political change? Materials will include readings, lectures, and selected films. This course has no prerequisites. (Graduate students register for 348.) GER:DB-SocSci, EC-GlobalCom

5 units, Win (Oi, J)

POLISCI 149S. Islam and the West

Changes in relative power and vitality of each side. The relationship in the Middle Ages revolved around power and domination, and since the Renaissance around modernity. Focus is on Muslims of the Middle East. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Milani, A)

POLISCI 149T. Middle Eastern Politics

Topics in contemporary Middle Eastern politics including institutional sources of underdevelopment, political Islam, electoral authoritarianism, and the political economy of oil.

5 units, Win (Blaydes, L)

POLISCI 150A. Political Methodology I

(Same as POLISCI 350A) Introduction to probability and statistical inference, with applications to political science and public policy. Prerequisite: elementary calculus. GER:DB-Math

5 units, Aut (Rivers, D)

POLISCI 150B. Political Methodology II

(Same as POLISCI 350B) Understanding and using the linear regression model in a social-science context: properties of the least squares estimator; inference and hypothesis testing; assessing model fit; presenting results for publication; consequences and diagnosis of departures from model assumptions; outliers and influential observations, graphical techniques for model fitting and checking; interactions among exploratory variables; pooling data; extensions for binary responses. GER:DB-Math

5 units, Win (Jackman, S)

POLISCI 150C. Political Methodology III

(Same as POLISCI 350C) Models for discrete outcomes, time series, measurement error, and simultaneity. Introduction to nonlinear estimation, large sample theory. Prerequisite: 150B/350B.

3-5 units, Spr (Wand, J)

POLISCI 151B. Data Analysis for Political Science

Operationalization of concepts, measurement, scale construction, finding and pooling/merging data, cross-tabulations, tests of association, comparison of means, correlation, scatterplots, and regression models. How to present the results of data analysis in research reports, essays, and theses. Emphasis is on getting and using data with appropriate statistical software. Prior mathematics not required. GER:DB-Math

5 units, not given this year

POLISCI 152. Introduction to Game Theoretic Methods in Political Science

(Same as POLISCI 352) Concepts and tools of non-cooperative game theory developed using political science questions and applications. Formal treatment of Hobbes' theory of the state and major criticisms of it; examples from international politics. Primarily for graduate students; undergraduates admitted with consent of instructor.

3-5 units, not given this year

POLISCI 157. Sampling and Surveys
(Same as POLISCI 357) The importance of sample surveys as a source of social science data including public opinion, voting, welfare programs, health, employment, and consumer behavior. Survey design, sampling theory, and estimation. Nonresponse, self-selection, measurement error, and web survey methods. Prerequisite: 150B or equivalent.
5 units, not given this year

POLISCI 204. Selena Diana Jenkins International Human Rights Colloquium
(Same as IPS 271, INTNLREL 110, POLISCI 304) 10 international and domestic human rights scholars, judges, and activists who have made significant contributions to international justice, women's and children's rights, environmental rights, and indigenous rights. Students encouraged to present their ongoing research and develop new research projects (individually and collaboratively). Students wishing to do significant research and reading in the context of the seminar may, in consultation with one of the instructors, sign up for independent study. Law students are first required to be enrolled in an International Human Rights in the law school in order to participate.
1 unit, Win (Stacy, H)

POLISCI 210. Special Topics: The Political Economy of Immigration
The goal of this class is to explore the political economy of immigration in receiving states over the last two hundred years, with a special focus on the current debates over immigration in the US today. The course assumes some knowledge of international relations and a more limited background in economic theory and economic history. Course readings and lectures are designed to provide both a theoretical orientation and the substantive information necessary to understand and analyze a range of policy issues that now confront immigrant-receiving states.
5 units, Win (Peters, M)

POLISCI 210C. Globalization and Its Discontents
Whose interests are served by the liberalization of trade and finance? What impact can multilateral organizations like the World Bank, International Monetary Fund, and World Trade Organization have on the economic policies of member states and the functioning of the global economy? What determines the policies or rules promoted by these organizations? What motivates foreign aid policies? What is globalization? How can its impacts on different countries and populations be assessed? Policy-oriented questions that emerge from these topics. Should government offset the welfare costs of globalization, and if so, how? Which priorities should be protected despite free trade liberalization? Is free trade fair trade? How should the World Bank and IMF be reformed to meet the needs of the international political economy in the 21st century? How should the international community address the current financial crisis? What is the appropriate balance between government regulation and market freedom
5 units, Spr (Gould, E)

POLISCI 210R. International Conflict: Management and Resolution
(Same as IPS 250, POLISCI 310R, PSYCH 383) (Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.
3 units, Win (Ross, L; Holloway, D; Weiner, A)

POLISCI 211. Political Economy of East Asia
(Formerly 117.) Comparative and international political economy of E.and S.E. Asia. Industrial development and the Asian miracle, economic integration, regional cooperation, the Asian financial crisis, and contemporary challenges.
5 units, Spr (Lipscy, P)

POLISCI 213R. Political Economy of Financial Crisis
(Same as POLISCI 313R) Political responses to domestic and international financial crises. Monetary and fiscal policy. The role of interest groups. International cooperation and the role of the IMF.
5 units, not given this year

POLISCI 213S. A Post American Century? American Foreign Policy in a Unipolar World
This seminar examines recent policy from Bush to Obama in the context of two classic traditions: Wilsonianism vs. Realism. What is the role of the international system, what is the weight of domestic forces like ideology, history and identity? Prerequisite: junior or senior standing. GER:DB-SocSci
5 units, Aut (Joffe, J)

POLISCI 214R. Challenges and Dilemmas in American Foreign Policy
(Same as POLISCI 314R) This seminar will examine the complexities and trade offs involved in foreign policy decision-making at the end of the twentieth century and the dawn of the post-9/11 era. Students will analyze dilemmas confronting policymakers through case studies including post-conflict reconstruction and state-building, nuclear proliferation, democratization and peace negotiation. The seminar will conclude with a 48-hour crisis simulation. For advanced undergraduates and graduate students. Application for enrollment required. Pick up application in Political Science Department (Encina West 100).
5 units, Win (Rice, C)

POLISCI 216. Law, Economics and Politics of International Trade
(Same as ECON 164) Taught by an economist and a lawyer. Examines aspects of the WTO system from legal and economic perspectives. Integrates a careful examination of topical legal issues with theoretical and empirical research in economics to develop both positive and normative themes regarding the WTO as an international institution. Overview of the economics of international cooperation on trade, and an introduction to the WTO as an institution and its core obligations. Topics may include: the dispute resolution system; the choice between multilateral and regional or bilateral trade agreements; the role of developing countries in the WTO; and the relationship between WTO law, domestic regulation and national sovereignty. Prerequisite: Econ 51 or equivalent undergraduate microeconomics.
2-5 units, Win (Bagwell, K; Sykes, A)

POLISCI 216E. International History and International Relations Theory
(Same as HISTORY 202, HISTORY 306E, POLISCI 316) The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system. GER:DB-SocSci
5 units, not given this year

POLISCI 219. Directed Reading and Research in International Relations
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 220R. The Presidency
(Same as POLISCI 320R) A comprehensive perspective on the American presidency. Topics include elections, policy making, control of the bureaucracy, unilateral action, war making. Goal is to understand why presidents behave as they do, and why the presidency as an institution has developed as it has, with emphasis on the dynamics of the American political system and how they condition incentives, opportunities, and power.
5 units, Win (Moe, T)

POLISCI 220S. The Supreme Court in Race, Law, and Politics
The U. S. Supreme Court as part of the ongoing governing process in the American political system. This relationship becomes real as students take on the persona of participants involved in a hypothetical case, including Justices of the Supreme Court, referred to as the Supreme Court Simulation Experience (SCSE). Students develop background data on the position participants might take on the issue(s) presented. Various briefs are filed with the court and argued by lawyers for the respective parties. Limited enrollment.

Prerequisites: junior standing and POLISCI 2 or equivalent, or consent of instructor.

5 units, Spr (Barker, L)

POLISCI 221. Democratic Theory and Democratic Citizenship
The value of tolerance and its implications for the principles and practices of democracy. Tolerance as understood by political philosophers and citizens. Readings include: John Stuart Mill's, On Liberty; Isaiah Berlin's, Two Concepts of Liberty; and modern studies of public opinion. Topics include: ideas and liberty; value pluralism; the interplay of authority and obedience; the role of political elites and mass publics in democratic societies; multiculturalism. Principal forms of value conflict in contemporary liberal democracies. GER:DB-Hum

5 units, Spr (Sniderman, P)

POLISCI 221F. Race and American Politics
How the issue of race has helped define the modern era of American politics. Major theories of political cleavage over public policies dealing with race.

5 units, not given this year

POLISCI 222P. Creating the American Republic
(Same as HISTORY 251) Concepts and developments in the late 18th-century invention of American constitutionalism; the politics of constitution making and ratifying; emergence of theories of constitutional interpretation including originalism; early notions of judicial review. Primary and secondary sources.

5 units, not given this year

POLISCI 222R. Culture, Identity, and Diversity
The interplay of liberalism, pluralism, and diversity. GER:DB-SocSci

5 units, Win (Sniderman, P)

POLISCI 222S. Topics in Constitutional History
(Same as AMSTUD 251, HISTORY 251G) Ideas of rights in American history emphasizing the problem of defining constitutional rights, the free exercise of religion, freedom of expression, and the contemporary debate over rights talk and the idiom of human rights. GER:DB-SocSci, EC-AmerCul

5 units, Win (Rakove, J)

POLISCI 224H. Heretics to Headscarves
(Same as HISTORY 202C, JEWISHST 182C) Broad survey of religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.

5 units, Aut (Rakove, J)

POLISCI 224T. Legislatures, Courts, and Public Policy
To understand the role of courts, focus is on a series of judicial decisions. To make sense of these decisions, focus is on material from the political, social, and economic history of the relevant statutes, such as debates and votes in Congress, later statutes, and speeches by politicians. To make sense of this primary evidence, focus is on a theoretical approach to American politics to be developed in the first weeks of the course. WIM

5 units, Aut (Rutten, A)

POLISCI 225E. The Laws of Politics: Term Limits, Campaign Finance, Blanket Primaries, and Redistricting
The intersection of election law, politics, and academia. Major policy changes that affect the way that politics works, the legal decisions that govern them, and the academic research aimed at influencing policymakers and judges. Topics include campaign finance, redistricting, blanket primaries, and term limits. Students make presentations summarizing cases and research, prepare legal briefs of their own, and argue their cases before a mock Supreme Court.

5 units, not given this year

POLISCI 225L. Positive Political Theory and the Law
(Same as POLISCI 325L) An introduction to this new and expanding field. Applications to a range of legal and political issues, including statutory interpretation, political economy of regulation, administrative law, and constitutional law.

5 units, Spr (Weingast, B)

POLISCI 226. Race and Racism in American Politics
(Same as CSRE 226, POLISCI 326) Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.

5 units, Aut (Segura, G)

POLISCI 226T. The Politics of Education
(Same as POLISCI 326T) America's public schools are government agencies, and virtually everything about them is subject to political authority and to decision making through the political process. Goal is to understand the politics of education and its impacts on the nation's schools. Focus is on the modern era of reform, with attention to the most prominent efforts to bring about fundamental change through accountability (including No Child Left Behind), school choice (charter schools, vouchers), pay for performance, and to the politics of blocking that has made genuine reform difficult to achieve.

5 units, Spr (Moe, T)

POLISCI 227P. Contemporary Political Issues
Examination of public opinion surrounding issues important in contemporary American politics, including but not limited to the economy, immigration, race, abortion, sexuality, foreign and defense policy, age, and role of government. Students perform primary research. Prerequisites: POLISCI 2, STATS 160 or equivalent, and consent of instructor.

5 units, Spr (Fiorina, M)

POLISCI 229. Directed Reading and Research in American Politics
May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 230A. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 330A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. GER:DB-Hum

4-5 units, Win (Ober, J)

POLISCI 231S. Contemporary Theories of Justice
Social and political justice and contemporary debates in political theory. Recent works that develop the principles of justice, and the political arrangements that best satisfy their requirements. Limited enrollment. WIM GER:DB-Hum, DB-SocSci, EC-EthicReas

5 units, not given this year

POLISCI 232T. The Dialogue of Democracy
(Same as AMSTUD 137, COMM 137, COMM 237, POLISCI 332T) All forms of democracy require some kind of communication so people are aware of issues and make decisions. Competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small-scale discussions or sound bites on television? Or social media? What is the role of technology in changing democratic practices, to mobilize, to persuade, to solve public problems? Readings from political theory about democratic ideals from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. Contemporary examinations of the media and the Internet to see how those practices are changing and how the ideals can or cannot be realized. GER:EC-EthicReas

4-5 units, Win (Fishkin, J)

POLISCI 237. Models of Democracy
(Same as COMM 212, COMM 312, POLISCI 337) Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments.

3-5 units, not given this year

POLISCI 239. Directed Reading and Research in Political Theory
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 240. Special Topics: Politics of Wealth Redistribution
The mechanisms through which individual and group preferences are transformed into policies in democracies. Because these mechanisms influence how powerful elites under dictatorship choose to extend or relinquish rule, it also examines the determinants of redistribution under autocracy. Premise is that in practice all government programs and policies are redistributive in nature. As a result, an analysis of who gets what and why is crucial to gaining an understanding of these policies. The institutions that shape incentives for governments to implement redistribution; the mechanisms, actors, and international conditions that can erode government incentives or capabilities to redistribute. Topics in redistribution. Students work on developing the analytical skills necessary to become critical and well-informed consumers of social science research.
5 units, Win (Albertus, M)

POLISCI 240P. Trials, Truth, and Memory
5 units, Win (Karl, T)

POLISCI 240T. American Efforts at Promoting Democracy Abroad: Theory and Reality
Theoretical and intellectual debates about democracy promotion with focus on realism versus liberalism. The evolution of these debates with attention to the Cold War, the 90s, and American foreign policy after 9/11. Tools for and bureaucratic struggles over how to promote democracy. Contemporary case studies.
5 units, Spr (Diamond, L)

POLISCI 241. Special Topics: Democracy and Inequality
The course has two primary objectives. First, we will evaluate the claim that democracy is more effective and more credible than autocracy at serving the interests of poor and working-class citizens. We will do so using quantitative cross-national evidence, historical evidence, and in-depth case studies of how political institutions within democracies and autocracies shape redistributive social policies. The second objective of the course is to develop the analytical tools of social-scientific inquiry: What are the empirical implications of theoretical arguments? What kinds of evidence would increase our confidence that a particular explanation is right? How should we measure inputs and outcomes? Is there a simpler alternative explanation? How would we design a study to test our hypotheses?
5 units, Spr (Elis, R)

POLISCI 241L. Democracy and the Market in Eastern Europe
Opportunities and challenges of double transitions towards democracy and capitalism. Topics include shock therapy versus gradualism, opposition to economic reform, the role of political competition and international actors in reform outcomes, and the creation of institutional supports for markets and democracy.
5 units, Aut (Young, P)

POLISCI 241S. Spatial Approaches to Social Science
(Same as ANTHRO 130D, ANTHRO 230D) This multidisciplinary course combines different approaches to how GIS and spatial tools can be applied in social science research. We take a collaborative, project oriented approach to bring together technical expertise and substantive applications from several social science disciplines. The course aims to integrate tools, methods, and current debates in social science research and will enable students to engage in critical spatial research and a multidisciplinary dialogue around geographic space.
5 units, Win (Rodden, J; Engel, C)

POLISCI 242D. Political Economy of Property Rights
(Same as HISTORY 278A) This course seeks to understand how property rights systems influence economic growth and the stewardship of resources. We are also interested in explaining the political process by which societies create property systems. In order to answer these questions we will read and discuss the work of political scientists, economists, and historians.
5 units, Win (Haber, S)

POLISCI 242P. Comparative Politics of Corruption
Causes, effects, and solutions to various forms of corruption in business and politics in both developing regions (e.g. Asia, E. Europe) and developed ones (the US and the EU).
5 units, Win (Staff)

POLISCI 243R. Research Seminar in Democratization and Human Rights
Goal is to produce a minimum 30-page paper based on field research abroad. Students prepare research problem statement, meet individually with the professor, and circulate drafts for class comment. Graduate students should register for directed reading under the professor's name. GER:DB-SocSci
5 units, Spr (Karl, T)

POLISCI 245P. Politics and Society in Israel
Focus is on Israel's political system and social makeup, from the pre-state period (Yishuv) to the 2009 elections. The ideological roots of Zionism; the core issues which comprise the Arab-Israeli conflict. Key aspects of the Israeli political system, including election methods, parties, and the constitutional status. The religious, ethnic, and national cleavages that manifest in Israeli public life and politics.
5 units, Spr (Lev-On, E)

POLISCI 245R. Politics in Modern Iran
Modern Iran has been a smithy for political movements, ideologies, and types of states. Movements include nationalism, constitutionalism, Marxism, Islamic fundamentalism, social democracy, Islamic liberalism, and fascism. Forms of government include Oriental despotism, authoritarianism, Islamic theocracy, and liberal democracy. These varieties have appeared in Iran in an iteration shaped by history, geography, proximity to oil and the Soviet Union, and the hegemony of Islamic culture. GER:DB-SocSci, EC-GlobalCom
5 units, Win (Milani, A)

POLISCI 246. African Politics
Key issues in African political economy: the nature and legacy of colonial rule; the African state; voting, elections, and Africa's democratic transitions; the sources of Africa's poor economic performance; ethnicity in political and social life; violence, social conflict, and civil war. Emphasis is on mastering the literature on African politics and developing intuitions and skills to permit students to become producers of high quality research in the area.
5 units, not given this year

POLISCI 246L. Struggle and Transformation: Political Economy of Southern Africa
Born in struggle, majority rule in southern Africa brought promise: a fundamental transformation from a racialized order to a developmental departure in which initiative and opportunity would no longer depend on race, gender, and class. Progress has been dramatic. Yet, inequalities have intensified and the liberation promise remains to be achieved. Contemporary southern Africa and the intersection of politics, economy, and society. Focused comparisons and cases studies address disaffection and legitimacy, participation and exclusion, democracy and control, parties and protest, struggles and transformation, within countries and across the region. No prerequisites.
5 units, Spr (Samoff, J)

POLISCI 248S. Latin American Politics
Fundamental transformations in Latin America in the last two decades: why most governments are now democratic or semidemocratic; and economic transformation as countries abandoned import substitution industrialization policies led by state intervention for neoliberal economic polices. The nature of this dual transformation. GER:DB-SocSci
5 units, Win (Magaloni, B)

POLISCI 249. Directed Reading and Research in Comparative Politics
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 259. Directed Reading and Research in Political Methodology
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 299A. Senior Project
Students conduct independent research work towards a senior honors thesis. See ""Honors Program"" above. (Staff)
1-5 units, Aut (Staff)

POLISCI 299B. Senior Project
Students conduct independent research work towards a senior honors thesis. See ""Honors Program"" above. (Staff)
1-5 units, Win (Staff)

POLISCI 299C. Senior Project
Students conduct independent research work towards a senior honors thesis. See ""Honors Program"" above. (Staff)
1-5 units, Spr (Staff)

POLISCI 299Q. Junior Research Seminar
Required of students interested in writing a senior honors thesis. Students must submit an honors application to the PoliSci office in Encina West 100 by the first Friday of spring quarter.
2 units, Spr (Magaloni, B)

POLISCI 299Q. Honors Research: Democracy, Development, and the Rule of Law in Developing Countries
(Same as INTNLREL 199) Restricted to students in the CDDRL option of the International Relations honors program. Goal is to prepare students to do research and/or fieldwork to complete their thesis research. Main currents in democracy and development literature concerning how economic growth and democratization are related; how the rule of law supports these processes in countries undergoing change. Student presentations of thesis questions; student groups develop research problems and designs. May be repeated for credit.
3-5 units, Spr (Stoner-Weiss, K)

POLISCI 336S. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas
4-5 units, Aut (Cohen, J)

GRADUATE COURSES IN POLITICAL SCIENCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

POLISCI 304. Selena Diana Jenkins International Human Rights Colloquium
(Same as IPS 271, INTNLREL 110, POLISCI 204) 10 international and domestic human rights scholars, judges, and activists who have made significant contributions to international justice, women's and children's rights, environmental rights, and indigenous rights. Students encouraged to present their ongoing research and develop new research projects (individually and collaboratively). Students wishing to do significant research and reading in the context of the seminar may, in consultation with one of the instructors, sign up for independent study. Law students are first required to be enrolled in an International Human Rights in the law school in order to participate.
1 unit, Win (Stacy, H)

POLISCI 310A. International Relations Theory, Part I
First of a three-part graduate sequence. History of international relations, current debates, and applications to problems of international security and political economy.
5 units, Aut (Schultz, K)

POLISCI 310B. International Relations Theory, Part II
Second of a three-part graduate sequence. History of international relations theory, current debates, and applications to problems of international security and political economy. Prerequisite: 310A.
5 units, Win (Lipscy, P)

POLISCI 310C. Research in International Relations
Third of a three-part graduate sequence. Focus is on developing research papers begun in 310A or B, and exploring active areas of research in the field. Prerequisite: 310B.
5 units, Spr (Sagan, S)

POLISCI 310R. International Conflict: Management and Resolution
(Same as IPS 250, POLISCI 210R, PSYCH 383) (Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.
3 units, Win (Ross, L; Holloway, D; Weiner, A)

POLISCI 311A. Workshop in International Relations
For graduate students. Contemporary work. Organized around presentation of research by students and outside scholars. May be repeated for credit.
1-2 units, Aut (Schultz, K)

POLISCI 311B. Workshop in International Relations
For graduate students. Contemporary work. Organized around presentation of research by students and outside scholars. May be repeated for credit.
1-2 units, Win (Schultz, K)

POLISCI 311C. Workshop in International Relations
Organized around presentation of research by students and outside scholars. May be repeated for credit.
1-2 units, not given this year

POLISCI 312S. Managing Global Complexity
(Same as IPS 201) The value of major theories and concepts in international relations for understanding and addressing global policy issues. Country case study with policy challenges such as development, democracy promotion, proliferation, and terrorism; the challenge of creating coherent policies that do not run at cross purposes. Case study of a policy challenge that cuts across academic disciplines and policy specializations to provide the opportunity to bring together skills and policy perspectives.
3 units, Spr (Krasner, S; Stoner-Weiss, K)

POLISCI 313R. Political Economy of Financial Crisis
(Same as POLISCI 213R) Political responses to domestic and international financial crises. Monetary and fiscal policy. The role of interest groups. International cooperation and the role of the IMF.
5 units, not given this year

POLISCI 314D. Democracy, Development, and the Rule of Law
(Same as IPS 230, INTNLREL 114D, POLISCI 114D) Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts.
5 units, Aut (Diamond, L; Stoner-Weiss, K)

POLISCI 314R. Challenges and Dilemmas in American Foreign Policy
(Same as POLISCI 214R) This seminar will examine the complexities and trade offs involved in foreign policy decision-making at the end of the twentieth century and the dawn of the post-9/11 era. Students will analyze dilemmas confronting policymakers through case studies including post-conflict reconstruction and state-building, nuclear proliferation, democratization and peace negotiation. The seminar will conclude with a 48-hour crisis simulation. For advanced undergraduates and graduate students. Application for enrollment required. Pick up application in Political Science Department (Encina West 100).
5 units, Win (Rice, C)

POLISCI 314S. Decision Making in U.S. Foreign Policy
(Same as IPS 314S) Priority to IPS students. Formal and informal processes involved in U.S. foreign policy decision making. The formation, conduct, and implementation of policy, emphasizing the role of the President and executive branch agencies. Theoretical and analytical perspectives; case studies.
5 units, Spr (Blacker, C)

POLISCI 316. International History and International Relations Theory
(Same as HISTORY 202, HISTORY 306E, POLISCI 216E) The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.
5 units, not given this year

POLISCI 319. Directed Reading in International Relations
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 320R. The Presidency
(Same as POLISCI 220R) A comprehensive perspective on the American presidency. Topics include elections, policy making, control of the bureaucracy, unilateral action, war making. Goal is to understand why presidents behave as they do, and why the presidency as an institution has developed as it has, with emphasis on the dynamics of the American political system and how they condition incentives, opportunities, and power.
5 units, Win (Moe, T)

POLISCI 323R. The Press and the Political Process
(Same as COMM 160, COMM 260) (Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes.
4-5 units, alternate years, not given next year

POLISCI 324. Graduate Seminar in Political Psychology
(Same as COMM 308) For students interested in research in political science, psychology, or communication. Methodological techniques for studying political attitudes and behaviors. May be repeated for credit.
1-3 units, Aut (Krosnick, J), Win (Krosnick, J), Spr (Krosnick, J)

POLISCI 325L. Positive Political Theory and the Law
(Same as POLISCI 225L) An introduction to this new and expanding field. Applications to a range of legal and political issues, including statutory interpretation, political economy of regulation, administrative law, and constitutional law.
5 units, Spr (Weingast, B)

POLISCI 326. Race and Racism in American Politics
(Same as CSRE 226, POLISCI 226) Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.
5 units, Aut (Segura, G)

POLISCI 326T. The Politics of Education
(Same as POLISCI 226T) America's public schools are government agencies, and virtually everything about them is subject to political authority and to decision making through the political process. Goal is to understand the politics of education and its impacts on the nation's schools. Focus is on the modern era of reform, with attention to the most prominent efforts to bring about fundamental change through accountability (including No Child Left Behind), school choice (charter schools, vouchers), pay for performance, and to the politics of blocking that has made genuine reform difficult to achieve.
5 units, Spr (Moe, T)

POLISCI 329. Directed Reading and Research in American Politics
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 330A. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 230A) Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.
4-5 units, Win (Ober, J)

POLISCI 330B. History of Political Thought II: Early Modern Political Thought, 1500-1700
(Same as POLISCI 130B) The development of constitutionalism, Renaissance humanism and the Reformation, and changing relationships between church and states. Emphasis is on the relationships among political thought, institutional frameworks, and immediate political problems and conflicts. The usefulness of the history of political thought to political science.
5 units, not given this year

POLISCI 331S. Politics and Collective Action
(Same as IPS 206A, PUBLPOL 304A) Classic theories for why collective action problems occur and how they can be solved. Politics of aggregating individual decisions into collective action, including voting, social protest, and competing goals and tactics of officials, bureaucrats, interest groups, and other stakeholders. Economic, distributive, and moral frameworks for evaluating collective action processes and outcomes. Applications to real-world policy problems involving collective action.
4 units, Spr (Hanson, W)

POLISCI 332. Graduate Seminar: John Rawls's Political Philosophy
(Same as PHIL 372D) Leading ideas in A Theory of Justice, Political Liberalism, and The Law of Peoples.
5 units, not given this year

POLISCI 332S. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
(Same as ETHICSOC 132X, POLISCI 132S, POLISCI 132X) Students taking this course for a WIM, register for PoliSci 132S. The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? Readings in political philosophy, political sociology, and public policy.
5 units, Spr (Sievers, B; Reich, R)

POLISCI 332T. The Dialogue of Democracy
(Same as AMSTUD 137, COMM 137, COMM 237, POLISCI 232T) All forms of democracy require some kind of communication so people are aware of issues and make decisions. Competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small-scale discussions or sound bites on television? Or social media? What is the role of technology in changing democratic practices, to mobilize, to persuade, to solve public problems? Readings from political theory about democratic ideals from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. Contemporary examinations of the media and the Internet to see how those practices are changing and how the ideals can or cannot be realized.
4-5 units, Win (Fishkin, J)

POLISCI 334. Philanthropy and Civil Society
(Same as EDUC 374, SOC 374) Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.
1-3 units, Aut (Powell, W; Reich, R), Win (Powell, W; Reich, R), Spr (Powell, W; Reich, R)

POLISCI 336. Introduction to Global Justice
(Same as ETHICSOC 136R, INTNLREL 136R, PHIL 76, POLISCI 136R) Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close

their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

5 units, Spr (Oberman, K)

POLISCI 336J. Collectivities

(Same as PHIL 279) Issues about the nature of collective action, shared intention, and cooperation, the role of sociality in the nature of mind, problems of preference and judgment aggregation, and, quite generally, different ways of thinking about the relationship of I to we. Enrollment limited to 30.

4 units, not given this year

POLISCI 337. Models of Democracy

(Same as COMM 212, COMM 312, POLISCI 237) Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments.

3-5 units, not given this year

POLISCI 337R. Justice at Home and Abroad: Civil Rights in the 21st Century

(Same as EDUC 261X, ETHICSOC 137R, POLISCI 137R) Focus is on theories of justice. How the core ideals of freedom, equality, and security animate theories which John Rawls considers the first virtue of social institutions. Topics include the U.S. Constitution as a legal framework for the operation of these ideals, civil rights legislation and litigation as the arena of tensions between those ideals, and how ideas of justice function both at home and abroad to impact civil liberties in today's war on terror.

5 units, Win (Reich, R; Steyer, J; Karlan, P)

POLISCI 337S. Seminar on Liberation Technologies

(Same as CS 546) This one-unit seminar will present speakers relevant in a variety of ways to how various forms of information technology are being used to defend human rights, improve governance, deepen democracy, empower the poor, promote economic development, protect the environment, enhance public health, and pursue a variety of other social goods.

1 unit, Aut (Cohen, J; Diamond, L), Win (Diamond, L; Winograd, T; Cohen, J), Spr (Winograd, T; Cohen, J)

POLISCI 339. Directed Reading and Research in Political Theory

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 340L. China in World Politics

(Same as POLISCI 140L) The implications of the rise of China in contemporary world politics and for American foreign policy, including issues such as arms and nuclear proliferation, regional security arrangements, international trade and investment, human rights, environmental problems, and the Taiwan and Tibet questions.

5 units, Aut (Miller, L)

POLISCI 344. Politics and Geography

The role of geography in topics in political economy, including development, political representation, voting, redistribution, regional autonomy movements, fiscal competition, and federalism.

3-5 units, not given this year

POLISCI 344U. Political Culture

An approach to culture emphasizing equilibrium attributes through relationships among culture, choice, coordination, and common knowledge. Implications for the study of political processes and institutions.

5 units, not given this year

POLISCI 346S. The Logic of Authoritarian Government, Ancient and Modern

(Same as HISTORY 378A) If authoritarianism is less economically efficient than democracy, and if authoritarianism is a less stable form of political organization than democracy, then why are there more authoritarian governments than democracies? To address this paradox, focus is on theoretical and empirical literature on authoritarian governments, and related literatures on the microeconomic analysis of property rights and credible commitments.

5 units, not given this year

POLISCI 348. Chinese Politics: The Transformation and the Era of Reform

(Same as POLISCI 148) (Graduate students register for 348.) Overview of the reforms in China since 1978 that have made its economy one of the fastest growing in the world yet it still has the Chinese Communist Party at the helm wielding one party rule. Key questions include the following: What has been the process and challenges of reform that have reshaped China's economic landscape? What are the political consequences of these dramatic economic changes? Why has the CCP remained strong while other communist regimes have failed? Markets have spread but what is the role of the state? What are the opportunities for political participation and prospects for political change? Materials include readings, lectures, and films. No prerequisites.

5 units, Win (Oi, J)

POLISCI 349. Directed Reading and Research in Comparative Politics

May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 350A. Political Methodology I

(Same as POLISCI 150A) Introduction to probability and statistical inference, with applications to political science and public policy. Prerequisite: elementary calculus.

5 units, Aut (Rivers, D)

POLISCI 350B. Political Methodology II

(Same as POLISCI 150B) Understanding and using the linear regression model in a social-science context: properties of the least squares estimator; inference and hypothesis testing; assessing model fit; presenting results for publication; consequences and diagnosis of departures from model assumptions; outliers and influential observations, graphical techniques for model fitting and checking; interactions among exploratory variables; pooling data; extensions for binary responses.

5 units, Win (Jackman, S)

POLISCI 350C. Political Methodology III

(Same as POLISCI 150C) Models for discrete outcomes, time series, measurement error, and simultaneity. Introduction to nonlinear estimation, large sample theory. Prerequisite: 150B/350B.

3-5 units, Spr (Wand, J)

POLISCI 351A. Foundations of Political Economy

Introduction to political economy with an emphasis on formal models of collective choice, public institutions, and political competition. Topics include voting theory, social choice, institutional equilibria, agenda setting, interest group politics, bureaucratic behavior, and electoral competition.

4 units, Aut (Callander, S)

POLISCI 351B. Economic Analysis of Political Institutions

Applying techniques such as information economics, games of incomplete information, sequential bargaining theory, repeated games, and rational expectations of microeconomic analysis and game theory to political behavior and institutions. Applicatoins include agenda formation in legislatures, government formation in parliamentary systems, the implications of legislative structure, elections and information aggregation, lobbying, electoral competition and interest groups, the control of bureaucracies, interest group competition, and collective choice rules.

4 units, Win (Shotts, K)

POLISCI 351C. Testing Models of Governmental Decision Making

(Same as POLECON 682) This course surveys applications of formal models to several stages of decision making, primarily in the U.S. national government and with an emphasis on the legislative branch. The course begins with explicit consideration of issues in philosophy of science and introduces an analytic framework to be applied to specific research throughout remaining sessions. Substantive topics and applications covered include strategies of committees, roll call voting, policy formation, effects of special rules, congressional-presidential relations, and congressional-agency relations. Students should have taken POLECON 680 and POLECON 681. Also listed as Political Science 351C.

4 units, Spr (Krehbiel, K)

POLISCI 352. Introduction to Game Theoretic Methods in Political Science
(Same as POLISCI 152) Concepts and tools of non-cooperative game theory developed using political science questions and applications. Formal treatment of Hobbes' theory of the state and major criticisms of it; examples from international politics. Primarily for graduate students; undergraduates admitted with consent of instructor.
3-5 units, not given this year

POLISCI 353A. Workshop in Statistical Modeling
Theoretical aspects and empirical applications of statistical modeling in the social sciences. Guest speakers. Students present a research paper. Prerequisite: 350B or equivalent.
1-2 units, Aut (Wand, J)

POLISCI 353B. Workshop in Statistical Modeling
Continuation of 353A. Prerequisite: 353A.
1-2 units, Win (Wand, J)

POLISCI 353C. Workshop in Statistical Modeling
Continuation of 353A. May be repeated for credit. Prerequisite: 353A.
1-2 units, Spr (Wand, J)

POLISCI 357. Sampling and Surveys
(Same as POLISCI 157) The importance of sample surveys as a source of social science data including public opinion, voting, welfare programs, health, employment, and consumer behavior. Survey design, sampling theory, and estimation. Nonresponse, self-selection, measurement error, and web survey methods. Prerequisite: 150B or equivalent.
5 units, not given this year

POLISCI 359. Advanced Individual Study in Political Methodology
May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 364. Theories of Political Institutions
Organized activity as it reflects the organization of political life. Eclectic and interdisciplinary. Emphasis is on political institutions and formal organizations, and the norms, expectation, and routines characteristic of informal political structure.
4 units, not given this year

POLISCI 365. Organizational Decision Making
Behavioral theories of organization. Emphasis is on the institutional applications of bounded rationality. Models of incrementalism; evolutionary models of change; organizational learning. The differences between predictions of theories of perfect rationality and those of imperfect rationality. Organizational responses (constructive and pathological) to constraints on information processing. Institutional contexts; public agencies and firms.
5 units, not given this year

POLISCI 369. Directed Reading and Research in Political Organizations
Advanced individual study in public administration. (Staff)
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 400. Dissertation
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 403. International Conflict Resolution Colloquium
(Same as PSYCH 283) (Same as LAW 611.) Sponsored by the Stanford Center on International Conflict and Negotiation (SCICN). Conflict, negotiation, and dispute resolution with emphasis on conflicts and disputes with an international dimension, including conflicts involving states, peoples, and political factions such as the Middle East and Northern Ireland. Guest speakers. Issues including international law, psychology, and political science, economics, anthropology, and criminology.
1 unit, not given this year

POLISCI 404. Dispute Resolution in International Economic Law
(Same as LAW 356.) Topics include: theoretical work on international trade and investment disputes; empirical work on WTO dispute resolution and the efficacy of developing country participation; and legal analysis of current, prominent disputes in the WTO and under international investment treaties. Substantial paper required. May be repeated for credit.
1 unit, Win (Bagwell, K; Sykes, A)

POLISCI 420A. Approaches to the Study of American Politics
Theories of American politics, focusing on Congress, the presidency, the bureaucracy, and the courts.
5 units, Aut (Segura, G; Grimmer, J)

POLISCI 420B. Topics in American Political Behavior
For graduate students with background in American politics embarking on their own research. Current research in American politics, emphasizing political behavior and public opinion. Possible topics: uncertainty and ambivalence in political attitudes, heterogeneity in public opinion, the structure of American political ideology, political learning, the media as a determinant of public opinion, and links between public opinion and public policy.
5 units, Win (Sniderman, P; Iyengar, S)

POLISCI 420C. American Political Institutions
Field seminar. Major theoretical perspectives, controversies, and literature on the substance of American politics, including Congress, the Presidency, federalism, bureaucracy, and the courts. Preparation for performing publishable research. Prerequisites: 420A,B.
5 units, Spr (Cox, G)

POLISCI 422. Workshop in American Politics
Research seminar. Frontiers in mass political behavior. Sources include data sets from the 2004 election cycle. Prerequisite: 420B or equivalent.
1-2 units, Aut (Segura, G; Jackman, S), Win (Jackman, S; Segura, G), Spr (Jackman, S; Segura, G)

POLISCI 423P. Race in American Politics
This course focuses on the role of racism in shaping the political choices of the ordinary American in the twenty-first century. Its premise is the necessity of rigorous conceptual and empirical analysis. Among the questions that it will probe are: To what extent do explicitly racist attitudes persist? How important a force in politics is subtle or implicit racism? To what extent are there counter-balancing forces, and to the extent that they are, how do they express themselves politically?
5 units, Spr (Sniderman, P)

POLISCI 430A. Wealthy Hellas
(Same as CLASSHIS 330A) Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, however (much of it conducted here at Stanford), suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. We will develop and test hypotheses to explain the rate and pace of economic change in the Greek world.
4-5 units, Win (Ober, J; Morris, I)

POLISCI 430B. Wealthy Hellas
(Same as CLASSHIS 330B) Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, much of it conducted at Stanford, suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. Students develop and test hypotheses to explain the rate and pace of economic change in the Greek world.
1-5 units, Spr (Ober, J; Morris, I)

POLISCI 431L. Graduate Seminar on Equality
(Same as PHIL 371D) Focus on ideas of equality of opportunity, with readings from political theory, as well as American constitutional law, political science, economics, and sociology. What is equality of opportunity? Why is equality of opportunity an important requirement of justice? What are the principal sources of inequalities of opportunity? And how might those inequalities be remedied? Readings from: Hayek, Rawls, Dworkin, Okin, Roemer, Tawney, Bourdieu, Barry, Jencks, Mazumder, Alstott, McLanahan, and Heckman.
5 units, Win (Cohen, J)

POLISCI 433. Workshop in Political Theory
For graduate students. May be repeated for credit.
1-2 units, Aut (Cohen, J; Reich, R), Win (Cohen, J; Reich, R), Spr (Cohen, J; Reich, R)

POLISCI 438. Democracy and the Constitution
(Same as PHIL 374C)
5 units, Aut (Cohen, J)

POLISCI 440A. Theories in Comparative Politics
Required of Political Science Ph.D. students with comparative politics as first or second concentration; others by consent of instructor. Theories addressing major concerns in the comparative field including democracy, regime change, the state, revolutions, national heterogeneity, and economic performance.
5 units, Aut (Laitin, D)

POLISCI 440B. Political Economy of Development
(Same as HISTORY 378E) Required of Political Science Ph.D. students with comparative politics as a first or second concentration; others by consent of the instructor. The origins of political and economic institutions and their impact on long run outcomes for growth and democracy. Emphasis is on the analysis of causal models, hypothesis testing, and the quality of evidence.
5 units, Win (Haber, S)

POLISCI 440C. Methods in Comparative Politics
Required of Political Science Ph.D. candidates with comparative politics as a first or second concentration; others by consent of instructor. Current methodological standards in comparative politics. Students develop their own research design that meets these standards.
5 units, Spr (Wand, J; Laitin, D)

POLISCI 440D. Workshop in Comparative Politics
Faculty, guest speakers, and graduate students conducting research in comparative politics present work-in-progress. Graduate students may enroll for up to 5 total units apportioned by quarter. Auditors welcome. Graduate students whose major or minor field is comparative politics must make at least one presentation to the seminar.
1-2 units, Aut (Magaloni, B; Blaydes, L), Win (Blaydes, L; Magaloni, B), Spr (Magaloni, B; Blaydes, L)

POLISCI 441L. Grad Seminar on Middle Eastern Politics
Survey of major topics in the study of Middle Eastern politics including state formation, authoritarian resilience and political Islam
5 units, Win (Blaydes, L)

POLISCI 443S. Political Economy of Reform in China
Content, process, and problems of China¿s post-Mao reforms. Changes in property rights, markets, credit, and the role of the state in economic development. Comparative insights about reform in the Chinese communist system that distinguishes it from the experience of regimes in E. Europe and the former Soviet Union.
5 units, not given this year

POLISCI 443T. Approaches to Chinese Politics
Major secondary literature on Chinese politics, involving the evolution of theoretical concepts and social scientific approaches characterizing the field. Subjects include changes made to defining fundamental issues of Chinese political theory, and the implications of shifts in research methods and analytical tools. Prerequisite: basic knowledge of politics of post-1949 China.
5 units, Spr (Oi, J)

POLISCI 444. Comparative Political Economy: Advanced Industrial Societies
Political economy approaches to key policy outcomes including redistribution, the size of government, fiscal behavior, and pork-barrel politics. Theories related to institutions, interest groups, and geography, focusing on middle- and upper-income countries.
3-5 units, not given this year

POLISCI 448R. Workshop: China Social Science
(Same as SOC 368W) For Ph.D. students in the social sciences and history. Research on contemporary society and politics in the People's Republic of China. May be repeated for credit. Prerequisite: consent of instructor.
1 unit, Aut (Walder, A; Oi, J), Win (Walder, A; Oi, J), Spr (Walder, A; Zhou, X; Oi, J)

POLISCI 451. Design and Analysis of Experiments
5 units, Spr (Iyengar, S; Jackman, S)

POLISCI 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PORTUGUESE LANGUAGE (PORTLANG) COURSES

UNDERGRADUATE COURSES IN PORTUGUESE LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PORTLANG 1. First-Year Portuguese, First Quarter
Emphasis is on oral comprehension and proficiency in speaking. Students learn the language as they contrast Brazilian culture with their own. Lab. Completion of 3 fulfills the University Foreign Language Requirement.
5 units, Aut (Staff)

PORTLANG 1A. Accelerated First-Year Portuguese, Part 1
For students with two years of college level study of a Romance language, preferably Spanish. Goal is to use socially and culturally appropriate forms in conversations, providing and obtaining information, and expressing feelings, emotions, and opinions. Students learn the language as they contrast Brazilian culture with their own. Lab. Completion of 2A fulfills the University's foreign language requirement.
3-5 units, Aut (Sotelino, K), Win (Sotelino, K), Spr (Sotelino, K)

PORTLANG 2. First-Year Portuguese, 2nd Quarter
Continuation of 1. Speaking and oral comprehension and reading and writing skills. Lab. Prerequisite: 1.
5 units, Win (Staff)

PORTLANG 2A. Accelerated First-Year Portuguese, Part 2
Continuation of 1A. Completion of 2A fulfills the University's foreign language requirement.
3-5 units, Aut (Wiedemann, L), Win (Wiedemann, L), Spr (Wiedemann, L)

PORTLANG 3. First-Year Portuguese
Emphasizes speaking and oral comprehension proficiency and the development of reading and writing skills. Literary and journalistic readings, studying of Brazilian popular music, and viewing short documentaries are the basis for discussions on Brazilian culture and current events. Lab. Completion of 3 fulfills the University Foreign Language Requirement. Prerequisite: 2 or equivalent.
5 units, Spr (Staff)

PORTLANG 11A. Accelerated Second-Year Portuguese, Part 1
Goal is to use socially and culturally appropriate forms in narrations, descriptions, and expression of ideas and opinions Prerequisite: first-year sequence, equivalent, or consent of instructor.
3-5 units, Aut (Wiedemann, L), Win (Wiedemann, L), Spr (Wiedemann, L)

PORTLANG 12A. Accelerated Second-Year Portuguese, Part 2
Continuation of 11A. Goal is to use socially and culturally appropriate forms in narrations, descriptions, and expression of ideas and opinions. Emphasis on expository writing. Prerequisite: 11A, equivalent, or consent of instructor.
3-5 units, Aut (Wiedemann, L), Win (Wiedemann, L), Spr (Wiedemann, L)

PORTLANG 50. Reading in Portuguese
Introductory class for students with superior reading proficiency in Spanish or another Romance language. Reading competence for research and courses in Luso-Brazilian studies. Literary, journalistic, and academic readings. Fulfills University reading requirement for advanced degrees. May be offered alternate years.
3-4 units, Spr (Staff)

PORTLANG 99. Language Specials
Prerequisite: consent of instructor. (Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTLANG 101. Reading Brazil
For intermediate or advanced students. Short expository readings, guest lectures, discussions, compositions on Brazilian issues. Review of grammatical structures. Vocabulary building with emphasis on common idiomatic expressions and troublesome lexical

distinctions. Prerequisite: 12A or equivalent, or consent of instructor.

3-4 units, Aut (Wiedemann, L)

PORTLANG 102. Brazil in Text: Advanced Grammar and Composition

For intermediate and advanced students. Further development of academic writing. Short fictional and expository readings, guest lectures, discussions, compositions on Brazilian issues. Emphasis is on building paragraphs, organizing arguments, and justifying positions. May be used as workshop to write papers in Portuguese for another course. May be repeated once for credit. Prerequisite: 12A or equivalent, or consent of instructor.

3-4 units, Win (Wiedemann, L)

PORTLANG 103. Advanced Conversation: Brazil Today

For intermediate and advanced students. Reading and discussions on issues from current newspapers and magazines, reading comprehension strategies with online news updates, and vocabulary building with emphasis on formal expository writing. Writing practice if desired. Students prepare short presentations and lead subsequent discussions. May be repeated once for credit. Prerequisite: 12A or consent of instructor.

3 units, Spr (Wiedemann, L)

PORTLANG 193Q. Spaces and Voices of Brazil through Film

(Stanford Introductory Seminar) (Same as ILAC 193Q) How a country is perceived and defines itself is a result of complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed, but has conserved some defining traits. Introduction to the history, culture, politics, and artistic production of Brazil through feature films, documentaries, and readings. Movies include Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September. In English. GER:DB-Hum, EC-GlobalCom

3-4 units, Aut (Wiedemann, L)

GRADUATE COURSES IN PORTUGUESE LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PORTLANG 297. Directed Reading

Prerequisite: consent of instructor. (Staff)

1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTLANG 394. Graduate Studies in Portuguese Conversation

Prerequisite: consent of instructor. (Staff)

1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTLANG 395. Graduate Studies in Portuguese

Prerequisite: consent of instructor. (Staff)

2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

PSYCHOLOGY (PSYCH) COURSES

UNDERGRADUATE COURSES IN PSYCHOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PSYCH 1. Introduction to Psychology

Human behavior and mental processes including the nervous system, consciousness, learning, memory, development, emotion, psychopathology, interpersonal process, society, and culture. Current research. GER:DB-SocSci

5 units, Aut (Gross, J), Win (Knutson, B), Spr (Walton, G)

PSYCH 7Q. Language Understanding by Children and Adults

(Stanford Introductory Seminar) How do we first learn to find meaning in strings of speech sounds? Understanding spoken language requires the rapid integration of acoustic information with linguistic knowledge and with conceptual knowledge based on experience with how things happen in the world. Topics include research on early development of language understanding and laboratory methods of how young children make sense of speech. Observations of preschool children and visits to Stanford laboratories. Might be repeatable for credit.

3 units, Aut (Fernald, A)

PSYCH 8N. The New Longevity

(Stanford Introductory Seminar) Preference to freshmen. Adult development from the perspective of life-span theory, a conceptual framework that views development as a series of adaptations to physical, societal and individual resources and constraints. Demographic and medical changes, how individuals typically change socially, emotionally and cognitively as they move through adulthood. An understanding of the conceptual foundations of the life-span approach and place aging of young people today in historical context. GER:DB-SocSci

3 units, Spr (Carstensen, L)

PSYCH 10. Introduction to Statistical Methods: Precalculus

(Same as STATS 60, STATS 160) Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages. GER:DB-Math

5 units, Aut (Walther, G), Win (Thomas, E), Spr (Taylor, J), Sum (Richards, W)

PSYCH 11N. Origin of Mental Life

(Stanford Introductory Seminar) Preference to freshmen. Mental life in infancy; how thinking originates. How do babies construe the objects, events, people, and language that surround them? Recent advances in psychological theory, hypotheses, and evidence about how the infant human mind develops. GER:DB-SocSci

3 units, Spr (Markman, E)

PSYCH 12N. Self Theories

(Stanford Introductory Seminar) Preference to freshmen. The impact of people's belief in a growing versus fixed self on their motivation and performance in school, business, sports, and relationships. How such theories develop and can be changed. GER:DB-SocSci

3 units, Aut (Dweck, C)

PSYCH 26N. Language Acquisition: Exploring the Minds of Children

(Stanford Introductory Seminar) Language is an extraordinary competence distinguishing humans from other species, yet there is debate about the role of biology in guiding language acquisition. Does language development follow an innate ¿bioprogram¿ or does it build on more general cognitive abilities, influenced by early experience? Topics include biological and experiential influences on the emergence of linguistic ability as children learn a first language. Discussions of theory and research, visits to Stanford laboratories and observations of very young language learners.

3 units, Win (Fernald, A)

PSYCH 28N. The Cultural Shaping of Mental Health and Illness

(Stanford Introductory Seminar) (Same as CSRE 28N) This seminar examines how our cultural ideas and practices shape our conceptions, perceptions, experiences, and treatment of emotional wellness and distress. We will read and discuss empirical research and case studies from psychology, anthropology, sociology, and medicine. Course requirements include weekly reading and thought papers, weekly discussion, and a final research project and presentation.

3 units, Win (Tsai, J)

PSYCH 30. Introduction to Perception

Behavioral and neural aspects of perception focusing on visual and auditory perception. Topics include: scientific methods for studying perception, anatomy and physiology of the visual and auditiory systems, color vision, depth perception, motion perception, stereopsis, visual recognition, pitch and loudness perception, speech perception, and reorganization of the visual system in the blind. GER:DB-NatSci

3 units, Aut (Grill-Spector, K)

PSYCH 45. Introduction to Learning and Memory

The literature on learning and memory including cognitive and neural organization of memory, mechanisms of remembering and forgetting, and why people sometimes falsely remember events that never happened. Cognitive theory and behavioral evidence

integrated with data from patient studies and functional brain imaging. Recommended: 1.

3 units, Spr (Wagner, A)

PSYCH 50. Introduction to Cognitive Neuroscience

Topics in human neuropsychology. The functional organization of the human nervous system and of brain imaging techniques (MRI, PET). Hemispheric specialization and the brain basis of perception, memory, language, emotion, spatial cognition, and problem solving. Neuropsychological deficits in neurological disorders and their implications in understanding normal function. Recommended: 1 GER:DB-NatSci

4 units, Aut (McClure, S)

PSYCH 55. Introduction to Cognition and the Brain

Major topics in cognitive psychology and neuroscience, including empirical approaches to perception, language, learning, memory, knowledge representation, problem solving, and reasoning.

4 units, Win (Boroditsky, L)

PSYCH 60. Introduction to Developmental Psychology

Psychological development from birth to adulthood, emphasizing infancy and the early and middle childhood years. The nature of change during childhood and theories of development. Recommended: 1. GER:DB-SocSci

3 units, Win (Frank, M)

PSYCH 60A. Introduction to Developmental Psychology Section

Guided observation of children age 2-5 at Bing Nursery School. Corequisite: 60.

2 units, Win (Lomangino, A; Hartman, B; Robinette, K)

PSYCH 70. Introduction to Social Psychology

Topics related to the influence of other people on individuals' thoughts, emotions, and behaviors. Factors that affect the way that we perceive ourselves and others; how people influence others; how persuasion happens; what causes us to like, love, help, or hurt others; and how social psychology helps to understand quesions about law, business, and health. GER:DB-SocSci

4 units, Win (Brown, J)

PSYCH 75. Introduction to Cultural Psychology

The cultural sources of diversity in thinking, emotion, motivation, self, personality, morality, development, and psychopathology. Recommended: 1. WIM GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Markus, H)

PSYCH 80. Introduction to Personality and Affective Science

Current empirical and theoretical approaches to personality. How and why do people differ? Does personality change over time? Can people change their personalities? What makes people happy? What are the physical, mental, and social consequences of personalities? Prerequisite: 1. GER:DB-SocSci

3 units, Spr (Tsai, J)

PSYCH 90. Introduction to Clinical Psychology

History of clinical psychology, models and assessment of personality, behavior, cognition, psychopathology, and approaches to the treatment of abnormal behavior. Emphasis is on current theory, research, issues in, and the role of clinical psychology in contemporary society. Recommended: 1. GER:DB-SocSci

3 units, Aut (Haas, A)

PSYCH 101. Community Health Psychology

(Same as HUMBIO 128) Social ecological perspective on health emphasizing how individual health behavior is shaped by social forces. Topics include: biobehavioral factors in health; health behavior change; community health promotion; and psychological aspects of illness, patient care, and chronic disease management. Prerequisites: HUMBIO 3B or PSYCH 1, or equivalent.

4 units, Win (Heaney, C)

PSYCH 102. Longevity

(Same as HUMBIO 149L, NENS 202) Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists. GER:DB-SocSci

4 units, given next year

PSYCH 104. Uniquely Human

Are humans the only species that displays altruism, experiences uncertainty, and is capable of language and deception? Sources include empirical and theoretical papers in comparative psychology. Prerequisite: 1.

3 units, Win (Hard, B)

PSYCH 104S. Affective Neuroscience

New frontiers in neuroscience research on emotion. Topics such as neuroscience methodologies, genetic contributions to the experience of emotion, neural bases of emotion, animal models of emotion, and biological approaches to emotional or affective dysfunction.

3 units, Sum (Ballard, K; Wu, C)

PSYCH 105S. General Psychology

The scientific study of behavior and mental processes focusing on history, methods, and findings of the field of psychology. How psychology affects people's lives. How to evaluate psychological claims.

3 units, Sum (Popick, J; Chen, M; Jacobs, S)

PSYCH 107S. Introduction to Social Psychology

A comprehensive overview of social psychology with in-depth lectures exploring the history of the field, reviewing major findings and highlighting areas of current research. Focus is on classic studies that have profoundly changed our understanding of human nature and social interaction, and, in turn, have triggered significant paradigm shifts within the field. Topics include: individuals and groups, conformity and obedience, attraction, intergroup relations, and judgment and decision-making.

3 units, Sum (Hetey, R; Carr, P; Brannon, T)

PSYCH 109S. Cognitive Psychology

Theories and empirical findings in the field of cognitive psychology. How do people perceive? How do they remember? How do they think? How such questions are addressed in the areas of memory, language, perception, reasoning, judgment, and decision making.

3 units, Sum (Toskos, A; Paluy, Y)

PSYCH 110. Research Methods and Experimental Design

Structured research exercises and design of an individual research project. Prerequisite: consent of instructor. GER:DB-SocSci

5 units, not given this year

PSYCH 111S. Abnormal Psychology

What is it like to be clinically depressed, to see things no one else sees, to be a victim of a traumatic experience? What are psychological, biological, and social factors involved in depression, schizophrenia, or post-traumatic stress disorder? The subjective experience, causal factors, clinical presentation, methods of assessment, treatment, and sociocultural context of psychological disorders.

3 units, Sum (Szczurek, L; Zolotsev, P)

PSYCH 113S. Developmental Psychology

A unified view of the developing child. How developmental psychology can be applied to the general understanding of children and the process of growing into adulthood. Findings in the areas of the child's cognitive, language, social, neurological, physical, emotional, personality, and moral development. Strengths and weaknesses of various perspectives and approaches scientists use to learn about children.

3 units, Sum (Weisleder Grynspan, A; Mazur, H; Romero, C)

PSYCH 115S. Personality Psychology

Focus on current empirical and theoretical approaches to personality. Lectures organized around the following questions central to personality research: How and why do people differ? How are individual differences measured? Does personality change over time? How does personality interact with sociocultural factors to influence behavior? What makes people happy? What are the physical, mental, and social consequences of personalities?

3 units, Sum (Chim, L; Sims, T; Henetz, T)

PSYCH 119. Psychology and Public Policy

(Same as PUBLPOL 172) Applications of psychology to public and social policy. Factors that affect the influence of psychological research and individual psychology on the creation of policy, and the influence of policy on attitudes and behavior at the personal and societal levels. Topics include education, health care, and criminal justice.

5 units, not given this year

PSYCH 120. Cellular Neuroscience: Cell Signaling and Behavior
(Same as BIO 153) Neural interactions underlying behavior. Prerequisites: PSYCH 1 or basic biology. GER:DB-NatSci
4 units, not given this year

PSYCH 124S. Applying Psychology to Modern Life
A scientific examination of everyday modern life. Topics include: how research on attention and memory can be applied to improve study strategies; how advertisers persuade and how their techniques can be resisted; how interpersonal conflicts can be avoided through knowledge of common errors in judging other people; and how studies on attraction and love can improve close relationships.
3 units, Sum (Master, A; Butler, L)

PSYCH 125. Beyond Stereotype Threat: Claiming a Rightful Place in an Academic Community
(Same as CTL 130) Stereotype threat as mitigating the quality of a student's test performance; its impact on academic success at Stanford. How to reduce the impact of stereotype threat on Stanford students.
3 units, Win (Glickman, A)

PSYCH 131. Language and Thought
(Same as PSYCH 262) The psychology of language including: production and understanding in utterances; from speech sounds to speaker's meaning; children's acquisition of the first language; and the psychological basis for language systems. Language functions in natural contexts and their relation to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or LINGUIST 1. GER:DB-SocSci
4 units, Aut (Clark, H)

PSYCH 132. Introduction to Cognitive and Information Sciences
(Same as LINGUIST 144, PHIL 190, SYMSYS 100) The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major. GER:DB-SocSci
4 units, Spr (McClelland, J; van Benthem, J)

PSYCH 133. Human Cognitive Abilities
(Same as EDUC 369) Psychological theory and research on human cognitive abilities; their nature, development, and measurement; and their importance in society. Persistent controversies and new areas of research, recent perspectives on the nature-nurture debate and the roles of genetics, health and education in shaping HCAs. Prerequisite: PSYCH 1 or equivalent. (PSE) GER:DB-SocSci, DB-SocSci
3 units, not given this year

PSYCH 134. Seminar on Language and Deception
Deceptive, exploitative, and other noncooperative uses of language. How is language used to deceive or exploit? Where are these techniques practiced and why? What are the personal, ethical, and social consequences of these practices? Prerequisite: 131, LINGUIST 1, or PHIL 181. GER:DB-SocSci
3 units, Win (Clark, H)

PSYCH 138. Wise Interventions
(Same as PSYCH 238) Classic and contemporary psychological interventions; the role of psychological factors in social reforms for social problems involving healthcare, the workplace, education, intergroup, relations, and the law. Topics include theories of intervention, the role of laboratory research, evaluation, and social policy.
4 units, Win (Walton, G)

PSYCH 140S. Sport Psychology
Focus is on research methods and findings and how to apply these findings to students' own performance. Topics include methods of performance enhancement, psychological characteristics of top performers, group dynamics and processes, effective leadership practices, the effects of stereotyping on sport participation and performance, and debates in the field. Emphasis is on sports, although most topics can be applied to performance in general.
3 units, Sum (Zitek, E)

PSYCH 141. Cognitive Development
How children's thinking and mental abilities change from infancy on. The major theories and explanations of intellectual growth. Sources include classic findings and state-of-the-art research on cognitive development. Prerequisite: 1. GER:DB-SocSci
3 units, Aut (Markman, E)

PSYCH 143. Developmental Anomalies
For advanced students. Developmental disorders and impairments. What the sparing of mental abilities in otherwise devastating disorders (or vice versa) tells about the mind and its development in the normal case. Examples of disorders and impairments: autism, congenital blindness, deafness, mental retardation, attachment disorder, and Williams syndrome. Limited enrollment. Prerequisite: consent of instructor. GER:DB-SocSci
3 units, not given this year

PSYCH 145. Seminar on Infant Development
For students preparing honors research. Conceptual and methodological issues related to research on developmental psycholinguistics; training in experimental design; and collection, analysis, and interpretation of data.
1-2 units, Spr (Fernald, A)

PSYCH 146. Observation of Children
Learning about children through guided observations at Bing Nursery School, Psychology's lab for research and training in child development. Physical, emotional, social, cognitive, and language development. Recommended: 60. GER:DB-SocSci
3-5 units, Aut (Hartman, B; Lomangino, A; Robinette, K), Spr (Hartman, B; Lomangino, A; Robinette, K)

PSYCH 147. Development in Early Childhood
Supervised experience with young children at Bing Nursery School. 3 units require 4 hours per week in Bing classrooms throughout the quarter; 4 units require 7 hours per week; 5 units require 10.5 hours per week. Seminar on developmental issues in the Bing teaching/learning environment. Recommended: 60 or 146, or consent of instructor.
3-5 units, Aut (Winters, J; Chandra, P; O'Hanlon, E), Win (Winters, J; Chandra, P; O'Hanlon, E), Spr (Winters, J; Chandra, P; O'Hanlon, E)

PSYCH 149. The Infant Mind: Cognitive Development over the First Year
How do babies learn so much in so little time? Emphasis is on cognitive and perceptual development, and the relationship between brain and behavior in infancy. Prerequisite: 1. Recommended: 60 or 141. GER:DB-SocSci
3 units, not given this year

PSYCH 150. Race and Crime
Topics in race, crime, and punishment in the United States. Readings and discussion focus on theoretical and empirical research on policing, sentencing, and incarceration. Readings will be drawn from psychology, sociology, criminology, economics, and legal studies.
3 units, Win (Eberhardt, J)

PSYCH 151. Emotion Regulation and Psychopathology
Overview of specific emotion regulation impairments in various psychopathologies and discussion of how current treatment protocols are likely to aid recovery by forming more adaptive emotion regulation ability. Topics include: foundations and emotion regulation models, emotion regulation impairments in mood disorders (unipolar depression and bipolar disorder), anxiety disorders (social phobia, post traumatic stress disorder, general anxiety disorder), eating disorders (anorexia and bulimia nervosa), and personality disorders (narcissistic personality disorder, borderline personality disorder).
3 units, Win (Staff)

PSYCH 152. Mediation for Dispute Resolution
(Same as EDUC 131) Mediation as more effective and less expensive than other forms of settling disputes such as violence, lawsuits, or arbitration. How mediation can be structured to maximize the chances for success. Simulated mediation sessions.
3 units, Aut (Krumboltz, J)

PSYCH 154. Judgment and Decision-Making
Survey of research on how we make assessments and decisions particularly in situations involving uncertainty. Emphasis will be on instances where behavior deviates from optimality. Overview of recent works examining the neural basis of judgment and decision-making.
3 units, Spr (McClure, S)

PSYCH 155. Introduction to Comparative Studies in Race and Ethnicity
(Same as CSRE 196C, ENGLISH 172D, SOC 146) How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. GER:DB-SocSci, EC-AmerCul
5 units, Win (Markus, H; Moya, P)

PSYCH 157. Social Foundations of Expertise and Intelligence
Psychological conceptions of expertise, ability, and intelligence and the research methods used to study these attributes. Topics include: research on how expertise in a diverse set of disciplines is developed; the role of practice in nurturing expertise; whether intelligence predicts life outcomes; the genetic and environmental determinants of intelligence; whether genes or environment explain racial differences such as the Black-White performance gap and the East Asian achievement advantage; and the Flynn effect.
3 units, not given this year

PSYCH 158. Emotions: History, Theories, and Research
(Same as PSYCH 259) Graduate students register for 259. Theoretical and empirical issues in the domain of emotions. The history of emotion theories, current approaches, and the interaction between emotion and cognition.
1-3 units, not given this year

PSYCH 159. Psychology of Attitude Change and Social Influence
Review of classic and current research on attitudes, attitude change and persuasion. Increase appreciation for the ways that our thoughts, actions, and feelings are shaped and manipulated by social influences.
3 units, Spr (Brown, J)

PSYCH 161. Emotion
(Same as PSYCH 261) (Graduate students register for 261.) The scientific study of emotion. Topics: models of emotion, emotion antecedents, emotional responses (facial, subjective, and physiological), functions of emotion, emotion regulation, individual differences, and health implications. Focus is on experimentally tractable ideas. GER:DB-SocSci
3 units, not given this year

PSYCH 165. Peace Studies
(Same as POLISCI 111) Interdisciplinary. The challenges of pursuing peace in a world with many conflicts and rising regional, ethnic, and religious antagonisms. Historical, social, psychological, and moral perspectives. Contributions of academic disciplines to the study of peace. Students explore a conflict and offer contributions to the building of peace. Limited enrollment. GER:DB-SocSci
5 units, not given this year

PSYCH 167. Seminar on Aggression
The causes and modification of individual and collective aggression. Major issues in aggression: social labeling of injurious conduct, social determinants of aggression, effects of the mass media, institutionally sanctioned violence, terrorism, psychological mechanisms of moral disengagement, modification of aggressive styles of behavior, and legal sanctions and deterrence doctrines.
3 units, not given this year

PSYCH 168. Emotion Regulation
(Same as PSYCH 268) (Graduate students register for 268.) The scientific study of emotion regulation. Topics: historical antecedents, conceptual foundations, autonomic and neural bases, individual differences, developmental and cultural aspects, implications for psychological and physical health. Focus is on experimentally tractable ideas. GER:DB-SocSci
3 units, Spr (Gross, J)

PSYCH 171. Research Seminar on Aging
Two quarter practicum exposes students to multiple phases of research by participating in a laboratory focusing on social behavior in adulthood and old age. Review of current research; participation in ongoing data collection, analysis, and interpretation. Prerequisites: 1, research experience, and consent of instructor.
4 units, Aut (Carstensen, L), Win (Carstensen, L), Spr (Carstensen, L)

PSYCH 179. The Psychology of Everyday Morality
(Same as PSYCH 270) (Graduate students register for 270.) For graduate students, coterms, and senior Psychology majors. Traditional approaches focusing on how morality colors mundane human activities such as eating and on morality as defined by actors themselves rather than social scientists. Moral hypocrisy, food and disgust, taboo trade-offs, moral reproach, and prejudice with compunction. Limited enrollment. Prerequisite: 70 and consent of instructor.
4 units, not given this year

PSYCH 183. Mind, Culture, and Society Research Core
Required of students in the mind, culture, and society specialization track. Research training on a variety of projects that explore how social identities such as race, class, gender, and culture affect psychological experiences across domains including education, law, business and health. Must participate for two consecutive quarters. Permission of instructor required.
2-3 units, Aut (Markus, H; Eberhardt, J), Win (Eberhardt, J; Markus, H), Spr (Markus, H; Eberhardt, J)

PSYCH 186. The Psychology of Everyday Morality
(Same as PSYCH 286) Recent literature on morality from a social psychological perspective. Topics include moral judgment, moral intuitions, moral hypocrisy, moral identity, moralization, moral reproach, shame and guilt, temptations, and self-regulation. Contemporary psychological research emphasizing descriptive approaches (what people actually do) rather than normative ones (what one should do).
3 units, not given this year

PSYCH 189. Stanford Center on Longevity Practicum
Student involvement in an interdisciplinary center aimed at changing the culture of human aging using science and technology.
3 units, Aut (Carstensen, L), Win (Carstensen, L), Spr (Carstensen, L), Sum (Carstensen, L)

PSYCH 190. Special Research Projects
May be repeated for credit. Prerequisite: consent of instructor.
1-6 units, Aut (Staff), Win (Monin, B), Spr (Staff)

PSYCH 193. Special Laboratory Research
May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.
1-6 units, Aut (Staff), Win (Dweck, C), Spr (Staff), Sum (Staff)

PSYCH 194. Reading and Special Work
Independent study. May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 195. Special Laboratory Projects
Independent study. May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.
1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 196. Contemporary Psychology: Overview of Theory, Research, Applications
Capstone experience for juniors and seniors that bridges course work with research opportunities. Lectures representing the department's areas: social, personality, developmental, neuroscience, and cognitive psychology. Faculty present current research. Discussions led by advanced graduate students in the field represented by that week's guest. Students write research proposals. Small grants available to students to conduct a pilot study of their proposed research. Limited enrollment. Prerequisite: consent of instructor. GER:DB-SocSci
3 units, Aut (Clark, H)

PSYCH 198. Senior Honors Research
Limited to students in the senior honors program. Finishing the research and data analysis, written thesis, and presentation at the Senior Honors Convention. May be repeated for credit.
1-4 units, Aut (Staff), Win (Ross, L), Spr (Ross, L)

PSYCH 199. Temptations and Self Control
(Same as PSYCH 299) (Graduate students register for 299.) Why do people do things that that they come to regret? How can people minimize behavior such as exercise avoidance, angry words, overeating, unsafe sex, and dangerous driving? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Real-world applications.
2 units, not given this year

PSYCH 289. Sensory Representations in Language and Memory
Is recollecting an experience similar to re-experiencing it? How closely tied is one's knowledge to the perceptual representations and processes that may have given rise to it? What role do perceptuo-motor representations play in understanding language? The recent literature on perceptual re-activation in episodic memory, perceptual grounding in semantic representations, and neural reuse of perceptual mechanisms for abstract thought. Emphasis is on recent research with an interdisciplinary scope, including discussion of theory, behavioral findings, neural mechanisms, and computational models. Prerequisite: PSYCH 207 or consent of instructor.

1-3 units, Aut (Boroditsky, L; Wagner, A)

GRADUATE COURSES IN PSYCHOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PSYCH 192. Career and Personal Counseling
(Same as EDUC 134, EDUC 234) Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences.

3 units, Spr (Krumboltz, J)

PSYCH 201. Social Psychology Lecture Series
Required of social psychology graduate students. Guest lecturers from Stanford and other institutions. May be repeated for credit. (Miller)

3 units, not given this year

PSYCH 202. Cognitive Neuroscience
Graduate core course. The anatomy and physiology of the brain. Methods: electrical stimulation of the brain, neuroimaging, neuropsychology, psychophysics, single-cell neurophysiology, theory and computation. Neuronal pathways and mechanisms of attention, consciousness, emotion, language, memory, motor control, and vision. Prerequisite: 207 or consent of instructor.

3 units, Spr (McClure, S)

PSYCH 204A. Human Neuroimaging Methods
This course introduces the student to human neuroimaging using magnetic resonance scanners. The course is a mixture of lectures and hands-on software tutorials. The course begins by introducing basic MR principles. Then various MR measurement modalities are described, including several types of structural and functional imaging methods. Finally algorithms for analyzing and visualizing the various types of neuroimaging data are explained, including anatomical images, functional data, diffusion imaging (e.g., DTI) and magnetization transfer. Emphasis is on explaining software methods used for interpreting these types of data.

1-3 units, Aut (Wandell, B; Dougherty, R)

PSYCH 204B. Computational Neuroimaging: Analysis Methods
Neuroimaging methods with focus on data analysis techniques. Basic MR physics and BOLD signals. Methods for neuroimaging data using real and simulated data sets. Topics include: linearity of the fmri signal; time versus space resolution tradeoffs; noise in neuroimaging; correlation analysis; visualization methods; cortical reconstruction, inflation, and flattening; reverse engineering; can cognitive states be predicted from brain activation? Prerequisite: consent of instructor.

1-3 units, not given this year

PSYCH 205. Foundations of Cognition
Topics: attention, memory, language, similarity and analogy, categories and concepts, learning, reasoning, and decision making. Emphasis is on processes that underlie the capacity to think and how these are implemented in the brain and modeled computationally. The nature of mental representations, language and thought, modular versus general purpose design, learning versus nativism. Prerequisite: 207 or consent of instructor.

1-3 units, Win (Boroditsky, L)

PSYCH 206. Cortical Plasticity: Perception and Memory
Seminar. Topics related to cortical plasticity in perceptual and memory systems including neural bases of implicity memory, recognition memory, visual priming, and perceptual learning. Emphasis is on recent research with an interdisciplinary scope, including theory, behavioral findings, neural mechanisms, and computational models. May be repeated for credit. Recommended: 30, 45

1-3 units, Win (Grill-Spector, K; Wagner, A)

PSYCH 207. Professional Seminar for First-Year Ph.D. Graduate Students
Required of and limited to first-year Ph.D. students in Psychology. Major issues in contemporary psychology with historical backgrounds.

2-3 units, Aut (McClelland, J)

PSYCH 208. Advanced Topics in Self-Defense
Seminar. Threat to the self and how people deal with them. Readings from social psychological areas including social comparison, self-affirmation, self-completion, self-discrepancy, shame and guilt, terror management, dimensions of self-worth, self-regulation, self-presentation, psychophysiology, and moral identity. Enrollment limited to 15.

1-3 units, not given this year

PSYCH 209A. The Neural Basis of Cognition: A Parallel Distributed Processing Approach
Models and data to support the notion that brain representations are patterns of activity over widely dispersed populations of neurons, that mental processing involves coherent distributed engagement of neurons in these populations, and that learning and development occur primarily through the adjustment of the strengths of the connections between the neurons. How models may be used to explain aspects of human cognition, development, and effects of brain damage on cognition. Prerequisites: linear algebra, differential equations, a programming course, and two courses in psychology or neuroscience.

3-4 units, Win (McClelland, J)

PSYCH 209B. Applications of Parallel Distributed Processing Models to Cognition and Cognitive Neuroscience
Research seminar. Builds on project proposal developed in 209A. Hands-on use of computational models to address phenomena in cognitive psychology and cognitive neuroscience. Classic and modern papers, and student presentations of their own projects. Final paper in the form of a journal article submission. Prerequisite: 209A.

4 units, Spr (McClelland, J)

PSYCH 210. Foundations of Memory
Memory and human cognition. Behavioral and neural data indicate that memory is not a unitary faculty but consists of multiple systems that support learning and remembering, each with its own processing characteristics and neurobiological substrates. What is known about memory emphasizing the cognitive and neural architectures of working, declarative, and nondeclarative memory. Recommended: 45.

3 units, not given this year

PSYCH 211. Developmental Psychology
Prerequisite: 207 or consent of instructor.

1-3 units, Win (Markman, E; Dweck, C)

PSYCH 212. Social Psychology
Classic studies in experimental social psychology. Group and group dynamics; compliance and social pressure; conformity, cooperation, conflict, and social dilemmas; attraction and preference; attitudes and attitude change; social comparison, emotion, and affiliation; dissonance, consistency, and self-justification; attribution and self-perception; judgment and decision making, motivation, automaticity, and culture. Prerequisite: 207 or consent of instructor.

1-3 units, Win (Lepper, M; Ross, L)

PSYCH 213. Affective Science
Core graduate course on affective science. Definitional issues such as differences between emotion and mood, as well as issues related to the function of affect, such as the role affect plays in daily life. Autonomic, neural, genetic, and expressive aspects of affective responding. The role of affect in cognitive processing, specifically how affective states direct attention and influence memory, as well as the role of affect in decision making. Emotion regulation and the strategic control of emotion; the cultural shaping of emotional experience and regulation; disorders of emotion; and developmental trajectories of experience and control from early to very late life. Prerequisite: PSYCH 207 or consent of instructor.

3 units, Win (Gross, J)

PSYCH 215. Mind, Culture, and Society
Social psychology from the context of society and culture. The interdependence of psychological and sociocultural processes: how sociocultural factors shape psychological processes, and how psychological systems shape sociocultural systems. Theoretical developments to understand social issues, problems, and polity. Works of Baldwin, Mead, Asch, Lewin, Burner, and contemporary theory and empirical work on the interdependence of psychology and social context as constituted by gender, ethnicity, race, religion, and region of the country and the world. Prerequisite: 207 or consent of instructor.
3 units, not given this year

PSYCH 216. Public Policy and Social Psychology: Implications and Applications
(Same as IPS 207B, PUBLPOL 305B) Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior.
4 units, Spr (Ross, L)

PSYCH 217. Topics and Methods Related to Culture and Emotion
Preference to graduate students. How cultural factors shape emotion and other feeling states. Empirical and ethnographic literature, theories, and research on culture and emotion. Applications to clinical, educational, and occupational settings. Research in psychology, anthropology, and sociology. May be repeated for credit.
1-3 units, not given this year

PSYCH 218. Early Social Cognitive Development
Current literature on social and cognitive development in infancy emphasizing the interface between the two domains. May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, not given this year

PSYCH 220. Special Topics in Cognitive Development
For graduate students and advanced undergraduates. How research from cognitive development, decision making, and preference change can inform interventions on important social issues. May be repeated for credit.
1-3 units, not given this year

PSYCH 221. Applied Vision and Image Systems
The design and control of color imaging devices (display, printers, cameras, and scanners). Aspects of human vision relevant to software and hardware design. Topics: digital halftoning, color calibration, color metrics, flicker sensitivity, motion compensation, human spatial resolution, visual masking, JPEG principles, printer design, scanner design, and color software architecture. Lab.
1-3 units, Win (Wandell, B)

PSYCH 223. Social Norms
(Same as OB 630) This course covers research and theory on the origins and function of social norms. Topics include the estimation of public opinion, the function of norms as ideals and standards of judgment, and the impact of norms on collective and individual behavior. In addition to acquainting students with the various forms and functions of social norms the course will provide students with experience in identifying and formulating tractable research questions.
4 units, not given this year

PSYCH 224. Research Topics in Emotion Regulation
Current research findings and methods, ongoing student research, and presentations by visiting students and faculty. May be repeated for credit. Prerequisite: consent of instuctor.
1 unit, not given this year

PSYCH 226. Models and Mechanisms of Memory
Current topics in memory as explored through computational models addressing experimental findings and physiological and behavioral investigations. Topics include: explicit and inplict learning; role of MTL structures in learning and memory; and single versus dual processes approaches to recognition. May be repeated for credit.
1-3 units, not given this year

PSYCH 232. Brain and Decision Making
Neuroeconomics combines experimental techniques from neuroscience, psychology, and experimental economics, such as electrophysiology, fMRI, eye tracking, and behavioral studies, and models from computational neuroscience and economics. May be repeated for credit. Prerequisite: consent of instructor.
3 units, Spr (Knutson, B)

PSYCH 233. MATLAB and Psychtoolbox for the Behavioral Sciences
Topics such as experiment design, stimulus presentation, counterbalancing, response collection, data analysis, and plotting. Programming experiments. Final project programming a complete behavioral experiment relevant to student's research. Prerequisite: introductory programming such as CS 105 or 106, or consent of instructor.
1-3 units, not given this year

PSYCH 234. Topics in Affective Disorders
Current research topics including epidemiology and phenomenology of affective disorders, psychological theories of depression, gender differences in affective disorders, cognitive and social functioning of depressed persons, psychobiology of affective disorders, depression in children, postpartum depression, suicide issues in the treatment of depression, and cultural aspects of affective disorders. Prerequisite: graduate standing in Psychology or consent of instructor.
1-3 units, given next year

PSYCH 236. The Social Self
The psychological bases of complex social organization such as work teams and national and cultural identities. Topics include: the effect of social influence on perception, beliefs, attitudes, emotions, and behaviors; shared intentionality; and the relational bases of learning, motivation, and performance. Works of classic scholars (Asch, Lewin) and contemporary researchers in social, developmental, and comparative psychology. Prerequisite: graduate standing or consent of instructor.
3 units, not given this year

PSYCH 238. Wise Interventions
(Same as PSYCH 138) Classic and contemporary psychological interventions; the role of psychological factors in social reforms for social problems involving healthcare, the workplace, education, intergroup, relations, and the law. Topics include theories of intervention, the role of laboratory research, evaluation, and social policy.
4 units, Win (Walton, G)

PSYCH 243. General Development Seminar
May be repeated for credit. Prerequisite: consent of instructors.
1-2 units, Win (Markman, E; Dweck, C; Fernald, A)

PSYCH 244. Psychology of Aging
Theory and research in gerontology. Normal and abnormal changes that occur in biological, cognitive, and psychological aging. Emphasis is on the environmental factors that influence the aging process. Prerequisite: graduate standing in Psychology or consent of instructor.
1-3 units, not given this year

PSYCH 245. Social Psychological Perspectives on Stereotyping and Prejudice
Classic and contemporary social psychological approaches to prejudice and stereotyping. Emphasis is on how stereotypes are employed and maintained, and the influence of stereotyping and prejudice on behavior in domains including education, employment, politics, and law. Limited enrollment.
3 units, Win (Eberhardt, J)

PSYCH 246. Cognitive and Neuroscience Friday Seminar
Participant presentations. May be repeated for credit. Prerequisite: graduate standing in psychology or neuroscience program.
1 unit, Aut (Wagner, A), Win (Wagner, A), Spr (Wagner, A)

PSYCH 247. Fundamentals of Neuroscience for Non-Life-Scientists
Human behavior and the human brain and how it enables perception, learning, decision making, planning, and action with a focus on how neuroscience may be presented or used in law, business, or education contexts. Neurotechnology and experimental methods used to conduct research.
2 units, not given this year

PSYCH 249. Human Motivation
Current research and theory including questions concerning the nature of human motives, intrinsic motivation, self-regulation, the roles of affect and cognition, and lifespan and cultural influences on motivation. Prerequisite: 207 or consent of instructors.
1-3 units, Spr (Lepper, M; Dweck, C)

PSYCH 250. High-level Vision: Behaviors, Neurons and Computational Models
(Same as CS 423) Interdisplinary approach aimed at understanding vision from several disciplines: neurophysiology, psychophysics, cognition, algorithms, and computational models. Focus is on the problem of scene understanding, covering topics from multiple perspectives drawing on recent research in psychology, neuroscience and computer science. Ongoing debates in the field, and discussion of recent empirical findings. Topics include theories of visual recognition for scene perception. What are the behavioral and cognitive characteristics of scene perception, and their connections to objection recognition. What are the neural computations that underlie scene perception? What are the roles of attention, expectation and experience in shaping scene recognition?
1-3 units, not given this year

PSYCH 251. Affective Neuroscience
Theory and research. Comparative and human research approaches map affective function to neuroanatomical and neurochemical substrates. Prerequisite: consent of instructor.
3 units, Spr (Knutson, B)

PSYCH 252. Statistical Methods for Behavioral and Social Sciences
For students who seek experience and advanced training in empirical research. Analysis of data from experimental through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables. Integrated with the use of statistical computing packages. Prerequisite: 10 or equivalent.
1-6 units, Aut (Thomas, E; Monin, B)

PSYCH 253. Statistical Theory, Models, and Methodology
Practical and theoretical advanced data analytic techniques such as loglinear models, signal detection, meta-analysis, logistic regression, reliability theory, and factor analysis. Prerequisite: 252 or EDUC 257.
3 units, Spr (Thomas, E)

PSYCH 257. Individually Supervised Practicum
Satisfies INS requirements for curricular practical training. Relevant experience for graduate students as part of their program of study. May be repeated for credit. Prerequisites: graduate standing in Psychology, consent of adviser. (Staff)
3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 258. Graduate Seminar in Social Psychology Research
For students who are already or are planning to become involved in research on social construal and the role that it plays in a variety of phenomena, notably the origin and escalation of conflict.
1-3 units, Aut (Markus, H), Win (Markus, H), Spr (Markus, H)

PSYCH 259. Emotions: History, Theories, and Research
(Same as PSYCH 158) Graduate students register for 259. Theoretical and empirical issues in the domain of emotions. The history of emotion theories, current approaches, and the interaction between emotion and cognition.
1-3 units, not given this year

PSYCH 260. Reinforcement Learning in the Brain
Recent advances in neural and behavioral models of reinforcement learning. Reinforcement learning models. Key findings in applying models to brain activity and behavior.
2-3 units, not given this year

PSYCH 261. Emotion
(Same as PSYCH 161) (Graduate students register for 261.) The scientific study of emotion. Topics: models of emotion, emotion antecedents, emotional responses (facial, subjective, and physiological), functions of emotion, emotion regulation, individual differences, and health implications. Focus is on experimentally tractable ideas.
3 units, not given this year

PSYCH 261A. Learning and Cognition in Activity
(Same as EDUC 295) Methods and results of research on learning, understanding, reasoning, problem solving, and remembering, as aspects of participation in social organized activity. Principles of coordination that support cognitive achievements and learning in activity settings in work and school environments.
3 units, Spr (Pea, R)

PSYCH 262. Language and Thought
(Same as PSYCH 131) The psychology of language including: production and understanding in utterances; from speech sounds to speaker's meaning; children's acquisition of the first language; and the psychological basis for language systems. Language functions in natural contexts and their relation to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or LINGUIST 1.
4 units, Aut (Clark, H)

PSYCH 265. Social Psychology and Social Change
(Same as EDUC 107X, EDUC 371X) The major ideas, theories, and findings of social psychology and their applied status. Emphasis is on historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research also discussed. Advanced undergraduates and graduate students from other disciplines are welcome.
2-3 units, Spr (Cohen, G)

PSYCH 266. Current Debates in Learning and Memory
Memory is not a unitary faculty, but consists of multiple forms of learning and remembering. The cognitive and neural architectures of memory, focusing on the application of functional brain imaging (primarily fMRI and ERP). Recommended: 45
1-3 units, not given this year

PSYCH 267. Human Memory: Facts, Fallacies, and Fragile Powers
Seminar. Applications of memory concepts in everyday life and in social and clinical settings. Topics include personal identity, childhood amnesia, autobiographic memory, emotions and memory, memory distortions, illusions, self-serving biases, recovery of repressed memories, false memories, implicit memories, and unconscious influences on social behavior, with applications to psychopathology.
1-3 units, not given this year

PSYCH 268. Emotion Regulation
(Same as PSYCH 168) (Graduate students register for 268.) The scientific study of emotion regulation. Topics: historical antecedents, conceptual foundations, autonomic and neural bases, individual differences, developmental and cultural aspects, implications for psychological and physical health. Focus is on experimentally tractable ideas.
3 units, Spr (Gross, J)

PSYCH 269. Graduate Seminar in Affective Science
May be repeated for credit. Prerequisite: graduate standing in Psychology. (Tsai)
1 unit, Aut (Tsai, J), Win (Tsai, J), Spr (Tsai, J)

PSYCH 270. The Psychology of Everyday Morality
(Same as PSYCH 179) (Graduate students register for 270.) For graduate students, coterms, and senior Psychology majors. Traditional approaches focusing on how morality colors mundane human activities such as eating and on morality as defined by actors themselves rather than social scientists. Moral hypocrisy, food and disgust, taboo trade-offs, moral reproach, and prejudice with compunction. Limited enrollment. Prerequisite: 70 and consent of instructor.
4 units, not given this year

PSYCH 272. Special Topics in Psycholinguistics
May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Spr (Clark, H)

PSYCH 273. Graduate Seminar on Language, Cognition, and Perception
Current topics and debates. Readings from psychology, linguistics, neuroscience, ethology, anthropology, and philosophy. May be repeated for credit.
3 units, not given this year

PSYCH 274. Graduate Research Workshop on Psychological Interventions
(Same as EDUC 287X) Psychological research has the potential to create novel interventions that promote the public good. Psychologically wise intervention research. Course supports student efforts to conduct such interventions, especially in the context of education, broadly conceived, as well as other areas. Classic interventions and important topics in intervention research, including effective delivery mechanisms, sensitive behavioral outcomes, the role of theory and psychological process, and considerations of the role of time and of mechanisms that can sustain treatment effects over time. Students present and receive feedback on their own ongoing and/or future intervention research. Prerequisite: graduate standing in Psychology or Education, or consent of instructor.
3 units, Win (Walton, G; Cohen, G)

PSYCH 275. Graduate Research
Intermediate-level research undertaken with members of departmental faculty. Prerequisite: consent of instructor. (Staff)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 279. Topics in Cognitive Control
The processes that enable flexible behavior by biasing contextually relevant perceptual, mnemonic, and response representations or processing pathways. Cognitive control is central to volitional action, allowing work with memory, task/goal states, and overriding inappropriate responses. Current models of cognitive control, functional neuroimaging, and neuropsychological evidence. Recommended: 45.
1-3 units, not given this year

PSYCH 281. Practicum in Teaching
Enrollment limited to teaching assistants in selected Psychology courses. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 282. Practicum in Teaching PSYCH 1
Logistical TA training including: preparing for sections; creating, correcting exams; grading an iterative writing assignment; office hours; review sessions; developing audiovisual expertise; communicating via coursework. Review of student evaluations with instructor to set goals and strategies. Second quarter focuses on pedagogical improvement. Limited to current PSYCH 1 TAs. May be repeated for credit.
1-2 units, Aut (Gross, J), Win (Knutson, B), Spr (Walton, G)

PSYCH 283. International Conflict Resolution Colloquium
(Same as POLISCI 403) (Same as LAW 611.) Sponsored by the Stanford Center on International Conflict and Negotiation (SCICN). Conflict, negotiation, and dispute resolution with emphasis on conflicts and disputes with an international dimension, including conflicts involving states, peoples, and political factions such as the Middle East and Northern Ireland. Guest speakers. Issues including international law, psychology, and political science, economics, anthropology, and criminology.
1 unit, not given this year

PSYCH 284. Computational Modeling of a Range of Neural Circuits
Lectures, student presentations, and extensive software exercises. Focus on quantifiable models of neural signaling, starting with physical specification of input signals, sensory transductions, spiking, and mean electrical field potentials, and the inter-relation to BOLD signals (fMRI). Applications will be drawn from many examples, but a there will be a particular focus on the visual pathways and how measurements and models relate to visual perception.
1 unit, Spr (Wandell, B; Grill-Spector, K)

PSYCH 286. The Psychology of Everyday Morality
(Same as PSYCH 186) Recent literature on morality from a social psychological perspective. Topics include moral judgment, moral intuitions, moral hypocrisy, moral identity, moralization, moral reproach, shame and guilt, temptations, and self-regulation. Contemporary psychological research emphasizing descriptive approaches (what people actually do) rather than normative ones (what one should do).
3 units, not given this year

PSYCH 288. Hierarchical Linear Modeling for Psychological Sciences
HLM is a statistical theory and a computer program used to analyze multi-level data, such as trials within participants or students within classrooms. HLM allows researchers to analyze data at each level of analysis separately, to partition the total variance across different levels, to explain variance at each level separately using level-appropriate predictors, and to model cross-level interactions. How to use the HLM program and to model various types of multilevel data using it. May be repeated for credit.
1-3 units, not given this year

PSYCH 290. Graduate Research Methods
Primary tool use for psychologists: basics of experiment design; computer-based experiments; web-based experiments; data analysis packages and data presentation; exploratory statistics; eye-tracking methods; psychophysiology methods; survey construction; corpus and discourse analysis; and perhaps hypnosis. Prerequisite: Ph.D. student in Psychology.
2 units, not given this year

PSYCH 291. Psychology Teaching Methods
Open to graduate students and advanced undergraduates. Principles of good teaching. Students practice teaching skills.
1-2 units, not given this year

PSYCH 297. Seminar for Coterminal Master of Arts
Contemporary issues and student research. Student and faculty presentations.
1-2 units, Spr (Clark, H)

PSYCH 299. Temptations and Self Control
(Same as PSYCH 199) (Graduate students register for 299.) Why do people do things that that they come to regret? How can people minimize behavior such as exercise avoidance, angry words, overeating, unsafe sex, and dangerous driving? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Real-world applications.
2 units, not given this year

PSYCH 303. Human and Machine Hearing
Topics: linear and nonlinear system theory applied to sound and hearing; understanding how to model human hearing in the form of algorithms that can process general sounds efficiently; how to construct, display, and interpret auditory images; how to extract features compatible with machine-learning systems; how to build systems that extract information from sound to do a job; and example applications of machine hearing to speech, music, security and surveillance, personal sound diaries, smart house. Prerequisites: basic calculus and algorithms.
3 units, Aut (Lyon, R)

PSYCH 373. Research Seminar: Mind, Brain, and Computation
Faculty and student research presentations focusing on work linking cellular, systems, cognitive, behavioral, and computational neuroscience. May be repeated for credit.
1 unit, Aut (McClelland, J), Win (McClelland, J), Spr (McClelland, J)

PSYCH 383. International Conflict: Management and Resolution
(Same as IPS 250, POLISCI 210R, POLISCI 310R) (Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.
3 units, Win (Ross, L; Holloway, D; Weiner, A)

PSYCH 459. Frontiers in Interdisciplinary Biosciences
(Same as BIO 459, BIOC 459, BIOE 459, CHEMENG 459, CHEM 459) Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.

1 unit, Aut (Robertson, C), Win (Robertson, C), Spr (Robertson, C)

PSYCH 801. Master's TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PSYCH 802. PhD TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PUBLIC POLICY (PUBLPOL) COURSES

UNDERGRADUATE COURSES IN PUBLIC POLICY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PUBLPOL 53SI. Creating and Analyzing Public Policy: The Roosevelt Institution
How to get your work into the public discourse. Students work in groups to draft policy recommendations for local policymakers serving as project sponsors.

2 units, Win (Abrams, W)

PUBLPOL 101. Politics and Public Policy
(Same as POLISCI 123, PUBLPOL 201) How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria. Prerequisite: POLISCI 2 (or equivalent for Public Policy majors). GER:DB-SocSci

5 units, Spr (Frisby, T)

PUBLPOL 102. Organizations and Public Policy
(Same as PUBLPOL 202) Analysis of organizational processes emphasizing organizations that operate in a non-market environment. Prerequisite: ECON 1A. GER:DB-SocSci

5 units, Spr (Bendor, J)

PUBLPOL 103B. Ethics and Public Policy
(Same as MS&E 197, STS 110) Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations. GER:DB-Hum, EC-EthicReas

5 units, Win (McGinn, R)

PUBLPOL 103C. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality. GER:DB-Hum, EC-EthicReas

4-5 units, Aut (Cohen, J)

PUBLPOL 103D. Ethics and Politics of Public Service
(Same as ETHICSOC 133, HUMBIO 178, PHIL 175A, PHIL 275A, POLISCI 133) Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford. GER:DB-SocSci

5 units, not given this year

PUBLPOL 104. Economic Policy Analysis
(Same as ECON 150, PUBLPOL 204) The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making and analysis, and applications to program adoption and implementation. Prerequisite: ECON 50.

5 units, Win (Rosston, G; Landais, C)

PUBLPOL 106. Economics of Legal Rules and Institutions
(Same as ECON 154, PUBLPOL 206) Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Locke, Mill, and Rawls. Economic efficiency and agent rationality, law as mitigation of market and cognitive failures, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50. WIM

5 units, Aut (Owen, B)

PUBLPOL 107. Public Finance and Fiscal Policy
(Same as ECON 141) What role should and does government play in the economy? What are the effects of government expenditure, borrowing, and taxation? Policy topics: budget surpluses/deficits; tax reform; social security, public goods, and externalities; fiscal federalism; public investment; and cost-benefit analysis. Prerequisites: 51, 52 (can be taken concurrently).

5 units, Spr (Boskin, M)

PUBLPOL 114. The Logic of Collective Choice
(Same as PUBLPOL 214) Social, economic, and political outcomes usually depend on the interaction of individual choices, studied through: social choice theory, which studies how we aggregate what individuals want into what the collective wants; and game theory, which studies how people aggregate what individuals want into what the group gets. Topics include rationality of preferences, majority rule and other choice methods, fairness and efficiency, institutional constraints on choice (such as agenda control), the institutional incentives, and collective action.

4 units, Aut (Lax, J)

PUBLPOL 119. Sociology of Terrorism
(Same as SOC 109, SOC 209) Multidisciplinary, including psychology, sociology, political science,and economics. Comparison of terrorist organizations and movements across institutions, places, and times; their motives, tactics, financing, and organization. Guest lecturers. Sources include movies, novels, and research literature. GER:DB-SocSci

5 units, Spr (Meyersson Milgrom, E)

PUBLPOL 121. Policy and Climate Change
Science and economics, including recent findings. History and evolution of local, state, regional, national, and international policy. California's recent landmark climate change bill. Future policy prospects, emphasizing national and international levels.

5 units, Aut (Nation, J)

PUBLPOL 125. Law and Public Policy
How lawyers argue and judges decide cases versus other forms of rhetoric and decision making. Legal reasoning and dispute resolution within Anglo-American common law and in comparative perspective across diverse societies. The relationship between law and public policy on current issues related to culture, technology, race, education, sexuality, abortion, gun control, civil liberties, national security and the environment. Sources include judicial

opinions, interdisciplinary legal scholarship, ethnography, literature, and film. GER:DB-SocSci

5 units, Spr (Greenberg, J)

PUBLPOL 133. Urban Politics

(Same as POLISCI 121, URBANST 111) The major actors, institutions, processes, and policies of sub-state government in the U.S., emphasizing city general-purpose governments through a comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite: POLISCI 2 or consent of instructor. GER:DB-SocSci

5 units, Aut (Gale, D)

PUBLPOL 135. Regional Politics and Decision Making in Silicon Valley

Dynamics of regional leadership and decision making in Silicon Valley, a complex region composed of 40 cities and four counties without any overarching framework for governance. Formal and informal institutions shaping outcomes in the region. Case studies include transportation, workforce development, housing and land use, and climate change.

3 units, Spr (Benest, F; Hancock, R)

PUBLPOL 154. Politics and Policy in California

State politics and policy making, including the role of the legislature, legislative leadership, the governor, special interests, campaign finance, the public, ballot initiatives, the state constitution, the media, and the role of research organizations. Case studies include pension reform, health care, term limits and other political reform measures, open primaries, infrastructure improvements, and the budget. Changes in constitutional and in state statutes that can improve policy making in California.

5 units, Win (Nation, J)

PUBLPOL 168. Global Organizations: Managing Diversity

(Same as SOC 168, SOC 268) Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: 102, MS&E 180, or SOC 160. GER:DB-SocSci

5 units, Win (Meyersson Milgrom, E)

PUBLPOL 172. Psychology and Public Policy

(Same as PSYCH 119) Applications of psychology to public and social policy. Factors that affect the influence of psychological research and individual psychology on the creation of policy, and the influence of policy on attitudes and behavior at the personal and societal levels. Topics include education, health care, and criminal justice.

5 units, not given this year

PUBLPOL 183. Philanthropy and Social Innovation

Philanthropy's role in modern society and the translation of its vision and capital into social action. Topics: individual giving; philanthropic landscape and models; foundation mission and infrastructure; philanthropic strategy and grantmaking; accountability and knowledge management; global and corporate philanthropy; and public policy engagement. Readings: business school cases and industry articles. Guest speakers include individual donors and foundation presidents. Mandatory discussion section. Enrollment limited.

3 units, Spr (Arrillaga, L)

PUBLPOL 184. Poverty and Policies in Developing Economies

Economic models of growth and poverty, differences in growth rates among countries, and the persistence of poverty. Models of physical and human capital accumulation, and recent theories of the importance of institutions, social capital, and political factors. The effectiveness of social policies in developing countries, emphasizing India, in the light of theories of growth and poverty, and in terms of immediate goals and long-term consequences. Policies include schooling and health, anti-poverty, banking, and political decentralization. Prerequisites: ECON 1A,B. GER:DB-SocSci

5 units, Spr (Kochar, A)

PUBLPOL 194. Technology Policy

How the U.S. federal government promotes, uses, and regulates new technologies; how it decides technology policies; and debates over how to use technology to advance national goals. Topics: American attitudes towards technology; technologies for defense, homeland security, energy, health, and economic competitiveness; and when and how to regulate nanotechnology, stem-cell research, government surveillance, and digital copyright. Recommended: POLISCI 2.

5 units, Win (Windham, P)

PUBLPOL 197. Junior Honors Seminar

(Same as ECON 198) Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Enrollment limited to 25.

5 units, Win (Rothwell, G), Spr (Rothwell, G)

PUBLPOL 198. Directed Readings in Public Policy

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

PUBLPOL 199. Senior Research

May be repeated for credit.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

PUBLPOL 200A. Senior Seminar

Students conduct original research for oral presentations and a paper on a policy-related topic. Topic and methods of analysis determined by student in consultation with instructor. Goal is to improve analytical, research, writing, and communication skills. Prerequisites: core courses in Public Policy or consent of instructor.

3 units, Aut (Sprague, M)

PUBLPOL 200B. Senior Seminar: Conducting Policy Analysis for Local Agencies

Small student teams conduct policy analyses requested by local policymakers. With guidance from the instructor and policymaker, each team researches a real-world problem and devises implementable policy recommendations to help address it. The project culminates in a professional report and presentation to the policymaker. Prerequisites: core courses in Public Policy or consent of instructor. GER:DB-SocSci

5 units, Win (Sprague, M)

PUBLPOL 200C. Senior Seminar: Conducting Policy analysis for Local Agencies

Small student teams conduct policy analyses requested by local policymakers. With guidance from the instructor and policymaker, each team researches a real-world problem and devises implementable policy recommendations to help address it. The project culminates in a professional report and presentation to the policymaker. Prerequisites: core courses in Public Policy or consent of instructor.

5 units, Spr (Sanders, N)

GRADUATE COURSES IN PUBLIC POLICY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PUBLPOL 201. Politics and Public Policy

(Same as POLISCI 123, PUBLPOL 101) How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria. Prerequisite: POLISCI 2 (or equivalent for Public Policy majors).

5 units, Spr (Frisby, T)

PUBLPOL 202. Organizations and Public Policy

(Same as PUBLPOL 102) Analysis of organizational processes emphasizing organizations that operate in a non-market environment. Prerequisite: ECON 1A.

5 units, Spr (Bendor, J)

PUBLPOL 204. Economic Policy Analysis

(Same as ECON 150, PUBLPOL 104) The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making

and analysis, and applications to program adoption and implementation. Prerequisite: ECON 50.

5 units, Win (Rosston, G; Landais, C)

PUBLPOL 206. Economics of Legal Rules and Institutions
(Same as ECON 154, PUBLPOL 106) Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Locke, Mill, and Rawls. Economic efficiency and agent rationality, law as mitigation of market and cognitive failures, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50.

5 units, Aut (Owen, B)

PUBLPOL 214. The Logic of Collective Choice
(Same as PUBLPOL 114) Social, economic, and political outcomes usually depend on the interaction of individual choices, studied through: social choice theory, which studies how we aggregate what individuals want into what the collective wants; and game theory, which studies how people aggregate what individuals want into what the group gets. Topics include rationality of preferences, majority rule and other choice methods, fairness and efficiency, institutional constraints on choice (such as agenda control), the institutional incentives, and collective action.

4 units, Aut (Lax, J)

PUBLPOL 231. Health Care Regulation, Finance and Policy
(Same as HRP 391) (SAME AS LAW 348) Provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the U.S. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.

3 units, Win (Kessler, D)

PUBLPOL 301A. Microeconomics
(Same as IPS 204A) Microeconomic concepts relevant to decision making. Topics include: competitive market clearing, price discrimination; general equilibrium; risk aversion and sharing, capital market theory, Nash equilibrium; welfare analysis; public choice; externalities and public goods; hidden information and market signaling; moral hazard and incentives; auction theory; game theory; oligopoly; reputation and credibility. Prerequisites: ECON 50 and MATH 51 or equiv.

4 units, Aut (Bulow, J)

PUBLPOL 301B. Cost-Benefit Analysis and Evaluation
(Same as IPS 204B) Relationship between microeconomic analysis and public policy making. Economic rationales for policy interventions. Economic models of politics and application to policy making. Relationship of income distribution to policy choice. Welfare evaluation of public and private decisions. Education policy, social security, and health care. Prerequisite: PUBLPOL 301A or ECON 51.

4 units, Spr (Lim, C)

PUBLPOL 302A. Introduction to American Law
(Same as AMSTUD 179, LAWGEN 106, POLISCI 122) For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general.

3-5 units, Aut (Friedman, L)

PUBLPOL 302B. Introduction to Economic Analysis of Law
(Same as LAW 528.) This course will provide a broad overview of the scholarly field known as law and economics. The focus will be on how legal rules and institutions can correct market failures. We will discuss the economic function of contracts and, when contracts fail or are not feasible, the role of legal remedies to resolve disputes. We will also discuss at some length the choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors, such as regulatory authorities. Extensive attention will be given to the economics of litigation, and to how private incentives to bring lawsuits differs from the social value of litigation. The economic motive to commit crimes, and the optimal governmental response to crime, will be studied in depth. Specific topics within the preceding broad themes include: the Coase Theorem; the tradeoff between the certainty and severity of punishment; the choice between ex ante and ex post sanctions; neglige

3 units, Win (Polinsky, M)

PUBLPOL 302C. Advanced Topics in Law and Economics
(Same as LAW 529.) This course complements the Introduction to Economic Analysis of Law course (Public Policy 302B) and provides a more advanced treatment of the topics discussed in that course (see that course description for topics covered). Students enrolling in Advanced Topics in Law and Economics must also enroll in Introduction to Economic Analysis of Law. The Advanced Topics course will meet for one hour each week immediately following one of the meetings of the Introduction course. In the Advanced Topics course students will be introduced to formal economic modeling of laws and legal institutions. Because this course is part of the core curriculum for the Master in Public Policy degree, intermediate-level training in microeconomics (at the undergraduate level) and some comfort in the use of calculus is required.

1 unit, Win (Polinsky, M)

PUBLPOL 303A. Foundations Of Statistical Inference
(Same as IPS 205A) (Same as LAW 362.) Statistical background and introduction to regression. Topics include hypothesis testing, linear regression, nearest-neighbors regression, and other statistical concepts. Hands-on empirical analysis using popular statistical packages. Goal is to analyze empirical studies, conduct empirical research, and to crossexamine or work with statistical experts.

4 units, Aut (Strnad, J)

PUBLPOL 303B. Econometrics
(Same as IPS 205B) (Same as LAW 366.) Descriptive statistics. Regression analysis. Hypothesis testing. Analysis of variance. Heteroskedasticity, serial correlation, errors in variables, simultaneous equations. The construction and use of models for analyzing economic and social phenomena. Bayesian analysis. Univariate and bivariate analysis. Simple regression model. Multiple regression model. Inference and heteroskedasticity. Linear probability model. Instrumental variables. Maximum likelihood methods. Measurement of social and political attitudes and ideologies. Statistical analysis of large data sets.

4 units, Win (Strnad, J)

PUBLPOL 303C. Bayesian Statistics and Econometrics
(Same as LAW 243.) Linear and nonlinear regression, covariance structures, panel data, qualitative variable models, nonparametric and semiparametric methods, time series, Bayesian model averaging and variable selection. Bayesian methodology including Markov chain Monte Carlo methods, hierarchical models, model checking, mixture models, empirical Bayes approaches, approximations, and computational issues and foundations. Prerequisite: graduate-level econometrics or equivalent.

5 units, Aut (Strnad, J)

PUBLPOL 304A. Politics and Collective Action
(Same as IPS 206A, POLISCI 331S) Classic theories for why collective action problems occur and how they can be solved. Politics of aggregating individual decisions into collective action, including voting, social protest, and competing goals and tactics of officials, bureaucrats, interest groups, and other stakeholders. Economic, distributive, and moral frameworks for evaluating collective action processes and outcomes. Applications to real-world policy problems involving collective action.

4 units, Spr (Hanson, W)

PUBLPOL 305A. Judgment and Decision Making
(Same as IPS 207A) (Same as LAW 333.) Theories and research on heuristics and biases in human inference, judgment, and decision making. Experimental and theoretical work in prospect theory emphasizing loss and risk aversion. Challenges that psychology offers to the rationalist expected utility model; attempts to meet this challenge through integration with modern behavioral economics. Decision making biases and phenomena of special relevance to public policy such as group polarization, group think, and collective action.

4 units, Win (Brest, P)

PUBLPOL 305B. Public Policy and Social Psychology: Implications and Applications
(Same as IPS 207B, PSYCH 216) Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior.
4 units, Spr (Ross, L)

PUBLPOL 306. Writing and Rhetoric for Policy Audiences
This course offers hands-on learning of effective writing and presentation techniques for audiences that include policy makers, decision and stake-holders, interest groups, the media, and the public. Class time will be spent learning lessons in rhetoric, reviewing different written genres (op-ed, report, memo), editing and peer review using large screens and laptops, as well as analyzing and practicing presentations (PPT, elevator pitch, radio broadcast, board meeting). Sources include policy briefings, memos, model videos, rhetoric handouts, style manual. Students will write and make oral and multimedia arguments, individually and in teams; students will also be responsible for peer review, introducing speakers, and moderating discussions at the colloquia. Enrollment limited. Prerequisite: consent of instructor.
4 units, Win (O'Brien, A; Owen, B)

PUBLPOL 307. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S) Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality.
4-5 units, Aut (Cohen, J)

PUBLPOL 309. Practicum
(Same as IPS 209) Applied policy exercises in various fields. Multidisciplinary student teams apply skills to a contemporary problem in a major policy exercise with a public sector client such as a government agency. Problem analysis, interaction with the client and experts, and presentations. Emphasis is on effective written and oral communication to lay audiences of recommendations based on policy analysis.
1-10 units, Aut (Nation, J; Hensler, D), Win (Nation, J)

PUBLPOL 309X. Public Policy Research Project
Supervised research internship. Individual students perform policy research for outside client, applying analytical skills from core curriculum. Requires permission of program director.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

PUBLPOL 310. Master of Arts Thesis
Restricted to students writing a master's thesis in Public Policy. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

PUBLPOL 311. Public Policy Colloquium
Weekly colloquia speaker series required for M.P.P. and M.A. in Public Policy students. Themes vary each quarter.
1 unit, Aut (Owen, B; Rosston, G), Win (Owen, B; Rosston, G), Spr (Owen, B; Rosston, G)

PUBLPOL 312. Public Policy for Science and Technology
This course will describe Federal science policy and the process and players by which it is made. The connections between science policy and the economy, national security, and health will be discussed. The roles that National Laboratories, universities, and industry play in the science enterprise will be examined.
2 units, Aut (White, R)

PUBLPOL 317. Comparing Institutional Forms: Public, Private, and Nonprofit
(Same as EDUC 377, GSBGEN 346, SOC 377) Seminar. For students interested in the nonprofit sector, and those in the joint Business and Education program. The missions, functions, and capabilities of nonprofit, public, and private organizations. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials. Advanced undergraduates require consent of instructor.
4 units

PUBLPOL 321. Sentencing, Corrections, and Criminal Justice Policy
(Same as LAW 621). This course familiarizes students with the history, structure, and performance of America's sentencing and corrections system. ""Sentencing"" is the process by which criminal sanctions are imposed in individual cases following criminal convictions. ""Corrections"" deals with the implementation and evaluation of criminal sentences after they are handed down. In fact, the two subject areas are inseparable. This course examines sentencing and corrections from global and historical views, from theoretical and policy perspectives, and with close attention to many problem-specific areas. It explores sentencing theories and their application, the nature, scope and function of corrections, the impact of mass incarceration on crime and communities, the effectiveness of rehabilitation, the relationship between sanctions and crime, and the consequences of prisoner reentry. These topics are considered as they play out in current political and policy debates. Guest lectures may
3 units, Win (Petersilia, J)

RADIATION ONCOLOGY (RADO) COURSES

UNDERGRADUATE COURSES IN RADIATION ONCOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

RADO 101. Readings in Radiation Biology
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RADO 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN RADIATION ONCOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

RADO 202. The Basic Science of Radiation Therapy
For residents or fellows in the training program in the Division of Radiation Therapy, and for interested medical students. Basic processes of radiation biology that underly the treatment of malignant diseases by radiation. Carcinogenesis and mutagenesis by radiation are also covered. Prerequisite: familiarity with cell biology and physiology; consent of instructor.
1 unit, Spr (Denko, N)

RADO 280. Early Clinical Experience in Radiation Oncology
Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.
1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RADO 299. Directed Reading in Radiation Oncology
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RADO 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RADO 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RADIOLOGY (RAD) COURSES

UNDERGRADUATE COURSES IN RADIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

RAD 72Q. Flouresence Imaging in Living Cells
Preference to sophomores. Basic principles of fluorescent probes and their applications for live-cell imaging. Topics include: general classes of flourescent probes together with their fluorescence mechanisms; strategies and methods for live cell labeling and imaging of specific proteins. Examples of applications of fluorescence imaging are presented. Provides students first-hand experience in fluorescence imaging research, and exploration of cutting edge techniques. Readings include current reviews and key original articles.

2 units, not given this year

RAD 101. Readings in Radiology Research
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RAD 199. Undergraduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN RADIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

RAD 200. Imaging Anatomy and Pathology
Supplements traditional disectional anatomy with modern cross-sectional imaging, and traditional examination of the cadaver with study of live subjects. Chest-abdominal and pelvic anatomy; congenital, traumatic, and neoplastic processes that affect these structures. Preparation for encounters with imaging tests in clinical medicine and surgery. Also open to graduate students in fields related to imaging sciences.

2 units, Spr (Federle, M; Penner, R)

RAD 203. Introduction to Interventional Radiology
Designed to expose pre-clinical and clinical MD students to minimally-invasive procedures using image guidance through a combination of didactics, simulation, and cathlab observation. Weekly organ-based and/or disease-based lectures are followed by simulation and faculty shadowing. Daily case-based presentations by faculty, technical demonstrations, and informal discussions reinforce the learning experience.

1 unit, not given this year

RAD 220. Introduction to Imaging and Image-based Human Anatomy
(Same as BIOE 220) The physics of medical imaging and human anatomy through medical images. Emphasis is on normal anatomy, contrast mechanisms, and the relative strengths of each imaging modality. Labs reinforce imaging techniques and anatomy. Prerequisites: basic biology, physics.

3 units, Win (Gold, G; Pauly, K)

RAD 222A. Multimodality Molecular Imaging in Living Subjects I
(Same as BIOE 222A) Provides an overview of the biology, instruments and chemistries for imaging of cellular and molecular processes in living animals and humans. Covers molecular biology, instrumentation physics, and chemistry of molecular imaging probes as an introduction to preclinical and clinical molecular imaging.

4 units, Aut (Contag, C; Xing, L; Rao, J)

RAD 222B. Multimodality Molecular Imaging in Living Subjects II
(Same as BIOE 222B) Focuses on molecular probes that target specific disease mechanisms. Covers molecular probe design for dynamic measures of biological function and how to deliver these to the target tissues for informative assays that reveal cellular and molecular changes.

4 units, Win (Contag, C; Xing, L; Rao, J)

RAD 222C. Multimodality Molecular Imaging in Living Subjects III
(Same as BIOE 222C) Topics course comprised of discussion and review of primary literature. Focuses on emerging chemistries and instruments that address unmet needs for improved diagnosis and disease management in cancer, neurological disease, cardiovascular medicine and musculoskeletal disorders. Identifies problems or controversies in the field, and resolves them through understanding the relevant primary literature.

4 units, Spr (Contag, C; Xing, L; Rao, J)

RAD 226. In Vivo Magnetic Resonance Spectroscopy and Imaging
Collections of identical independent nuclear spins are described by the classical vector model of magnetic resonance imaging (MRI); however, interactions among spins, as occur in many in vivo processes, require a more complete description. Physics and engineering principles of these in vivo magnetic resonance phenomena with emphasis on current research questions and clinical applications. Topics: quantum mechanical description of magnetic resonance, density matrix theory, product operator formalism, relaxation theory and contrast mechanisms, spectroscopic imaging, spectral editing, and multinuclear studies. Prerequisites: EE 369B or familiarity with magnetic resonance, working knowledge of linear algebra.

3 units, Win (Spielman, D)

RAD 227. Functional MRI Methods
(Same as BIOPHYS 227) Basics of functional magnetic resonance neuroimaging, including data acquisition, analysis, and experimental design. Journal club sections. Cognitive neuroscience and clinical applications. Prerequisites: basic physics, mathematics; neuroscience recommended.

3 units, Win (Glover, G)

RAD 228. Magnetic Resonance Imaging Programming Topics
Primarily for students working on research projects involving MRI pulse sequence programming. Introductory and student-initiated topics in seminars and hands-on labs. Image contrast mechanisms achieved by pulse sequences that control radiofrequency and gradient magnetic fields in real time, while acquiring data in an organized manner for image reconstruction. Prerequisites: EE 369B and consent of instructor.

3 units, Sum (Hargreaves, B)

RAD 280. Early Clinical Experience in Radiology
Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RAD 299. Directed Reading in Radiology
Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RAD 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RAD 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGIOUS STUDIES (RELIGST) COURSES

UNDERGRADUATE COURSES IN RELIGIOUS STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

RELIGST 10N. The Problem of God: Aquinas to the New Atheism
(Stanford Introductory Seminar) Critical inquiry the meaning and credibility of theistic belief through exemplary classic formulations, modern critics, and contemporary defenders. What has the

idea of God meant to serious minds in the past? And in the modern or postmodern world? GER:DB-Hum

4 units, Win (Sockness, B)

RELIGST 11N. The Meaning of Life: Philosophical, Aesthetic, and Religious Perspectives

(Stanford Introductory Seminar) Preference to freshmen. Ultimate questions about life. The unexamined life is not worth living, but also the unlived life is not worth examining. Students and professor examine their own lives in the light of questions that the readings and lectures bring up. The big picture: is there such a thing as the meaning of life? What is entailed in making personal/existential sense of one's own life? What constitutes the good life, lived in society? How can a university education bear upon the search for a meaningful life? What methods for or approches to life can one learn from studies in the humanities? Sources include artworks, poems, texts, and a film. Works such: Plato's allegory of the Cave from The Republic; Manet's A Bar at the Folies Bergere.

3 units, Aut (Sheehan, T)

RELIGST 12. Introduction to Hinduism

Historical study from earliest period to the present, including religious poetry, narrative, performance, concepts of self and liberation, yoga, ritual, God and gods, views of religion through history, region, class, caste, and gender. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 14. Exploring Buddhism

From its beginnings to the 21st century. Principal teachings and practices, institutional and social forms, and artistic and iconographical expressions. GER:DB-Hum, EC-GlobalCom

4 units, Spr (Harrison, P)

RELIGST 15N. Travels through the Afterlife

(Stanford Introductory Seminar) (Same as JEWISHST 15N) Since the beginning of civilization, humans have refused to believe that physical death is the end of life and have sought in various ways to travel into the afterlife. One cannot know what lies beyond death, but there are other kinds of insights to be learned from these otherworldly journeys. The origins and history of the afterlife, going back in time to ancient Egypt, Mesopotamia, Israel, Greece, and medieval Europe to survey these cultures' view of death and what lies beyond it. What has happened to belief in the afterlife in modern American culture. Goal is to confront one of the most difficult aspects of life, the fear of death and oblivion, and to explore the power of thought and imagination to move beyond the confines of mortality. GER:DB-Hum

4 units, Aut (Weitzman, S)

RELIGST 16N. The Story of Human Virtues

Bravery, Temperance, Generosity, Justice, Wisdom, and Friendship. Plato and Aristotle on human virtues, and select Muslim, Jewish, Christian, and secular appropriations and transformations of that Greek heritage. GER:DB-Hum

4 units, not given this year

RELIGST 16SI. Religion and Spirituality: LGBTQ Perspectives

(Same as JEWISHST 16SI) Many lesbian, gay, bisexual, transgender, and queer (LGBTQ) people today are finding that mainstream religious institutions do not meet their unique spiritual needs, and they are looking elsewhere to create meaningful spiritual lives. How LGBTQ people are creating and practicing religion and spirituality in the U.S. The diversity of American LGBTQ religious and spiritual traditions, both within and beyond the boundaries of traditional religions. Religious and spiritual practices created by and for LGBTQ people and communities, rather than the responses of religious institutions towards the reality of LGBTQ people in their midst. Students attend an LGBTQ worship service in a tradition of their choice. Goal is a better understanding of, and appreciation for, the diversity of religious and spiritual traditions within LGBTQ communities.

1 unit, Aut (Fonrobert, C)

RELIGST 18. Zen Buddhism

Classical Zen thought in China, and its background, origins, and development. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 19S. Angels in America: Western Religion and Contemporary Culture

How religion is presented in the media. Cultural representations that shape and disrupt this image of the relationship between being religious and being modern. How believers and doubters in Islam, Judaism, and Christianity are portrayed in popular culture. Sources include the music of Dar Williams and M.I.A., the plays of Tony Kushner, and the Canadian sitcom Little Mosque on the Prairie. How gay believers, agnostic leaders, terrorists, and born-again children of secular parents complicate the notion of religious belief in today¿s world.

3 units, not given this year

RELIGST 20. Introduction to the Zoroastrian Religion

Introduction to Zoroastrianism through a survey of its defining themes, including an examination of the figure of the prophet Zarathustra, modes of transmitting sacred knowledge, the nature of good and evil, and the importance of ritual practice and practitioners. How Zoroastrianism views the individual with respect to the body, the life cycle, and issues of gender and sexuality. The intersection of religion and ethnicity that has defined Zoroastrianism from its origins in the 2nd millennium BCE in Central Asia up to the present day. GER:DB-Hum

3 units, Win (Vevaina, Y)

RELIGST 23. Exploring Judaism

Introduction to the varied beliefs, ritual practices, and sacred stories of Judaism, moving from foundational texts like the Bible and the Talmud to recent changes in Jewish religious life that have arisen in response to secular and feminist critiques, the Holocaust, and the emergence of the State of Israel. GER:DB-Hum

4 units, not given this year

RELIGST 24. Exploring Christianity

The historical development of Christian religious thought and practice from Jesus to the present. Emphasis is on the formation of Christianity's major teachings and their transformation and diverse expressions in the medieval, reformation, and modern periods. Readings focus on primary texts. GER:DB-Hum

4 units, not given this year

RELIGST 27. Exploring Islam

Introduction to Islam, its core beliefs and practices, through architecture and the arts. Explore the visual language through which these have been expressed across diverse Muslim societies. GER:DB-Hum, EC-GlobalCom

4 units, Aut (Nanji, A)

RELIGST 35. Introduction to Chinese Religions

(Formerly 55.) Confucianism, Daoism, Buddhism, and the interchange among these belief systems and institutions. Set against the background of Chinese history, society, and culture, with attention to elite and popular religious forms. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 37. Introduction to Japanese Religions

Major themes in Japanese religious culture, including gods, religious sites, and specialist and popular practices. Films and readings from literary, ethnographic, and historical sources in translation. GER:DB-Hum

4 units, Spr (Horton, S)

RELIGST 46. Introduction to Daoism

(Formerly 56.) Historical survey from origins to the present. Main schools, notions, communal rites, and individual practices, and the relation of Daoism to facets of Chinese culture. GER:DB-Hum

4 units, not given this year

RELIGST 54. The Roots of Right and Wrong in Christianity, Judaism, and Islam

What Christian, Jewish, and premodern Muslim thinkers have to say about these questions: what makes an act right or wrong; can a basis for right and wrong be identified independently of revealed religion; is observing commands and prohibitions sufficient to lead a life of virtue and refinement? Readings in primary texts. GER:DB-Hum

4 units, not given this year

RELIGST 57. Millennium, Messiahs, and Mayhem
How the apocalypse has captured the imaginations and influenced the behaviors of many Jews and Christians who predict the end of the world during their lifetimes, whether facilitated by the arrival of a human or divine emissary, preceded by a cataclysm, or announced by a renunciation of normative morals. Examples include the Book of Revelations, the Dead Sea Scrolls, the Brotherhood of the Free Spirit, Shabtai Tzvi, Jacob Frank, the Mormons, and Chabad Chasidism.

4 units, not given this year

RELIGST 62. Philosophy of Religion
Classic and modern questions in the philosophy of religion traced through Western and Eastern traditions: the coherence of theism, relativism, verification and ethics of belief, and mystical experience. Readings from traditional and modern texts. GER:DB-Hum

4 units, not given this year

RELIGST 82. Approaches to the Study of Religion: Christianity
Historical and contemporary Christianity from four viewpoints: ritual and prayer; sacred texts and creeds; ethics and life; and community governance. GER:DB-Hum

4 units, not given this year

RELIGST 84. Mystics, Pilgrims, Monks, and Scholars: Religious Devotion in Medieval Christianity
The variety and vitality of religious expression in medieval Christian Europe. How Christians sought God through mystical encounter, the structure of monastic life, visits to shrines, devotion to the saints, and the study of scripture and ancient Christian wisdom. Readings focus on primary texts. GER:DB-Hum

4 units, Aut (Pitkin, B)

RELIGST 90. Buddhism and Gender
In the Buddhist tradition there are contradictory approaches to gender: in some cases, gender is described as an illusion; in others, the female body is an impediment to enlightenment. How do Buddhists - men and women, lay and monastic - interpret these divergent views? Different Buddhist approaches to the category of gender. Values associated with masculinity and femininity in Buddhist philosophy, the gendered symbolism surrounding buddhahood, images of the masculine and feminine in Buddhist texts, and the experiences of lay and monastic men and women.

4 units, not given this year

RELIGST 95. How to Read the Bible
(Same as JEWISHST 95) What does the Bible mean? Seeks to help students answer this question for themselves by introducing some of the many ways in which the Bible has been read over the ages. The focus will be the book of Genesis, but the real subject is the history of biblical interpretation¿how Genesis has been understood by theologians, writers, artists, scholars and others¿and the ultimate goal is not merely to engage the Bible itself but to gain a better appreciation of the act of reading, why people read differently and the consequences of that difference for religious history. GER:DB-Hum

4 units, Aut (Weitzman, S), Sum (Weitzman, S)

RELIGST 101. Who is Allah?
Introduction to classical Islamic theology. How did notions about God's nature define theological communities? What made some ideas more likely than others to function as markers of group identity? Were the different sects distinguished by different methods of reading scriptures? Did differences in the interpretation of the Qur'ân generate the communal divisions, or did differing communal identities generate different interpretations of the Qur'ân? God's power (free will versus predestination) the age of the Universe (pre-eternal world vs coming into being at some point) roots of ethics (what makes an act right or wrong.) Readings of the greatest philosophers and theologians in classical Islam. GER:DB-Hum

3 units, not given this year

RELIGST 102. Modern Islam
How Muslims have engaged in diverse ways with the Modern World and with new ethical, social and political challenges from the 19th century on. GER:DB-Hum

5 units, Aut (Nanji, A)

RELIGST 103. Religion and Global Conflict
A weekly lecture series - drawing upon experts in various disciplines, departments, and centers on campus and beyond - which seeks to understand and explain religion's renewed, and often violent, public and political relevance for global affairs at the beginning of the 21st century.

2 units, not given this year

RELIGST 104. The Daoist Body
The human body as seen in Daoist traditions and related areas, particularly cosmol- ogy and medicine. Major sources including images and charts, and the views of the human being that they reflect. GER:DB-Hum, EC-GlobalCom

4 units, Aut (Bokenkamp, S)

RELIGST 105. Truthful Fictions: Religion in Popular Narratives
What do St. Augustine's Confessions, Dante's Divine Comedy, and Joss Whedon's Buffy the Vampire Slayer have in common? What can Cylons tell us about character and free will? How some of today's new mythologies explore religious themes like hope, transcendence, selfhood, ethics, spiritual crisis, and heroism. Materials include novels, graphic novels, television, and film. GER:DB-Hum

4 units, Spr (West, C)

RELIGST 107. Hindus and Muslims in South Asia
The history of Hindus and Muslims living together in S. Asia for over 1,000 years. Peace and conflict, composite cultures, and interdependent social worlds. Partition in 1947 and the creation of separate nations. Religion, arts, society, and politics. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 108. The Mahabharata
How the Sanskrit epic and its versions in other languages are interwoven with the history of Hinduism and S. Asian arts, philosophy, and social and political thought. How the text is interpreted through performance, including village ritual dramas, classical dance, and mass market television. GER:DB-Hum

4 units, not given this year

RELIGST 108A. Religious Epics of India: The Ramayana
The much-loved Ramayana story, from the ancient Sanskrit epic poem of Valmiki to other avatars through the ages--vernacular and Sanskrit poetry, theater, the chart-busting television serial of the late 1980s, classic comics, animated film. Religion, politics, cultural ideals, gender, media,. Recent battles over ""Ram's birthplace"" in Ayodhya and their effects on Hindu-Muslim relations and political power. GER:DB-Hum

4 units, not given this year

RELIGST 111. Religions of Mexico
Key issues in the study of religion and religions of Mexico. Sacred cities of the Aztec and Maya, the encounter between Christianity and indigenous religions and contemporary religious performances in Mexico and among Mexican Americans. Theoretical frames of Mircea Eliade, Emile Durkheim, and Victor Turner. Emphasis is on the recently recovered indigenous codex known as the Mapa de Cuauhtinchan #2. GER:DB-Hum

4 units, not given this year

RELIGST 112. Handmaids and Harlots: Biblical Women in Jewish and Christian Traditions
Miraculous births, wandering in the wilderness, encounters with angels: stories of Hagar, Sarah, Hannah, and Mary, and how their tales are read and re-told by later Jews and Christians. Sources include the Hebrew Bible and New Testament, Jewish and Christian commentary, and religious iconography. GER:DB-Hum, EC-Gender

4 units, not given this year

RELIGST 113B. Japanese Religion Through Film
Themes in premodern and modern Japanese religion though animations, movies and documentaries GER:DB-Hum

4 units, Aut (Lin, I)

RELIGST 114B. Religions of Korea
Religious traditions in Korea from antiquity to the present. An examination of texts including Buddha tales, official histories, spatial representations, popular literature, modern media reports and other primary sources. The impact of imperialism, modernity, and nationalism on the contemporary practice of religion.

4 units, Aut (Koo, S)

RELIGST 115. Hope and Prophetic Politics: Abraham Joshua Heschel and Martin Luther King, Jr.
The biblically informed prophetic tradition that has long shaped the history of American religious and political thought and that has often clashed with an impulse towards empire and the desire to accumulate power. Focus is on Abraham Joshua Heschel and Martin Luther King, Jr., 20th-century religious intellectuals whose lives and works draw on this tradition to raise and address questions basic to the role of religion in public life. GER:DB-Hum
4 units, not given this year

RELIGST 117. The Future of Christianity
Developments affecting the world¿s largest religion in the new millennium: shifting demographics; declining numbers in mainline Christian denominations in North America and Europe; the emergence of ¿global Christianity¿ in Africa, Asia, and South America; Christianity after the baby boomer generation; ""flash point"" issues (sexuality, global economic system, politics, bioethics); religious pluralism. Will Christianity have a future? What kind of future? GER:DB-Hum
4 units, Spr (Pitkin, B)

RELIGST 118. Gandhi, King, and Nonviolence
(Same as HISTORY 105) Lives, times, theory, and practice of Mohandas Gandhi and Martin Luther King, Jr.; their significance to issues of violence and nonviolence today. GER:DB-Hum
4 units, not given this year

RELIGST 123. Islam Today
Case studies from the Muslim world to explore contemporary developments that affect Muslims in maintaining religious identity and continuity. GER:DB-Hum
4 units, Spr (Nanji, A)

RELIGST 124. Sufi Islam
The complex of Islamic intellectual and social perspectives subsumed under the term Sufism. Sufi mystical philosophies and historical and social evolution. Major examples include: Qushayrî, Râbi'a, Junayd, Hallâj, Sulamî, Ibn al-'Arabî, Rûmî, Nizâm al-Dîn Awliyâ'. Social and political roles of Sufi saints and communities. Readings include original prose and poetry in translation, secondary discussions, and ethnography. GER:DB-Hum
4 units, not given this year

RELIGST 125. Authority of the Past in Islamic Thought
How have Muslims thought about the past as a source for contextualizing the present and generating prescriptions for right conduct? What imaginations of time undergird major Islamic intellectual perspectives? A wide-ranging exploration based on readings from the Quran, lives of prophets, chronicles, philosophy of history, hagiography, epic and mythology, and ethnography.
4 units, Win (Bashir, S)

RELIGST 126. Protestant Reformation
16th-century evangelical reformers (Luther, Calvin, Zwingli) and reform movements (Lutheran, Reformed, Anabaptist) in their medieval context. GER:DB-Hum
4 units, not given this year

RELIGST 127A. Kabbalah: The Mystical Teachings of Judaism
Jewish mystical literature, especially the Zohar. Mystical concepts of the divine: masculine and feminine aspects of the Godhead, divine sonship; eroticism and sexuality; cosmogony and apocalypse; mystical secrecy and popularization, including the contemporary Kabbalah movement in the U.S. and figures such as Madonna and Roseanne. Guest lectures by scholars of Kabbalah including Moshe Idel from Jerusalem and Daniel Matt, the American translator of the Zohar.
2 units, not given this year

RELIGST 129. Modern Jewish Thought
From the early Enlightenment to the present. Universalism, subjectivity, and redemption within Judaism's encounter with modernity as reflected on by Jewish intellectuals within the Western philosophical tradition; how modern Jewish intellectuals have shaped and been shaped by current debates. Challenges to religious identity by secularism, capitalism, and the nation state. Messianism, mysticism, reactionary romanticism, critical theory, post-Holocaust philosophy, spirituality, and feminism. Thinkers include Spinoza, Marx, Freud, Buber, Strauss, the Frankfurt school, Benjamin, Arendt, and Levinas.
4 units, not given this year

RELIGST 130. Genesis and Gender: Male and Female in Judaism, Christianity, and Islam
(Same as JEWISHST 120) What does it mean to be a man or a woman? And what role have classical and religious traditions played in shaping understandings of gender differences? Investigation of the construction of gender identities, roles, and differences in Greek and Roman sources and three monotheistic faiths. Interpretation and retellings of the story of Adam and Eve in the Bible and the Qu¿ran, commentaries, lives and practices of religious communities, religious iconography down to the present. GER:DB-Hum, EC-Gender
4 units, Aut (Fonrobert, C; Pitkin, B)

RELIGST 132. Jesus the Christ
How did Jesus of Nazareth, who never claimed to be Christ or divine, become the son of God after his death? Sources include the history of first-century Judaism and Christianity.
4 units, not given this year

RELIGST 132C. Jesus the Jew in First Century Christianity
Contemporary historical-critical methods in investigating how one might study Jewish and Christian texts of the 1st century CE. Social contexts including economic realities and elite ideological views. What can be known historically about 1st-century Judaism and Jesus' part it in it. How Jewish apocalyptic messianism shaped the birth of Christianity and its trajectory through the 1st century. GER:DB-Hum
4 units, not given this year

RELIGST 132D. Early Christian Gospels
(Same as CLASSGEN 132) An exploration of Christian gospels of the first and second century. Emphasis on the variety of images and interpretations of Jesus and the good news, the broader Hellenistic and Jewish contexts of the gospels, the processes of developing and transmitting gospels, and the creation of the canon. Readings include the Gospel of John, the Gospel of Mark, the Gospel of Thomas, the Gospel of Mary and other canonical and non-canonical gospels. GER:DB-Hum
4 units, Spr (Copeland, K)

RELIGST 132E. Christianity and Poetry
(Same as COMPLIT 156) This course examines the relationship between poetry and Christianity from Dante to T.S. Eliot. The course will focus on how Christian devotional practices (prayer, meditation), and liturgical forms appear in poetry. Does ""poetic faith"" (Coleridge) differ from religious faith? How do poets address God? What poetic devices do they use to pray, repent, or give thanks? Authors include Dante, St. Teresa of Avila, John Donne, Emily Dickinson, and Eliot.
3-5 units, Spr (Staff)

RELIGST 133. Inventing Christianity in Late Antiquity
The transformation of an apocalyptic sect into an imperial religion from 200 to 600 C.E. Shifts in structures of authority, worship, and belief mapped against shifts in politics, economics and religion in the larger Roman empire. Cultural visions of this history including Edward Gibbon's Decline and Fall of the Roman Empire, Dan Brown's conspiracy theory in The Da Vinci Code, and Elaine Pagels' The Secret Gospel of Thomas. GER:DB-Hum
4 units, not given this year

RELIGST 136. Buddhist Yoga
Buddhist models of spiritual practice emphasizing issues in the interpretation of the contemplative path. GER:DB-Hum, EC-GlobalCom
4 units, not given this year

RELIGST 139. Nihilism
The history of a religious specter. Examine the challenges and promises of ¿nihilistic thinking¿ in the wide context of European moral thought, focusing on the role it played in major 19th/20th century critiques of modernity (notably with the so-called ¿end of metaphysics¿). Particular emphasis will be on the role of ¿nothing¿ as category of thought, and why so many religious thinkers and philosophers have tried to make something out of it. Readings to include Pascal, Jacobi, Kierkegaard, Nietzsche, Barth, Heidegger, Benjamin, Nishitani, Arendt, and the ¿return to religion¿ in late postmodern thought. Examples from literature/art and culture (Doestoevsky, Dada, contemporary culture critique) to enrich and ground the discussions.
3-5 units, Win (Khawaja, N)

RELIGST 144. John Calvin and Christian Faith
Close reading and analysis of Calvin's Institutes of the Christian Religion as a classic expression of Christian belief. GER:DB-Hum

4 units, not given this year

RELIGST 146. Religious Mystery and Rational Reflection
The boundaries of rational knowledge about Christian faith through a reading of the transcendental project of Jesuit theologian Karl Rahner. Rahner's thought, informed by various sources (e.g., the mystics, Aquinas, Kant, Hegel and Ignatius Loyola), results in an interpretation of Christian faith that strives for intellectual honesty in the face of challenges from science, atheism, and postmodern culture. Yet it leaves room for a fundamental human openness to the source and goal of self-transcendence, what Rahner calls holy mystery. Weekly short position papers required. GER:DB-Hum

4 units, Spr (Crowley, P)

RELIGST 148. From Jesus to Paul
Jesus considered himself God's definitive prophet, but he did not think he was God, and had no intention of founding a new religion. How did this Jewish prophet become the gentile God and the founder of Christianity? The role of Paul. GER:DB-Hum

4 units, not given this year

RELIGST 148A. St. Paul and the Politics of Religion
The major letters written by Paul, the Apostle, and his biography, Acts of the Apostles. Historical context in first century Jewish cultural politics. Origins of Christianity, and the split into Judaism and Christianity. The relationship between Jews and non-Jews. The juxtaposition of law and faith. Origins of cultural universalism. Paul as Jewish radical versus Paul, the first Christian thinker and theologian. Recent philosophical readings of Paul (Taubes, Badiou, and Agamben). GER:DB-Hum

4 units, not given this year

RELIGST 150. The Lotus Sutra: History of a Buddhist Book
The Lotus school of Mahayana, and its Indian sources, Chinese formulation, and Japanese developments. GER:DB-Hum, DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 151A. Buddhist Art in a Cosmopolitan Environment
The Buddhist art of Gandhara, historical Northwest India, was the product of a complex interplay of different cultures, religions and societies in the region. Gandharan art from the historic circumstances that led to its development in the first century AD to its gradual disappearance in its homeland around 500 AD. GER:DB-Hum

4 units, not given this year

RELIGST 154. Buddhism Today: Responses to New Global Challenges
How do the traditions of Buddhism cope with new social, ethical, and global challenges? Case studies from Sri Lanka, Japan, and the West. The historical position of Buddhist social thought. Buddhism's ascetic and meditative legacy: friend or foe of social engagement? GER:DB-Hum, EC-GlobalCom

4 units, not given this year

RELIGST 156. Goddesses and Gender in Hinduism
India's tradition of worshiping female forms of the divine, including Kali, Durga, Lakshmi, Saraswati, Radha, Sita, and local deities. The stories, histories, iconographies, theologies, arts, and practices associated with these goddesses. How the worship of goddesses impacts the lives of women. Readings include Is the Goddess a Feminist? GER:DB-Hum, EC-Gender

4 units, not given this year

RELIGST 159. Music and Religion in South Asia
Music and other arts in South Asia are often intertwined with religion. Guest teacher Tara Kini, a Hindustani classical singer from India, will join Prof. Hess in introducing history, theory and practice of music as it relates to religion, especially Hinduism and Islam, in South Asia. How is sound understood as revelation of divinity? How do songs express devotional emotion and theology? How do film songs show popular religious culture? How do musical performance and construction of history become arenas for political ideology? Students will do musical practice along with academic study. Guest artists will appear. No background required. GER:DB-Hum, EC-GlobalCom

4-5 units, Aut (Hess, L)

RELIGST 159A. Religion and Performance
(Same as RELIGST 359A) What happens when religion is viewed through the lens of performance? Texts become dramas, songs, recitations, oral commentaries, dances, movies, and political appropriations. Beliefs become embodied enactments; doctrine puts on a costume and indulges in role play. Approaches to performance theory through religious enactments such as ritual, prayer, festival, drama, music, and film. Most examples from S. Asian religions; students may undertake research projects into other cultures and traditions. GER:DB-Hum

4 units, not given this year

RELIGST 161. Religion and Its Modern Critics
(Same as RELIGST 261) Philosophical critique of religion as it developed in the modern west. Looking primarily at Feuerbach, Marx, Nietzsche and Freud--the so-called ""masters of suspicion""--consider the century-long effort to understand religious consciousness as a form of projection, ideology or illusion. Central concern will be to evaluate the major claim of the critics: that religion fosters a sense of alienation or estrangement within the human condition GER:DB-Hum

4 units, Spr (Kangas, D)

RELIGST 162. Spirituality and Nonviolent Urban and Social Transformation
(Same as URBANST 126) A life of engagement in social transformation is often built on a foundation of spiritual and religious commitments. Case studies of nonviolent social change agents including Rosa Parks in the civil rights movement, César Chávez in the labor movement, and WIlliam Sloane Coffin in the peace movement; the religious and spiritual underpinnings of their commitments. Theory and principles of nonviolence. Films and readings. Service learning component includes placements in organizations engaged in social transformation. Service Learning Course (certified by Haas Center). GER:DB-Hum

5 units, not given this year

RELIGST 167. Medieval Religious Philosophy
(Same as PHIL 101A) (Same as PHIL 101A.) Survey of medieval philosophy, focusing on God, world and words. A pervasive assumption about the structure of the world, that it reflected the categories of God's mind and emerged from an act of divine speech, gave impetus to the interest in the nature of language and its relation to the world. Scripture served as one kind of divine communication to human beings, and ""The Book of the World"" as another. The problem of universals, the question of how words relate to God, epistemology, theories of reference, semiotics, are some of the topics discussed. Readings from Augustine, Anselm, Aquinas, Scotus, and Ockham, etc. GER:DB-Hum

4 units, Aut (Gelber, H)

RELIGST 170C. Reading in Biblical Hebrew
Third of a three quarter sequence. Readings and translation of biblical narratives emphasizing grammar and literary techniques. Prerequisite: AMELANG 170B.

4 units, not given this year

RELIGST 172. Sex, Body, and Gender in Medieval Religion
Anxiety about sex and the body increased markedly during the early years of Christianity, while the doctrine of the Incarnation put the human body at the center of religious concern. Ideals of virginity, chastity, ascetic self-denial of necessities like food, sleep, and freedom from pain were central to lay and clerical piety. The religious theory and practice associated with questions about sex, body, and gender in the Middle Ages as constructed in literature, mythology, ritual, mystic, and monastic texts. GER:DB-Hum, EC-Gender

4 units, not given this year

RELIGST 174. Martyrdom in the Ancient World
(Same as CLASSGEN 174) Jewish, pagan and Christian groups under Roman rule all told tales of persecution and resistance. How did they use these stories, and the historical experiences behind them, to form group identity? Emphasis is on ancient documents in translation, and modern scholarly interpretations, to examine the competing agendas of parties involved, group dynamics, individual motivation, symbolic violence, and the body as a locus of power and control. GER:DB-Hum

4 units, not given this year

RELIGST 174E. Kierkegaard: Existentialism and Religion
(Same as RELIGST 374E) Kierkegaard is rightly called one of the founders of existentialism. Like Socrates, the one philosopher in the western tradition to whom he felt consciously in debt, Kierkegaard sought to return philosophy to the work of thinking through the human condition in all its uncertainty and finitude. Although 20th century existentialists like Sartre and Camus were self-consciously atheist, Kierkegaard's existentialism has religious origins. Through readings of Kierkegaard's philosophical and religious texts, explore the possibility of an existentialist interpretation of the human condition that is religious in nature. Kierkegaard's development of a 'philosophy of existence' as a response to major trends in modern European thought, particularly in response to the philosophies of German idealism (Kant, Hegel) and romanticism. GER:DB-Hum
4 units, not given this year

RELIGST 176. Religious Diversity: Theoretical and Practical Issues
What does it mean for a religion to be true? If one religion is true, what about the truth of other religious possibilities? How, and why, should religious traditions be compared? Readings address tolerance and pluralism, relativism, comparative theory, and new religious virtues. GER:DB-Hum
4 units, not given this year

RELIGST 183. The Death of God: Between Hegel and Marx
The radical transformations in Western notions of God between the death of Hegel and the birth of historical materialism, arguing that questions about theism and atheism, humanism, and history formulated in the period 1831-50 are still pertinent today. Texts from Hegel, the young Hegelians, Feuerbach, and Marx on issues of God, history, and the social dimensions of human nature. GER:DB-Hum
4 units, not given this year

RELIGST 185. Prophetic Voices of Social Critique
Judges, Samuel, Amos, and Isaiah depict and question power, strong leaders who inevitably fail, the societal inequities and corruption inevitable in prosperity, and the interplay between prophet as representative of God and the human king. How these texts succeed in their scrutiny of human power and societal arrangements through attention to narrative artistry and poetic force, and condemnation of injustice. Includes service-learning component in conjunction with the Haas Center. GER:DB-Hum
4 units, not given this year

RELIGST 199. Individual Work
Prerequisite: consent of instructor and department. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 201. Classical Islamic Law
(Same as RELIGST 301) Emphasis is on methods of textual interpretation. History of premodern Islamic law, including origins, formation of schools of law, and social and political contexts. Laws of sale, marriage, divorce, and the obligation to forbid wrong. GER:DB-Hum
3-5 units, not given this year

RELIGST 203. Myth, Place, and Ritual in the Study of Religion
(Same as RELIGST 303) Sources include: ethnographic texts and theoretical writings; the approaches of Charles Long, Jonathan Z. Smith, Victor Turner, Michael D. Jackson, and Wendy Doniger; and lived experiences as recounted in Judith Sherman's Say the Name: A Survivor's Tale in Prose and Poetry, Jackson's At Home in the World, Marie Cardinal's The Words to Say It, and John Phillip Santos¿ Places Left Unfinished at the Time of Creation. GER:DB-Hum
3-5 units, not given this year

RELIGST 207A. Modern African Islam through Literature
(Same as RELIGST 307A) Read the works of Modern Muslim Literature in Africa. Explore the expressions and modes by which Islam and its contemporary condition are represented in African contexts. GER:DB-Hum
4 units, Spr (Nanji, A)

RELIGST 210. Translating the Daode Jing
One of the most frequently translated works in world literature. Challenges faced by translators, support from commentaries and related sources, and assumptions underlying translations into Western languages. Recommended: classical Chinese. GER:DB-Hum
4 units, not given this year

RELIGST 212. Chuang Tzu
The Chuang Tzu (Zhuangzi) in its original setting and as understood by its spiritual progeny. Limited enrollment. GER:DB-Hum
5 units, not given this year

RELIGST 216. Japanese Buddhism
Focus on the religious lives of lay people in medieval Japan, as evidenced in collections of Buddhist stories (setsuwashu), narrative picture scrolls (emaki), and related historical materials. All readings are in English, but the instructor will also work with students interested in reading the original Japanese. GER:DB-Hum
4 units, Win (Horton, S)

RELIGST 217. Japanese Studies of Religion in China
(Same as RELIGST 317) (Graduate students register for 317.) Readings in Japanese secondary sources on Chinese religions.
3 units, not given this year

RELIGST 220. Modern Muslim Thought: Philosophy, Politics, Society
Focus is on major challenges of the modern period. Historicity and plurality. Questions concerning governance, law, development, and political and social order in majority and minority Muslim contexts. Readings include original works in English and in translation. GER:DB-Hum
5 units, not given this year

RELIGST 220B. Crypto-Muslim Culture in Early Modern Spain
(Same as ILAC 214) What is known about the secret religious practice and culture of the Moriscos, Spain's large minority community of Muslim converts to Christianity (1500-1609)? What role did their handwritten literature (largely Islamic texts written in Castilian but copied out in Arabic script) play in the formation and maintenance of their culture? What can these Crypto-Muslim communities teach us regarding the place of Muslim culture in Western Europe today? The course will be taught in English; knowledge of Spanish and/or Arabic script is useful but not necessary.
3-5 units, Win (Barletta, V)

RELIGST 221. The Talmud
(Same as RELIGST 321) Strategies of interpretation, debate, and law making. Historical contexts. Prerequisite: Hebrew. GER:DB-Hum
4 units, not given this year

RELIGST 221A. Philology of Rabbinic Literature
(Same as RELIGST 321A) The genesis of rabbinic texts as texts. Evolution from oral stage to manuscript to printed text. Questions of redaction versus edition. Focus on Palestinian and Babylonian Talmud, with excursions into midrashic texts. Prerequisite: strong background in Hebrew. Knowledge of Aramaic preferred.
3-5 units, not given this year

RELIGST 221B. The Talmud as Literature
(Same as RELIGST 321B) In what sense can Talmud be studied as literature? Which voices can be identified? Concepts of author, editor, or redactor. The basic textual units of Talmud: sugya, chapter, and tractate. The sugya as literary genre. The aesthetic of talmudic dialectics. Prerequisite: Strong Hebrew, Aramaic preferred. GER:DB-Hum
3-5 units, not given this year

RELIGST 221C. Aramaic Jewish texts
(Same as JEWISHST 221C, JEWISHST 321C, RELIGST 321C) Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language though time. The course is intended for students with substantial knowledge of Hebrew. GER:DB-Hum
2-5 units, Aut (Balberg, M; Fonrobert, C)

RELIGST 222. Literature and Society in Medieval Islam
The development of literary traditions, 600-1500. Major poetic and prose topoi through examples from Arabic, Persian, and Turkish literature in translation. Literature's place in Islamic societies and biographies of significant authors. The religious value of literary

forms. Literary canons as unifying agents in different parts of the medieval Muslim world. Comparison between high and folk literatures. The role of aesthetic paradigms in the formation of Islamic religious and cultural identities. GER:DB-Hum

4 units, not given this year

RELIGST 222B. Sufism Seminar

(Same as RELIGST 322B) Sufism through original texts and specialized scholarship. Prerequisite: ability to read at least one major language of Islamic religious literature (Arabic, Persian, Turkish, Urdu). GER:DB-Hum

3-5 units, not given this year

RELIGST 222C. Debauchery and asceticism

(Same as RELIGST 322C) Arabic texts written by and about early Muslim figures famous either for their limitless self-indulgence or their rigorous self-denial. Language and style of these texts, their implied or explicit dialogue with religious values, and their possible relation to each other. Questions of representation, self-representation, and biographical fallacy. Intended for students with reading knowledge of Arabic.

3-5 units, not given this year

RELIGST 223. Studying Islam: History, Methods, Debates

Islam as a subject of academic inquiry since the 19th century. Origins and critiques of major methodological perspectives in Islamic studies such as philology, religious studies, history, art history, and anthropology. Landmarks in the development of the field and the work of major scholars. Academic debates regarding unity versus diversity, orientalism, fundamentalism and Islamism, Sufism, and gender. Current trends in scholarship on medieval and modern Muslim societies. Prerequisite: course work in Islamic studies or methodology in religious studies. GER:DB-Hum

4 units, not given this year

RELIGST 223A. The Arabic Qur'an

(Same as RELIGST 323A) Early history, language, structure, style, chronology, motifs, themes, and interpretation. Knowledge of Arabic required. GER:DB-Hum

3-5 units, not given this year

RELIGST 224. Classical Islamic Texts

(Same as RELIGST 324) Premodern Islamic scholarship. Genre-specific historical research methods. The hadith literature, tafsir, biographical dictionaries, fiqh, tarikh, and geographical works. Prerequisite: reading knowledge of Arabic. GER:DB-Hum

3-5 units, not given this year

RELIGST 224B. Unveiling the Sacred: Explorations in Islamic Religious Imagination

(Same as RELIGST 324B) Poetry and prose in translation as well as historical studies. Islamic movements invested in the idea that the sensory world has a hidden or esoteric counterpart that can be understood or experienced through following particular religious programs. Various forms of Shi'ism and Sufism, millenarian and apocalyptic movements, the Nation of Islam and its offshoots. Philosophical propositions, historical contexts, and the role of ritual in the construction of religious systems. GER:DB-Hum

3-5 units, not given this year

RELIGST 226. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period

(Same as RELIGST 326) Characteristics of religious philosophy from Saadia Gaon to Maimonides, Jewish opposition to and support of philosophy in the medieval Christian and Muslim world, texts from the early development of Kabbalah, the relationship between philosophy and Kabbalah, and conflicting views of Kabbalah from the 16th through 18th centuries.

5 units, not given this year

RELIGST 226A. Judaism and Hellenism

(Same as RELIGST 326A) interactions and conflicts between Jews and Greeks in the centuries following the conquests of Alexander the Great and the cultural/religious repercussions of their encounter. In what ways were Jews influenced by Greek culture? In what ways, and for what reasons, did they resist it? And how the interaction of these cultures shape the subsequent development of Judaism and Christianity? Jewish texts in the Greco-Roman period, including Jewish-Greek writers like Philo of Alexandria, the Apocrypha, the Dead Sea Scrolls, selected writings from the New Testament, and the Passover Haggadah. GER:DB-Hum

3-5 units, not given this year

RELIGST 226B. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict

(Same as CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 326B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world. GER:DB-Hum

5 units, Aut (Fonrobert, C)

RELIGST 226C. Mystics and Merrymakers: Innovations in Modern Judaism

(Same as JEWISHST 226C, JEWISHST 326C, RELIGST 326C) How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival. GER:DB-Hum

3 units, Win (Rosenberg, J; Fonrobert, C)

RELIGST 227. The Qur'an

(Same as RELIGST 327) Early history, themes, structure, chronology, and premodern interpretation. Relative chronology of passages. GER:DB-Hum

5 units, not given this year

RELIGST 229. Winged Bulls and Sun Disks: Religion and Politics in the Persian Empire

Since Herodotus in the 5th century BCE, the Persian Empire has been represented as the exemplar of oriental despotism and imperial arrogance, a looming presence and worthy foil for the West and Greek democracy. History of the Achaemenid Empire, beginning with the rise of the Medes in the 7th century BCE to the fall of the Achaemenids to Alexander the Great¿s armies in 331 BCE. Focus on the intimate relationship between religion and empire and will also survey the diverse cultural institutions and religious practices found within the Empire. Evaluate contemporary representations of the Persians in politics and popular culture, such as the recent film ¿300¿ and the graphic novel on which it is based, in an attempt to better appreciate the enduring cultural legacy of the Greco-Persian wars. GER:DB-Hum

3 units, Spr (Vevaina, Y)

RELIGST 230B. Zen Studies

(Same as RELIGST 330B) Readings in recent English-language scholarship on Chan and Zen Buddhism GER:DB-Hum

4 units, Spr (Foulk, T)

RELIGST 236. European Reformations

(Same as HISTORY 231G, HISTORY 331G, RELIGST 336) Readings in and discussion of theological and social aspects of sixteenth century reformations: Luther, Radical Reform, Calvin, and Council of Trent, missionary expansion, religious conflict, creative and artistic expressions. Texts include primary sources and secondary scholarly essays and monographs.

4-5 units, Win (Stokes, L; Pitkin, B)

RELIGST 237. Jewish and Christian Rome, 1st to 6th Centuries

To what extent are Judaism and Christianity products of the Roman Empire, and shaped by its politics? Literature concerning Jewish and Christian perceptions of power, and archaeological and artistic traces of both religions in the imperial city of Rome. What roles did strategies of resistance and accommodation play in the formation of these religious communities¿ emerging identities? Possible optional field trip to Rome over Spring break. GER:DB-Hum

5 units, not given this year

RELIGST 238. Christian Neo-Platonism, East and West
(Same as RELIGST 338) Christianity's shift to neo-Platonic Greek philosophical categories and its significance for contemporary spirituality. Readings from Plotinus, Proclus, Greek fathers such as Pseudo-Dionysus, and from Ambrose and Augustine. GER:DB-Hum
3-5 units, not given this year

RELIGST 239. Luther and the Reform of Western Christianity
(Same as RELIGST 339) Luther's theology, ethics, biblical interpretation, and social reforms and their significance for the remaking of Western Christianity. Readings include Luther's own writings and secondary sources about Luther and his world. GER:DB-Hum
3-5 units, not given this year

RELIGST 241B. Mystics and Mysticism
(Same as RELIGST 341B) The varieties of meaning and significance the term mysticism takes on in religious studies though an exploration of accounts of mystical experiences: visions, bodily sensations, sense of the sacred, along with practices engaged in and texts written by those claiming such experiences for themselves or others. Focus is on medieval/renaissance Christians but students are invited to explore examples from other times, traditions and places. GER:DB-Hum
5 units, Win (Gelber, H)

RELIGST 245. Religion, Reason, and Romanticism
The late 18th-century European cultural shift from rationalist to romantic modes of thought and sensibility. Debates about religion as catalysts for the new Zeitgeist. Readings include: the Jewish metaphysician, Mendelssohn; the dramatist, Lessing; the philosopher of language and history, Herder; the critical idealist, Kant; and the transcendental idealist, Fichte. GER:DB-Hum
5 units, not given this year

RELIGST 247. Chinese Buddhist Texts
(Same as RELIGST 347) Readings in Chinese Buddhist texts, including selections from s¿tras, ¿¿stras, Vinaya texts, indigenous monastic rules (qingui), and Chan texts (yulu, gongan). Prerequisite: background in classical Chinese GER:DB-Hum
3-5 units, Win (Foulk, T)

RELIGST 247B. Readings in Chinese Religious Texts: The Lingbao Scriptures
(Same as RELIGST 347B) A survey of the original Lingbao scriptures. Composed in the late-4th / early 5th century, these texts radically revised Daoist practice, incorporated elements of Buddhist thought and practice, and created liturgies that are still used in Daoist communities today. (Reading knowledge of Literary Chinese ¿¿ required). GER:DB-Hum
4 units, Aut (Bokenkamp, S)

RELIGST 248. Chinese Buddhism in World Historical Perspective
(Same as RELIGST 348) Shared cosmologies, trade routes, and political systems. Prerequisite: background in Chinese or Japanese.
3-5 units, not given this year

RELIGST 248A. Chinese Buddhism Beyond the Great Wall
(Same as RELIGST 348A) The thought, practice, and cultural resonance of the sorts of originally Chinese Buddhism that flourished to the north and northwest of China proper during the two to three centuries following the fall of the Tang - i.e., under the Khitan Liao (907-1125) and the Tangut Xixia (1032-1227) dynasties - with special emphasis on the later fortunes of the Huayan, Chan, and Mijiao (Esoteric) traditions. Prerequisite: reading knowledge of Chinese. GER:DB-Hum
3-5 units, not given this year

RELIGST 250. Classics of Indian Buddhism
Texts in English translation includING discourses (sutras), philosophical treatises, commentaries, didactic epistles, hymns, biographies, and narratives. GER:DB-Hum
4 units, not given this year

RELIGST 250B. Depictions of the Buddha
(Same as RELIGST 350B) The image of the Buddha changes relatively little from its earliest conceptions. The role of the image and the notion of the Buddha do change fundamentally with time and place. South Asian depictions of the Buddha from the earliest symbolic representations to the wrathful and peaceful forms found in the esoteric Buddhism of India and the Himalayas, as well as the changing conceptions of the Buddha to which these depictions are related. GER:DB-Hum
3-5 units, not given this year

RELIGST 251. Readings in Indian Buddhist Texts
(Same as RELIGST 351) (Graduate students register for 351.) Introduction to Buddhist literature through reading original texts in Sanskrit. Prerequisite: Sanskrit. GER:DB-Hum
3-5 units, Spr (Harrison, P)

RELIGST 251A. Buddhist Visions of Paradise
(Same as RELIGST 351A) Textual and art-historical evidence for the early development in the greater Indian cultural area of the cult of the Buddhas of the present and their paradise worlds (""Pure Land Buddhism""). GER:DB-Hum
3-5 units, not given this year

RELIGST 253. Mountains, Buddhist Practice, and Religious Studies
(Same as RELIGST 353) The notion of the sacred mountain. Readings from ethnographic and theoretical works, and primary sources. GER:DB-Hum
3-5 units, not given this year

RELIGST 254. Recent Contributions to Buddhist Studies
May be repeated for credit.
4 units, not given this year

RELIGST 257. Readings in Daoist Texts
(Same as RELIGST 357) Readings from primary sources. Prerequisite: classical Chinese.
4 units, not given this year

RELIGST 258. Japanese Buddhist Texts
(Same as RELIGST 358) Readings in medieval Japanese Buddhist materials. May be repeated for credit. Prerequisite: background in Japanese or Chinese. GER:DB-Hum
3-5 units, not given this year

RELIGST 261. Religion and Its Modern Critics
(Same as RELIGST 161) Philosophical critique of religion as it developed in the modern west. Looking primarily at Feuerbach, Marx, Nietzsche and Freud, the so-called masters of suspicion, consider the century-long effort to understand religious consciousness as a form of projection, ideology, or illusion. Central concern is to evaluate the major claim of the critics: that religion fosters a sense of alienation or estrangement within the human condition. GER:DB-Hum
4 units, Spr (Kangas, D)

RELIGST 263. Judaism and the Body
Representations and discourses of the body in Jewish culture; theories of body and ritual. Case studies of circumcision, menstrual impurity, and intersexuality. Readings include classical texts in Jewish tradition and current discussions of these textual traditions. GER:DB-Hum, EC-Gender
4 units, not given this year

RELIGST 265. Research Methods and Resources in Jewish Studies
(Same as JEWISHST 225, JEWISHST 325, RELIGST 365) Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription).
1-3 units, Win (Baker, Z)

RELIGST 271A. Dante's Spiritual Vision
Poetry, ethics, and theology in Dante's Divine Comedy. Supplementary readings from classical authors such as St. Thomas Aquinas, and from modern writers, such as Jorge Borges. Fulfills capstone seminar requirement for the Philosophy and Literature tracks. Students may take 271A without taking 271B. Consent of the instructor required. GER:DB-Hum
4-5 units, Aut (Yearley, L)

RELIGST 271B. Dante's Spiritual Vision
Poetry, ethics, and theology in Dante's Divine Comedy. Supplementary readings from classical authors such as St. Thomas, and from modern writers, such as Jorge Borges. Fulfills capstone seminar requirement for the Philosophy and Literature tracks. Prerequisite: 271A GER:DB-Hum

4-5 units, Win (Yearley, L)

RELIGST 272. Kant on Religion
(Same as RELIGST 372) Critical examination of Kant¿s principle writings on religion against the background of his general theoretical and practical philosophy and guided by the hypothesis that his philosophy of religion continues to offer significant insights and resources to contemporary theories of religion. Recent reassessments of Kant on religion in the secondary literature will also be read and discussed

3-5 units, not given this year

RELIGST 273. Historicism and Its Problems
(Same as RELIGST 373) The emergence, varieties, and crises of historicism as a world view and approach to the study of religion in the 19th and 20th centuries. The implications of historical reason and historical consciousness for the philosophy of religion, ethics, and theology. GER:DB-Hum

3-5 units, not given this year

RELIGST 274. From Kant to Kierkegaard
(Same as RELIGST 374) (Graduate students register for 374.) The main currents of religious thought in Germany from Kant's critical philosophy to Kierkegaard's revolt against Hegelianism. Emphasis is on the theories of religion, the epistemological status of religious discourse, the role of history (especially the figure of Jesus), and the problem of alienation/reconciliation in seminal modern thinkers: Kant, Schleiermacher, Hegel, and Kierkegaard. GER:DB-Hum

3-5 units, not given this year

RELIGST 275. Kierkegaard and Religious Existentialism
(Same as RELIGST 375) (Graduate students register for 375.) Close reading of Kierkegaard¿s magnum opus, Concluding Unscientific Postscript to Philosophical Fragments, in its early 19th-century context. GER:DB-Hum

3-5 units, not given this year

RELIGST 277. The Later Heidegger
(Same as RELIGST 377) Lectures and seminar discussions of the problematic of the later Heidegger (1930 - 1976) in the light of his entire project. Readings from ""Pathmarks,"" ""Four Seminars,"" ""On Time and Being,"" and other texts. GER:DB-Hum

3 units, Aut (Sheehan, T)

RELIGST 278. Heidegger: Confronting the Ultimate
(Same as RELIGST 378) Heidegger's work on meaning, the self, and the sacred. Texts include Being and Time, courses and opuscula up to 1933, the Letter on Humanism, and Contributions of Philosophy. GER:DB-Hum

3-5 units, not given this year

RELIGST 279. Heidegger and the Holy
(Same as RELIGST 379) Heidegger's philosophy as opening a new door onto the possibility of experiencing the sacred after the collapse of traditional metaphysical theology. A close reading of Being and Time as an introduction to the question of the holy.

4 units, not given this year

RELIGST 280. Schleiermacher: Reconstructing Religion
(Same as RELIGST 380) Idealist philosopher, Moravian pietist, early German Romantic, co-founder of the University of Berlin, head preacher at Trinity Church, translator of Plato's works, Hegel's opponent, pioneer in modern hermeneutics, father of modern theology. Schleiermacher's controversial reconception of religion and theology in its philosophical context. GER:DB-Hum

3-5 units, Aut (Sockness, B)

RELIGST 282. King Solomon and the Search for Wisdom
(Same as JEWISHST 228, JEWISHST 328, RELIGST 382) What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.

4 units, Win (Weitzman, S)

RELIGST 290. Majors Seminar
Required of all majors and joint majors. The study of religion reflects upon itself. Representative modern and contemporary attempts to ""theorize,"" and thereby understand, the phenomena of religion in anthropology, psychology, sociology, cultural studies, and philosophy. WIM. WIM

5 units, Win (Sockness, B)

RELIGST 297. Senior Essay/Honors Essay Research
Guided by faculty adviser. May be repeated for credit. Prerequisite: consent of instructor and department.

3-5 units, Aut (Staff), Win (Staff), Spr (Staff)

RELIGST 298. Senior Colloquium
For Religious Studies majors writing the senior essay or honors thesis. Students present work in progress, and read and respond to others. Approaches to research and writing in the humanities.

5 units, Spr (Fonrobert, C)

GRADUATE COURSES IN RELIGIOUS STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

RELIGST 219. Buddhism and Death
The role of pre and post mortem practices in ancient and modern Buddhist traditions; examples from India, China, and Japan. How the clergy and laity conceived of the process of dying, and how those beliefs were transformed into rituals.

4 units, not given this year

RELIGST 301. Classical Islamic Law
(Same as RELIGST 201) Emphasis is on methods of textual interpretation. History of premodern Islamic law, including origins, formation of schools of law, and social and political contexts. Laws of sale, marriage, divorce, and the obligation to forbid wrong.

3-5 units, not given this year

RELIGST 302. Islamic Studies Proseminar
Research methods and materials for the study of Islam.

1-5 units, Aut (Bashir, S)

RELIGST 303. Myth, Place, and Ritual in the Study of Religion
(Same as RELIGST 203) Sources include: ethnographic texts and theoretical writings; the approaches of Charles Long, Jonathan Z. Smith, Victor Turner, Michael D. Jackson, and Wendy Doniger; and lived experiences as recounted in Judith Sherman's Say the Name: A Survivor's Tale in Prose and Poetry, Jackson's At Home in the World, Marie Cardinal's The Words to Say It, and John Phillip Santos¿ Places Left Unfinished at the Time of Creation.

3-5 units, not given this year

RELIGST 304A. Theories and Methods
Required of graduate students in Religious Studies. Approaches to the study of religion. Prerequisite: consent of instructor.

4 units, not given this year

RELIGST 304B. Theories and Methods
Required of graduate students in Religious Studies. Approaches to the study of religion. Prerequisite: consent of instructor.

4 units, Aut (Bashir, S)

RELIGST 307A. Modern African Islam through Literature
(Same as RELIGST 207A) Read the works of Modern Muslim Literature in Africa. Explore the expressions and modes by which Islam and its contemporary condition are represented in African contexts.

4 units, Spr (Nanji, A)

RELIGST 308. Medieval Japanese Buddhism
Japanese religion and culture, including Buddhism, Shinto, popular religion, and new religions, through the medium of film.

3-5 units, not given this year

RELIGST 312. Buddhist Studies Proseminar
Research methods and materials for the study of Buddhism. May be repeated for credit. Prerequisite: reading knowledge of Chinese or Japanese.

1-5 units, not given this year

RELIGST 317. Japanese Studies of Religion in China
(Same as RELIGST 217) (Graduate students register for 317.) Readings in Japanese secondary sources on Chinese religions.
3 units, not given this year

RELIGST 321. The Talmud
(Same as RELIGST 221) Strategies of interpretation, debate, and law making. Historical contexts. Prerequisite: Hebrew.
4 units, not given this year

RELIGST 321A. Philology of Rabbinic Literature
(Same as RELIGST 221A) The genesis of rabbinic texts as texts. Evolution from oral stage to manuscript to printed text. Questions of redaction versus edition. Focus on Palestinian and Babylonian Talmud, with excursions into midrashic texts. Prerequisite: strong background in Hebrew. Knowledge of Aramaic preferred.
3-5 units, not given this year

RELIGST 321B. The Talmud as Literature
(Same as RELIGST 221B) In what sense can Talmud be studied as literature? Which voices can be identified? Concepts of author, editor, or redactor. The basic textual units of Talmud: sugya, chapter, and tractate. The sugya as literary genre. The aesthetic of talmudic dialectics. Prerequisite: Strong Hebrew, Aramaic preferred.
3-5 units, not given this year

RELIGST 321C. Aramaic Jewish texts
(Same as JEWISHST 221C, JEWISHST 321C, RELIGST 221C) Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language though time. The course is intended for students with substantial knowledge of Hebrew.
2-5 units, Aut (Balberg, M; Fonrobert, C)

RELIGST 322B. Sufism Seminar
(Same as RELIGST 222B) Sufism through original texts and specialized scholarship. Prerequisite: ability to read at least one major language of Islamic religious literature (Arabic, Persian, Turkish, Urdu).
3-5 units, not given this year

RELIGST 322C. Debauchery and asceticism
(Same as RELIGST 222C) Arabic texts written by and about early Muslim figures famous either for their limitless self-indulgence or their rigorous self-denial. Language and style of these texts, their implied or explicit dialogue with religious values, and their possible relation to each other. Questions of representation, self-representation, and biographical fallacy. Intended for students with reading knowledge of Arabic.
3-5 units, not given this year

RELIGST 323A. The Arabic Qur'an
(Same as RELIGST 223A) Early history, language, structure, style, chronology, motifs, themes, and interpretation. Knowledge of Arabic required.
3-5 units, not given this year

RELIGST 324. Classical Islamic Texts
(Same as RELIGST 224) Premodern Islamic scholarship. Genre-specific historical research methods. The hadith literature, tafsir, biographical dictionaries, fiqh, tarikh, and geographical works. Prerequisite: reading knowledge of Arabic.
3-5 units, not given this year

RELIGST 324B. Unveiling the Sacred: Explorations in Islamic Religious Imagination
(Same as RELIGST 224B) Poetry and prose in translation as well as historical studies. Islamic movements invested in the idea that the sensory world has a hidden or esoteric counterpart that can be understood or experienced through following particular religious programs. Various forms of Shi'ism and Sufism, millenarian and apocalyptic movements, the Nation of Islam and its offshoots. Philosophical propositions, historical contexts, and the role of ritual in the construction of religious systems.
3-5 units, not given this year

RELIGST 326. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period
(Same as RELIGST 226) Characteristics of religious philosophy from Saadia Gaon to Maimonides, Jewish opposition to and support of philosophy in the medieval Christian and Muslim world, texts from the early development of Kabbalah, the relationship between philosophy and Kabbalah, and conflicting views of Kabbalah from the 16th through 18th centuries.
5 units, not given this year

RELIGST 326A. Judaism and Hellenism
(Same as RELIGST 226A) interactions and conflicts between Jews and Greeks in the centuries following the conquests of Alexander the Great and the cultural/religious repercussions of their encounter. In what ways were Jews influenced by Greek culture? In what ways, and for what reasons, did they resist it? And how the interaction of these cultures shape the subsequent development of Judaism and Christianity? Jewish texts in the Greco-Roman period, including Jewish-Greek writers like Philo of Alexandria, the Apocrypha, the Dead Sea Scrolls, selected writings from the New Testament, and the Passover Haggadah.
3-5 units, not given this year

RELIGST 326B. Judaism and Christianity in the Mediterranean World: Contact, Comptetition, and Conflict
(Same as CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 226B) Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.
5 units, Aut (Fonrobert, C)

RELIGST 326C. Mystics and Merrymakers: Innovations in Modern Judaism
(Same as JEWISHST 226C, JEWISHST 326C, RELIGST 226C) How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.
3 units, Win (Rosenberg, J; Fonrobert, C)

RELIGST 327. The Qur'an
(Same as RELIGST 227) Early history, themes, structure, chronology, and premodern interpretation. Relative chronology of passages.
5 units, not given this year

RELIGST 328S. The Study of the Midrash
Two-week block seminar; four sessions. Talmudic philology; development and transmission of the Talmudic text and manuscripts. Relationship between Midrash and Mishnah and between Mishnah and Tosefta; development of talmudic sugiot; relationship between the Babylonian and Palestinian Talmud.
1-2 units, given occasionally

RELIGST 330B. Zen Studies
(Same as RELIGST 230B) Readings in recent English-language scholarship on Chan and Zen Buddhism
4 units, Spr (Foulk, T)

RELIGST 336. European Reformations
(Same as HISTORY 231G, HISTORY 331G, RELIGST 236) Readings in and discussion of theological and social aspects of sixteenth century reformations: Luther, Radical Reform, Calvin, and Council of Trent, missionary expansion, religious conflict, creative and artistic expressions. Texts include primary sources and secondary scholarly essays and monographs.
4-5 units, Win (Stokes, L; Pitkin, B)

RELIGST 338. Christian Neo-Platonism, East and West
(Same as RELIGST 238) Christianity's shift to neo-Platonic Greek philosophical categories and its significance for contemporary spirituality. Readings from Plotinus, Proclus, Greek fathers such as Pseudo-Dionysus, and from Ambrose and Augustine.
3-5 units, not given this year

RELIGST 339. Luther and the Reform of Western Christianity
(Same as RELIGST 239) Luther's theology, ethics, biblical interpretation, and social reforms and their significance for the remaking of Western Christianity. Readings include Luther's own writings and secondary sources about Luther and his world.
3-5 units, not given this year

RELIGST 341. Comparative Perspective on Confucian Texts
Classical Confucian texts, in prose and poetry, interpreted through comparative perspectives drawn from both inside and outside China. Consent of the instructor required.
4-5 units, Win (Yearley, L)

RELIGST 341B. Mystics and Mysticism
(Same as RELIGST 241B) The varieties of meaning and significance the term mysticism takes on in religious studies though an exploration of accounts of mystical experiences: visions, bodily sensations, sense of the sacred, along with practices engaged in and texts written by those claiming such experiences for themselves or others. Focus is on medieval/renaissance Christians but students are invited to explore examples from other times, traditions and places.
5 units, Win (Gelber, H)

RELIGST 347. Chinese Buddhist Texts
(Same as RELIGST 247) Readings in Chinese Buddhist texts, including selections from s¿tras, ¿¿stras, Vinaya texts, indigenous monastic rules (qingui), and Chan texts (yulu, gongan). Prerequisite: background in classical Chinese
3-5 units, Win (Foulk, T)

RELIGST 347B. Readings in Chinese Religious Texts: The Lingbao Scriptures
(Same as RELIGST 247B) A survey of the original Lingbao scriptures. Composed in the late-4th / early 5th century, these texts radically revised Daoist practice, incorporated elements of Buddhist thought and practice, and created liturgies that are still used in Daoist communities today. (Reading knowledge of Literary Chinese ¿¿ required).
4 units, Aut (Bokenkamp, S)

RELIGST 348. Chinese Buddhism in World Historical Perspective
(Same as RELIGST 248) Shared cosmologies, trade routes, and political systems. Prerequisite: background in Chinese or Japanese.
3-5 units, not given this year

RELIGST 348A. Chinese Buddhism Beyond the Great Wall
(Same as RELIGST 248A) The thought, practice, and cultural resonance of the sorts of originally Chinese Buddhism that flourished to the north and northwest of China proper during the two to three centuries following the fall of the Tang - i.e., under the Khitan Liao (907-1125) and the Tangut Xixia (1032-1227) dynasties - with special emphasis on the later fortunes of the Huayan, Chan, and Mijiao (Esoteric) traditions. Prerequisite: reading knowledge of Chinese.
3-5 units, not given this year

RELIGST 349. Meditation and Mythology in Chinese Buddhism
Readings in Chinese texts and English scholarly literature on issues such as specific techniques and hagiographical imagery in Chinese Buddhist traditions of self-cultivation. Prerequisite: background in Chinese or Japanese.
3-5 units, not given this year

RELIGST 350. Modern Western Religious Thought Proseminar
Selected topics in recent and contemporary religious thought. May be repeated for credit.
1-5 units, not given this year

RELIGST 350B. Depictions of the Buddha
(Same as RELIGST 250B) The image of the Buddha changes relatively little from its earliest conceptions. The role of the image and the notion of the Buddha do change fundamentally with time and place. South Asian depictions of the Buddha from the earliest symbolic representations to the wrathful and peaceful forms found in the esoteric Buddhism of India and the Himalayas, as well as the changing conceptions of the Buddha to which these depictions are related.
3-5 units, not given this year

RELIGST 351. Readings in Indian Buddhist Texts
(Same as RELIGST 251) (Graduate students register for 351.) Introduction to Buddhist literature through reading original texts in Sanskrit. Prerequisite: Sanskrit.
3-5 units, Spr (Harrison, P)

RELIGST 351A. Buddhist Visions of Paradise
(Same as RELIGST 251A) Textual and art-historical evidence for the early development in the greater Indian cultural area of the cult of the Buddhas of the present and their paradise worlds (""Pure Land Buddhism"").
3-5 units, not given this year

RELIGST 353. Mountains, Buddhist Practice, and Religious Studies
(Same as RELIGST 253) The notion of the sacred mountain. Readings from ethnographic and theoretical works, and primary sources.
3-5 units, not given this year

RELIGST 357. Readings in Daoist Texts
(Same as RELIGST 257) Readings from primary sources. Prerequisite: classical Chinese.
4 units, not given this year

RELIGST 358. Japanese Buddhist Texts
(Same as RELIGST 258) Readings in medieval Japanese Buddhist materials. May be repeated for credit. Prerequisite: background in Japanese or Chinese.
3-5 units, not given this year

RELIGST 359A. Religion and Performance
(Same as RELIGST 159A) What happens when religion is viewed through the lens of performance? Texts become dramas, songs, recitations, oral commentaries, dances, movies, and political appropriations. Beliefs become embodied enactments; doctrine puts on a costume and indulges in role play. Approaches to performance theory through religious enactments such as ritual, prayer, festival, drama, music, and film. Most examples from S. Asian religions; students may undertake research projects into other cultures and traditions.
4 units, not given this year

RELIGST 365. Research Methods and Resources in Jewish Studies
(Same as JEWISHST 225, JEWISHST 325, RELIGST 265) Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription).
1-3 units, Win (Baker, Z)

RELIGST 370. Comparative Religious Ethics
The difference that the word religious makes in religious ethics and how it affects issues of genre. Theoretical analyses with examples from W. and E. Asia. Prerequisite: consent of instructor.
4 units, not given this year

RELIGST 372. Kant on Religion
(Same as RELIGST 272) Critical examination of Kant¿s principle writings on religion against the background of his general theoretical and practical philosophy and guided by the hypothesis that his philosophy of religion continues to offer significant insights and resources to contemporary theories of religion. Recent reassessments of Kant on religion in the secondary literature will also be read and discussed
3-5 units, not given this year

RELIGST 373. Historicism and Its Problems
(Same as RELIGST 273) The emergence, varieties, and crises of historicism as a world view and approach to the study of religion in the 19th and 20th centuries. The implications of historical reason and historical consciousness for the philosophy of religion, ethics, and theology.
3-5 units, not given this year

RELIGST 374. From Kant to Kierkegaard
(Same as RELIGST 274) (Graduate students register for 374.) The main currents of religious thought in Germany from Kant's critical philosophy to Kierkegaard's revolt against Hegelianism. Emphasis is on the theories of religion, the epistemological status of religious discourse, the role of history (especially the figure of Jesus), and the problem of alienation/reconciliation in seminal modern thinkers: Kant, Schleiermacher, Hegel, and Kierkegaard.
3-5 units, not given this year

RELIGST 374E. Kierkegaard: Existentialism and Religion
(Same as RELIGST 174E) Kierkegaard is rightly called one of the founders of existentialism. Like Socrates, the one philosopher in the western tradition to whom he felt consciously in debt, Kierkegaard sought to return philosophy to the work of thinking through the human condition in all its uncertainty and finitude. Although 20th century existentialists like Sartre and Camus were self-consciously atheist, Kierkegaard's existentialism has religious origins. Through readings of Kierkegaard's philosophical and religious texts, explore the possibility of an existentialist interpretation of the human condition that is religious in nature. Kierkegaard's development of a 'philosophy of existence' as a response to major trends in modern European thought, particularly in response to the philosophies of German idealism (Kant, Hegel) and romanticism.
4 units, not given this year

RELIGST 375. Kierkegaard and Religious Existentialism
(Same as RELIGST 275) (Graduate students register for 375.) Close reading of Kierkegaard¿s magnum opus, Concluding Unscientific Postscript to Philosophical Fragments, in its early 19th-century context.
3-5 units, not given this year

RELIGST 377. The Later Heidegger
(Same as RELIGST 277) Lectures and seminar discussions of the problematic of the later Heidegger (1930 - 1976) in the light of his entire project. Readings from ""Pathmarks,"" ""Four Seminars,"" ""On Time and Being,"" and other texts.
3 units, Aut (Sheehan, T)

RELIGST 378. Heidegger: Confronting the Ultimate
(Same as RELIGST 278) Heidegger's work on meaning, the self, and the sacred. Texts include Being and Time, courses and opuscula up to 1933, the Letter on Humanism, and Contributions of Philosophy.
3-5 units, not given this year

RELIGST 379. Heidegger and the Holy
(Same as RELIGST 279) Heidegger's philosophy as opening a new door onto the possibility of experiencing the sacred after the collapse of traditional metaphysical theology. A close reading of Being and Time as an introduction to the question of the holy.
4 units, not given this year

RELIGST 380. Schleiermacher: Reconstructing Religion
(Same as RELIGST 280) Idealist philosopher, Moravian pietist, early German Romantic, co-founder of the University of Berlin, head preacher at Trinity Church, translator of Plato's works, Hegel's opponent, pioneer in modern hermeneutics, father of modern theology. Schleiermacher's controversial reconception of religion and theology in its philosophical context.
3-5 units, Aut (Sockness, B)

RELIGST 382. King Solomon and the Search for Wisdom
(Same as JEWISHST 228, JEWISHST 328, RELIGST 282) What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.
4 units, Win (Weitzman, S)

RELIGST 385. Research in Buddhist Studies
Independent study in Buddhism. May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 386. Research in Islamic Studies
Independent study in Islamic Studies. May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 387. Research in Jewish Studies
Independent study in Jewish Studies. May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 388. Research in Modern Religious Thought, Ethics, and Philosophy
Independent study in Modern Religious Thought, Ethics, and Philosophy. May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 389. Individual Work for Graduate Students
May be repeated for credit. Prerequisite: consent of instructor.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RELIGST 390. Teaching Internship
Required supervised internship for PhDs.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff)

RELIGST 391. Pedagogy
Required of Ph.D. students. May be repeated for credit.
1 unit, Aut (Rosenberg, J)

RELIGST 392. Paper in the Field
Prerequisite: consent of graduate director. May be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

RELIGST 395. Master of Arts Thesis
2-9 units, Aut (Staff), Win (Staff), Spr (Staff)

RELIGST 399. Recent Works in Religious Studies
Readings in secondary literature for Religious Studies doctoral students. May be repeated for credit.
1-2 units, Spr (Fonrobert, C)

RELIGST 801. TGR Project
(Staff)
0 units, Aut (Staff), Win (Staff), Spr (Staff)

RELIGST 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES (REES) COURSES

UNDERGRADUATE COURSES IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

REES 35. Films of Central Asia
Films with English subtitles from Tajikistan, Uzbekistan, Kazakhstan, Kyrgyzstan, and Turkmenistan. May be repeated once for credit. (AU)
1-2 units, Win (Kunanbaeva, A), Spr (Kunanbaeva, A)

REES 100. Current Issues in Russian, East European, and Eurasian Studies
Enrollment limited to REEES students. Scholars present analyses of methodologies, challenges, and current issues in the study of Russia, E. Europe, and Eurasia.
1 unit, Aut (Crews, R; Wessling, R), Win (Crews, R; Wessling, R), Spr (Crews, R; Wessling, R)

REES 105. Central and East European Politics
(Same as REES 205) Focus is on how the states of Central and East Europe, including the Baltic states, have moved from communism and the Soviet Bloc to democracy, NATO and the EU. Topics include the communist legacy, transitions and their legacies, ethnic issues, and the evolution of economic and social policies, and the comparison of democratization processes in these countries to democracies in other regions, such as Latin America and southern Europe. GER:DB-SocSci
5 units, not given this year

REES 130. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries
(Same as REES 330) The experience of religion, particularly Orthodoxy, under tsars and commissars. Religion as a lived experience; practice and belief in the provinces and villages, intertwining of religion and folk customs (the so-called double faith); condition of the Church before and after the Revolutions of 1917; religion under Soviet control; and liberation of the Church since the collapse of the Soviet Union.
4-5 units, not given this year

GRADUATE COURSES IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

REES 200. Current Issues in Russian, East European, and Eurasian Studies
Enrollment limited to REEES students. Scholars present analyses of methodologies, challenges, and current issues in the study of Russia, E. Europe, and Eurasia.
1 unit, Aut (Crews, R; Wessling, R), Win (Crews, R; Wessling, R), Spr (Crews, R; Wessling, R)

REES 205. Central and East European Politics
(Same as REES 105) Focus is on how the states of Central and East Europe, including the Baltic states, have moved from communism and the Soviet Bloc to democracy, NATO and the EU. Topics include the communist legacy, transitions and their legacies, ethnic issues, and the evolution of economic and social policies, and the comparison of democratization processes in these countries to democracies in other regions, such as Latin America and southern Europe.
5 units, not given this year

REES 299. Directed Reading
1-12 units, Aut (Staff), Win (Staff), Spr (Staff)

REES 320. State and Nation Building in Central Asia
Issues of identity, development, and security following the dissolution of the Soviet Union and the emergence of independent states in Central Asia and the Southern Caucasus. Topics include the impact of 9/11, the spread of radical Islamist movements in the region, its growing role as a transit route for drugs, weapons, and possibly nuclear materials, the impact of the Soviet legacy, the nature of political and economic transformations, relations with neighboring countries, security challenges, and options facing U.S. policy makers.
5 units, Aut (Lapidus, G)

SCIENCE, TECHNOLOGY, AND SOCIETY (STS) COURSES

For information on undergraduate programs in Science, Technology, and Society, see page 000 of this bulletin.

UNDERGRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

STS 101. Science, Technology, and Contemporary Society
(Same as ENGR 130, STS 201) Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. GER:DB-SocSci
4-5 units, Aut (McGinn, R)

STS 101Q. Technology in Contemporary Society
(Stanford Introductory Seminar) Preference to sophomores. Introduction to the STS field. The natures of science and technology and their relationship, what is most distinctive about these forces today, and how they have transformed and been affected by contemporary society. Social, cultural, and ethical issues raised by recent scientific and technological developments. Case studies from areas such as information technology and biotechnology, with emphasis on the contemporary U.S. Unexpected influences of science and technology on contemporary society and how social forces shape scientific and technological enterprises and their products. Enrollment limited to 12. GER:DB-SocSci
4 units, Aut (McGinn, R)

STS 103Q. Reading and Writing Poetry about Science
(Stanford Introductory Seminar) (Same as ENGLISH 103Q) Preference to sophomores. Students will study recent poetry inspired by the phenomena and history of the sciences in order to write such poems themselves. These poems bring sensuous human experience to bear on biology, ecology, neuroscience, physics, astronomy, and geology, as well as on technological advances and missteps. Poets such as Mark Doty, Jody Gladding, Albert Goldbarth, Jorie Graham, Sarah Lindsay, Adrienne Rich, W.S. Merwin, and C. K. Williams. Grounding in poetics, research in individually chosen areas of science, weekly analytical and creative writing. Enrollment limited to 12.
4 units, Win (Roberts, E; Rusk, L)

STS 110. Ethics and Public Policy
(Same as MS&E 197, PUBLPOL 103B) Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations. GER:DB-Hum, EC-EthicReas, WIM
5 units, Win (McGinn, R)

STS 112. Ten Things: An Archaeology of Design
(Same as CLASSART 113, CLASSART 213) Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology. GER:DB-SocSci
3-5 units, Aut (Shanks, M)

STS 114. Technology, Ecology, and the Imagination of the Future
(Same as ENGLISH 153G) Seminar. Literary visions of the future from the 60s to the present. How such texts imagine new and existing technologies in interrelation with the evolution of natural ecosystems. The development of wild habitats, alterations of the human body, and visions of the future city. The role of images and stories about globalization. Literary, scientific, and technical texts. GER:DB-Hum
5 units, not given this year

STS 115. Ethical Issues in Engineering
(Same as ENGR 131) Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment. GER:DB-Hum
4 units, Spr (McGinn, R)

STS 144. Game Studies: Issues in Design, Technology, and Player Creativity
What can be learned about innovation from digital games? Digital game technologies, communities, and cultures. Topics include game design, open source ideas and modding, technology studies, player/consumer-driven innovation, fan culture, transgressive play, and collaborative co-creation drawn from virtual worlds and online games.
4 units, not given this year

STS 152. Nuclear Weapons, Risk and Hope
Recent research indicates that depending on nuclear weapons for our security is thousands of times riskier than society will tolerate with respect to nuclear power plants. This seminar explores methods for estimating the risk, why society ignores the danger, and what can be done to correct that imbalance. No prerequisites, and at a level understandable to non-majors, including in the humanities.
1 unit, Aut (Hellman, M)

STS 180. Imagining the Computer, Wiring the World
(Same as STS 280) The theme of revolution in the popular imagination about computing. How people imagine themselves as members of a global network society, navigating cyberspace and pioneering a bold, new information age. But where did modern information technology come from? Has it brought about revolution, and if so for whom? The cultural and political visions that shaped modern computing, and how the resulting technology has shaped a globalizing sociopolitical order.
4 units, Spr (Slayton, R)

STS 190. Junior Honors Seminar
For juniors intending to pursue honors in STS or a related discipline. Goal is to identify a research problem and identify key components of honors research and thesis writing such as literature reviews, methodologies, theoretical frameworks, and writing standards.
3-4 units, Win (Slayton, R)

STS 199. Individual Work
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

STS 200. Senior Colloquium
Analytical and theoretical texts treating the natures and interplay of science, technology, and society. Prerequisite: STS major with senior standing and four STS core courses, or consent of instructor.
4 units, Win (Downer, J), Spr (Downer, J)

STS 210. Ethics, Science, and Technology
Ethical issues raised by advances in science and technology. Topics: biotechnology including agriculture and reproduction, the built environment, energy technologies, and information technology. Prerequisite: 110 or another course in ethics. Limited enrollment. GER:DB-Hum
4 units, alternate years, not given this year

STS 290A. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to write a literature review with adviser consultation.
1-5 units, Aut (Slayton, R)

STS 290B. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to analyze data and write up results.
1-5 units, Win (Slayton, R)

STS 290C. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to complete the final thesis.
1-5 units, Spr (Slayton, R)

GRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

STS 201. Science, Technology, and Contemporary Society
(Same as ENGR 130, STS 101) Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology.
4-5 units, Aut (McGinn, R)

STS 280. Imagining the Computer, Wiring the World
(Same as STS 180) The theme of revolution in the popular imagination about computing. How people imagine themselves as members of a global network society, navigating cyberspace and pioneering a bold, new information age. But where did modern information technology come from? Has it brought about revolution, and if so for whom? The cultural and political visions that shaped modern computing, and how the resulting technology has shaped a globalizing sociopolitical order.
4 units, Spr (Slayton, R)

STS 299. Advanced Individual Work
(Staff)
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

SLAVIC GENERAL (SLAVGEN) COURSES

UNDERGRADUATE COURSES IN SLAVIC GENERAL

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SLAVGEN 110. The Gogol Bordello: Ukraine as a Meeting House of Cultures
(Same as SLAVGEN 210) The cohabitation of authors and cultural geography in multiethnic Ukraine. Comparison of Ukrainian texts, images of Ukraine and Ukrainians by their Polish, Jewish, German, and Russian cohabitants. Possible authors include : Andrukhovych, Aleichem, Babel, Celan, Franko, Gogol, Lewycka, Mickiewicz, Shevchenko, Pushkin, Schulz, Ukraina, and Zabuzhko. GER:DB-Hum
3-5 units, not given this year

SLAVGEN 122. Yiddish Story
(Same as SLAVGEN 222) The humor, drama, anger, and artistry of modern E. European and American Yiddish writers including Sholem Aleichem, I. L. Peretz, Isaac Bashevis Singer, Chaim Grade, and Yankev Glatshteyn. In English. GER:DB-Hum, EC-GlobalCom
5 units, not given this year

SLAVGEN 123. The Yiddish Novel
(Same as SLAVGEN 223) How Yiddish novels reveal changes in modern Jewish life and literature in Europe and the U.S. The influences of folklore, traditional Jewish culture, and European literature. Works by Isaac and Joshua Singer, Joseph Opatoshu, Der Nister, Chava Rosenfarb, Sholem Asch, and David Bergelson. Readings in English; optional sessions for close readings in Yiddish. GER:DB-Hum
3-4 units, not given this year

SLAVGEN 133. Poles and Others: Literature and History in Modern Poland
(Same as SLAVGEN 233) The physical and cultural territories of the former Polish-Lithuanian Commonwealth have long been objects of contest. The 20th century witnessed two or three rebirths of Poland and one or two deaths; a belated modernization of Polish society; the final inclusion of Polish-speaking peasants and burghers in a Polish national identity; and the exclusion of Jews, Germans, Lithuanians, Belarusans, Ukrainians, and others from the state and participation in a partially shared culture. GER:DB-Hum
3-4 units, not given this year

SLAVGEN 141. Staging the Revolution: Russian Theater and Society, 1917-1937
(Same as SLAVGEN 241) Between 1917 and 1937, artistic experimentation in the Russian theater coincided with political and social changes in Russian society. Modernist artists interpreted the revolution as an artistic possibility to demolish conventions of representation. Mass festivals, circus, and street performances replaced the old theater. In the time of the Great Terror and staged trials, theater and opera remained among the leading arts, but state patronage caused a major reorientation of artistic practices. Readings include plays by Mayakovsky, Bulgakov, Babel, Tretiakov, and Erdman. Readings in English. GER:DB-Hum
4 units, not given this year

SLAVGEN 145. Age of Experiment: From Pushkin to Dostoevsky
(Same as SLAVGEN 245) Before the Great 19th c. Russian Novel broke the barrier for realist and philosophical heft, Russian writers experimented furiously in short fictional forms. We will read a rich assortment of texts from Pushkin and Gogol through early Tolstoy

and Dostoevsky, with an eye to literary innovation and influence on modern short form. GER:DB-Hum, EC-GlobalCom

3-4 units, Aut (Greenleaf, M)

SLAVGEN 146. The Great Russian Novel: History and Other Theories of Time and Action

(Same as SLAVGEN 246) Connections of philosophy to literary form in Turgenev's Fathers and Sons, Tolstoy's War and Peace, Dostoevsky's The Brothers Karamazov, and Chekov's The Cherry Orchard, and other stories. GER:DB-Hum, EC-GlobalCom

3-4 units, Win (Greenleaf, M)

SLAVGEN 147. The Age of War and Revolution: A Survey of Russian Literature and Culture, 1900-1950s

(Same as SLAVGEN 247) First of two-part sequence. Russian modernism and the avant garde.The Russian Revolution, the era of the NEP, Soviet civilization, and the literature of opposition following Stalin¿s death. Texts in English translation. GER:DB-Hum, EC-GlobalCom

3-4 units, Spr (Draskoczy, J)

SLAVGEN 148. Dissent and Disenchantment: A Survey of Russian Literature and Culture, 1953 to the Present

(Same as SLAVGEN 248) From the death of Stalin to post-communist Russia. Literature of the thaw and de-Stalinization, official and unofficial literature of dissent, samizdat, village and urban prose, literature of the new emigration, late Soviet underground, sots-art, perestroika, and post-communist literature and culture. Texts in English translation. For graduate credit for research paper, register for 399. GER:DB-Hum, EC-GlobalCom

3-4 units, not given this year

SLAVGEN 150. Countercultures in Conversation: Russian and American Rock Music and Protest Poetry

(Same as SLAVGEN 250) Non-conformist protest movements in contemporary Russian poetry; historical and cultural context; and comparison with similar processes in American social and cultural life. Sources include Russian and American poetry, songs, and DVDs. Fourth unit for readings in Russian. GER:DB-Hum

3-4 units, not given this year

SLAVGEN 151. Dostoevsky and His Times

(Same as COMPLIT 119, COMPLIT 219, SLAVGEN 251) Open to juniors, seniors, and graduate students. Major works in English translation with reference to related developments in Russian and European culture, literary criticism, and intellectual history. GER:DB-Hum

4 units, not given this year

SLAVGEN 153. Russian Jewish LIterature

(Same as SLAVGEN 253) Russian Jewish experience inspired books and films in Hebrew, Yiddish, Russian and English that reveal a world of conflict, humor and beauty. From the mid-19th century to the t21st century. Authors include Haim Nahman Bialik, Sholem Aleichem, Isaac babel, Osip Mandelstam, Joseph Brodsky, Leonid Tsypkin, Ludmila Ulitskaia, Gary Shteyngardt. GER:DB-Hum

3-4 units, not given this year

SLAVGEN 162. Gender Images in Film

(Same as SLAVGEN 262) Film creates permanent new images of femininity. One of its conscious prerequisites is the notion of social stereotypes. The development of enduring images of the film heroine, 1914-90, through a comparison of the Russian, American, and W. European cinema, and analytical approaches to them from feminist film theory. GER:EC-Gender

3 units, not given this year

SLAVGEN 163. Gender in Postwar Russian Culture

(Same as SLAVGEN 263) Issues of femininity and masculinity in Russian literature, film, and popular culture from the 40s to the present. Readings include fiction, memoirs, poetry, drama, and theoretical works in gender studies. GER:EC-Gender

3-4 units, not given this year

SLAVGEN 165. Poetry, Painting, and Music of the Russian Avant Garde

(Same as SLAVGEN 265) Interrelationships between poetry and other arts in Russia, 1905-30. The pursuit of synthesis of arts and the modernist agenda of life creation and immortality. Parallel developments in literature, painting, and music, and style and poetics. Russian modernist poetry in the context of changes in the language of visual arts and music). Women poets and artists. Native sources and Western influences; non-Russian elements and transnational tendencies. The impact of scientific discoveries and technological inventions on artistic experimentation.

3-4 units, not given this year

SLAVGEN 166. Transcending (Meta)Physical Borders: Russian Cinema since 1964

(Same as SLAVGEN 266) Soviet and Russian films which explore the theme of transcending physical (national) and metaphysical (supernatural) borders. Sources include classics of art-house cinema (Paradzhanov, Shepitko, Tarkovsky, Mikhalkov) and more recent feature films of independent Russia (Muratova, Sokurov, Bekmambetov, Popogrebsky-Khlebnikov). GER:DB-Hum

3-4 units, Win (Skakov, N)

SLAVGEN 181. Philosophy and Literature

(Same as CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENGEN 181, ITALGEN 181, GERGEN 181) Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. GER:DB-Hum

4-5 units, Win (Anderson, L; Landy, J)

GRADUATE COURSES IN SLAVIC GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SLAVGEN 210. The Gogol Bordello: Ukraine as a Meeting House of Cultures

(Same as SLAVGEN 110) The cohabitation of authors and cultural geography in multiethnic Ukraine. Comparison of Ukrainian texts, images of Ukraine and Ukrainians by their Polish, Jewish, German, and Russian cohabitants. Possible authors include : Andrukhovych, Aleichem, Babel, Celan, Franko, Gogol, Lewycka, Mickiewicz, Shevchenko, Pushkin, Schulz, Ukraina, and Zabuzhko.

3-5 units, not given this year

SLAVGEN 221. Modernism and the Jewish Voice in Europe

(Same as COMPLIT 247, GERGEN 221A) Some of the most haunting literary voices of the 20th century emerged from the Jewish communities of Eastern and Central Europe. The Jewishness of the modernists is thematized, asking whether it contributed to shared attitudes toward text, history, or identity. Their works are situated in specific linguistic traditions: Yiddish, Hebrew, Russian, Polish, or German. Primary readings from Ansky, Bialik, Mandelstam, Babel, Schulz, Kafka, Celan; secondary readings in history, E. European literature, and theory, including Marx, Freud, Benjamin, and Arendt.

3-4 units, not given this year

SLAVGEN 222. Yiddish Story

(Same as SLAVGEN 122) The humor, drama, anger, and artistry of modern E. European and American Yiddish writers including Sholem Aleichem, I. L. Peretz, Isaac Bashevis Singer, Chaim Grade, and Yankev Glatshteyn. In English.

5 units, not given this year

SLAVGEN 223. The Yiddish Novel

(Same as SLAVGEN 123) How Yiddish novels reveal changes in modern Jewish life and literature in Europe and the U.S. The influences of folklore, traditional Jewish culture, and European literature. Works by Isaac and Joshua Singer, Joseph Opatoshu, Der Nister, Chava Rosenfarb, Sholem Asch, and David Bergelson. Readings in English; optional sessions for close readings in Yiddish.

3-4 units, not given this year

SLAVGEN 233. Poles and Others: Literature and History in Modern Poland
(Same as SLAVGEN 133) The physical and cultural territories of the former Polish-Lithuanian Commonwealth have long been objects of contest. The 20th century witnessed two or three rebirths of Poland and one or two deaths; a belated modernization of Polish society; the final inclusion of Polish-speaking peasants and burghers in a Polish national identity; and the exclusion of Jews, Germans, Lithuanians, Belarusans, Ukrainians, and others from the state and participation in a partially shared culture.
3-4 units, not given this year

SLAVGEN 241. Staging the Revolution: Russian Theater and Society, 1917-1937
(Same as SLAVGEN 141) Between 1917 and 1937, artistic experimentation in the Russian theater coincided with political and social changes in Russian society. Modernist artists interpreted the revolution as an artistic possibility to demolish conventions of representation. Mass festivals, circus, and street performances replaced the old theater. In the time of the Great Terror and staged trials, theater and opera remained among the leading arts, but state patronage caused a major reorientation of artistic practices. Readings include plays by Mayakovsky, Bulgakov, Babel, Tretiakov, and Erdman. Readings in English.
4 units, not given this year

SLAVGEN 245. Age of Experiment: From Pushkin to Dostoevsky
(Same as SLAVGEN 145) Before the Great 19th c. Russian Novel broke the barrier for realist and philosophical heft, Russian writers experimented furiously in short fictional forms. We will read a rich assortment of texts from Pushkin and Gogol through early Tolstoy and Dostoevsky, with an eye to literary innovation and influence on modern short form.
3-4 units, Aut (Greenleaf, M)

SLAVGEN 246. The Great Russian Novel: History and Other Theories of Time and Action
(Same as SLAVGEN 146) Connections of philosophy to literary form in Turgenev's Fathers and Sons, Tolstoy's War and Peace, Dostoevsky's The Brothers Karamazov, and Chekov's The Cherry Orchard, and other stories.
3-4 units, Win (Greenleaf, M)

SLAVGEN 247. The Age of War and Revolution: A Survey of Russian Literature and Culture, 1900-1950s
(Same as SLAVGEN 147) First of two-part sequence. Russian modernism and the avant garde.The Russian Revolution, the era of the NEP, Soviet civilization, and the literature of opposition following Stalin¿s death. Texts in English translation.
3-4 units, Spr (Draskoczy, J)

SLAVGEN 248. Dissent and Disenchantment: A Survey of Russian Literature and Culture, 1953 to the Present
(Same as SLAVGEN 148) From the death of Stalin to post-communist Russia. Literature of the thaw and de-Stalinization, official and unofficial literature of dissent, samizdat, village and urban prose, literature of the new emigration, late Soviet underground, sots-art, perestroika, and post-communist literature and culture. Texts in English translation. For graduate credit for research paper, register for 399.
3-4 units, not given this year

SLAVGEN 250. Countercultures in Conversation: Russian and American Rock Music and Protest Poetry
(Same as SLAVGEN 150) Non-conformist protest movements in contemporary Russian poetry; historical and cultural context; and comparison with similar processes in American social and cultural life. Sources include Russian and American poetry, songs, and DVDs. Fourth unit for readings in Russian.
3-4 units, not given this year

SLAVGEN 251. Dostoevsky and His Times
(Same as COMPLIT 119, COMPLIT 219, SLAVGEN 151) Open to juniors, seniors, and graduate students. Major works in English translation with reference to related developments in Russian and European culture, literary criticism, and intellectual history.
4 units, not given this year

SLAVGEN 253. Russian Jewish LIterature
(Same as SLAVGEN 153) Russian Jewish experience inspired books and films in Hebrew, Yiddish, Russian, and English that reveal a world of conflict, humor and beauty. From the mid-19th century to the 21st century. Authors include Haim Nahman Bialik, Sholem Aleichem, Isaac babel, Osip Mandelstam, Joseph Brodsky, Leonid Tsypkin, Ludmila Ulitskaia, Gary Shteyngardt.
3-4 units, not given this year

SLAVGEN 262. Gender Images in Film
(Same as SLAVGEN 162) Film creates permanent new images of femininity. One of its conscious prerequisites is the notion of social stereotypes. The development of enduring images of the film heroine, 1914-90, through a comparison of the Russian, American, and W. European cinema, and analytical approaches to them from feminist film theory.
3 units, not given this year

SLAVGEN 263. Gender in Postwar Russian Culture
(Same as SLAVGEN 163) Issues of femininity and masculinity in Russian literature, film, and popular culture from the 40s to the present. Readings include fiction, memoirs, poetry, drama, and theoretical works in gender studies.
3-4 units, not given this year

SLAVGEN 265. Poetry, Painting, and Music of the Russian Avant Garde
(Same as SLAVGEN 165) Interrelationships between poetry and other arts in Russia, 1905-30. The pursuit of synthesis of arts and the modernist agenda of life creation and immortality. Parallel developments in literature, painting, and music, and style and poetics. Russian modernist poetry in the context of changes in the language of visual arts and music). Women poets and artists. Native sources and Western influences; non-Russian elements and transnational tendencies. The impact of scientific discoveries and technological inventions on artistic experimentation.
3-4 units, not given this year

SLAVGEN 266. Transcending (Meta)Physical Borders: Russian Cinema since 1964
(Same as SLAVGEN 166) Soviet and Russian films which explore the theme of transcending physical (national) and metaphysical (supernatural) borders. Sources include classics of art-house cinema (Paradzhanov, Shepitko, Tarkovsky, Mikhalkov) and more recent feature films of independent Russia (Muratova, Sokurov, Bekmambetov, Popogrebsky-Khlebnikov).
3-4 units, Win (Skakov, N)

SLAVGEN 269. Folklore Theory and Slavic Folklore
For two centuries intellectuals have seen the stories of peasants, children, and others as folklore to be collected and studied to understand ethnic histories, human universalities, orality versus literacy, and mass politics. Readings include folklore theorists such as Grimm, Propp, Ong, Lord and Perry, Dundes, and Bauman and Briggs. Sources include Slavic and Jewish lore, but students can examine other traditions. Assignments include folklore collection. Russian readers may sign up for a section on Russian lore and its theory (one extra unit).
3-5 units, Spr (Safran, G)

SLAVGEN 313. Visuality and Literacy Workshop
Relationships among visual arts, theater, and literature in the culture of modernity.
1-2 units, not given this year

SLAVIC LANGUAGE (SLAVLANG) COURSES

UNDERGRADUATE COURSES IN SLAVIC LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SLAVLANG 1. First-Year Russian, First Quarter
Functionally-based communicative approach, including essential Russian grammar. Discussions of Russian culture and the Russian view of reality. 1: Aut, 2: Win, 3: Spr
5 units, Aut (Gruen, I)

SLAVLANG 2. First-Year Russian, Second Quarter
Continuation of 1. Prerequisite 1 or equivalent.
5 units, Win (Gruen, I)

SLAVLANG 3. First-Year Russian, Third Quarter
Continuation of 2. Prerequisite 2 or equivalent.
5 units, Spr (Khassina, E)

SLAVLANG 5. Russian for Native Speakers, First Quarter
Self-paced.Reading and writing skills and communicating in formal and informal settings. Does not fulfill the University foreign language requirement.
2 units, Aut (Staff)

SLAVLANG 6. Russian for Native Speakers, Second Quarter
Continuation of 5.
2 units, Win (Staff)

SLAVLANG 7. Russian for Native Speakers, Third Quarter
Continuation of 6.
2 units, Spr (Khassina, E)

SLAVLANG 42. Russian for Returnees
For students returning from the Stanford Program in Moscow; others welcome. Goal is to prepare students who took first-year Russian abroad for SLAVLANG 53.
2 units, Win (Staff)

SLAVLANG 51. Second-Year Russian, First Quarter
More difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. Prerequisite 3 or equivalent.
5 units, Aut (Khassina, E)

SLAVLANG 52. Second-Year Russian, Second Quarter
Continuation of 51. Prerequisite 51 or equivalent.
5 units, Win (Khassina, E)

SLAVLANG 53. Second-Year Russian, Third Quarter
Continuation of 52. Prerequisite 52 or equivalent.
5 units, Spr (Khassina, E)

SLAVLANG 55. Intermediate Russian Conversation
May be repeated for credit. Prerequisite: first-year Russian or equivalent placement.
2 units, not given this year

SLAVLANG 60A. Beginning Russian Conversation
(AU)
1 unit, Aut (Staff)

SLAVLANG 60B. Intermediate Russian Conversation
(AU)
1 unit, Win (Schupbach, R)

SLAVLANG 60C. Advanced Russian Conversation
(AU)
1 unit, Spr (Staff)

SLAVLANG 60D. East European Breweries and Brewing
(AU) (Staff)
1 unit, Win (Staff), Spr (Staff)

SLAVLANG 60F. Slavic Films Series
AU
1 unit, Win (Staff)

SLAVLANG 60P. Slav Dom Theme Projects
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

SLAVLANG 60T. Teaching Slavic Conversation
(AU)
1 unit, Aut (Staff), Win (Schupbach, R), Spr (Staff)

SLAVLANG 99. Language Specials
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

SLAVLANG 111. Third-Year Russian, First Quarter
A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. 111: Aut, 112: Win, 113: Spr
4 units, Aut (Greenhill, R)

SLAVLANG 112. Third-Year Russian, Second Quarter
Continuation of 111. Prerequisite 111 or equivalent.
4 units, Win (Greenhill, R)

SLAVLANG 113. Third-Year Russian, Third Quarter
Continuation of 112. Prerequisite 112 or equivalent.
4 units, Spr (Greenhill, R)

SLAVLANG 177. Fourth-Year Russian
Culture, history, and current events. Films, classical and contemporary writers, newspaper articles, documentaries, radio and TV programs, and music. Review and fine-tuning of grammar and idiomatic usage. Prerequisite: 113 or equivalent.
3 units, Aut (Staff)

SLAVLANG 178. Fourth-Year Russian
Continuation of 177. Prerequisite: 117 or equivalent.
3 units, Win (Greenhill, R)

SLAVLANG 179. Fourth-Year Russian
Continuation of 178. Prerequisite: 178 or equivalent.
3 units, Spr (Greenhill, R)

SLAVLANG 181. Fifth-Year Russian, First Quarter
Language proficiency maintenance; appropriate for majors and non-majors with significant language experience overseas. Discussions, oral presentations, and writing essays on contemporary Russia.
3 units, Aut (Khassina, E)

SLAVLANG 182. Fifth-Year Russian, Second Quarter
Continuation of 181. Prerequisite 181 or equivalent.
3 units, Win (Khassina, E)

SLAVLANG 183. Fifth-Year Russian, Third Quarter
Continuation of 182. Prerequisite 182.
3 units, Spr (Greenhill, R)

SLAVLANG 184A. Russian Reading Conversation and Composition
Proficiency in reading, spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.
2-3 units, not given this year

SLAVLANG 184A. Russian Reading Conversation and Composition
Proficiency in reading, spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.
2-3 units, not given this year

SLAVLANG 184B. Russian Advanced Conversation and Composition
Proficiency in spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.
2-3 units, not given this year

SLAVLANG 184C. Russian Advanced Conversation and Composition
Proficiency in spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.
2-3 units, not given this year

SLAVLANG 199. Individual Work
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SLAVIC LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SLAVLANG 299. Independent Study
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SLAVLANG 395. Graduate Studies in Russian
Prerequisite: consent of instructor. (Staff)
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

SLAVIC LITERATURE (SLAVLIT) COURSES

UNDERGRADUATE COURSES IN SLAVIC LITERATURE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SLAVLIT 129. Poetry as System: Introduction to Theory and Practice of Russian Verse
(Same as SLAVLIT 229) The history and theory of Russian versification from the 17th to the 20th century. Prerequisite: reading knowledge of Russian. GER:DB-Hum
4 units, not given this year

SLAVLIT 167. Introduction to Russian Cultural Studies
The fundamentals of literary analysis of poetics and rhetoric, as well as concepts and topics in Russian intellectual history. Goal is to improve students' comprehension and expression in Russian while building a conceptual vocabulary for understanding Russian literature and historical thought. In Russian. Prerequisite: third-year Russian or equivalent. GER:DB-Hum
3-5 units, not given this year

SLAVLIT 169. Advanced Russian Seminar: Reading Pushkin's Evgenii Onegin
A close reading of Pushkin's masterpiece in the context of the changes that were taking place in literary life of his times. Eugene Onegin and the birth of modern Russian novel. The evolution of Pushkin's literary style and narrative techniques. Final paper. In Russian. Prerequisites: three years of Russian or consent of instructor.
2-4 units, not given this year

SLAVLIT 179. Literature from Old Rus' and Medieval Russia
(Same as SLAVLIT 279) From earliest times through the 17th century. The development of literary and historical genres, and links among literature and art, architecture, and religious culture. Readings in English; graduate students read in original.
4 units, Spr (Zhivov, V)

SLAVLIT 182. Pushkin's Eugene Onegin
Russian literature's central masterpiece. In Russian. (Fleishman)
4 units, not given this year

SLAVLIT 183. Readings in the Russian Press
(Same as SLAVLIT 283) For students at the fifth-year Russian level. Advanced language training based on Russian newspapers and magazines. Discussion of issues regarding the Russian media and reading articles of a typical Russian press format.
4 units, not given this year

SLAVLIT 184. The History of the Russian Literary Language
(Same as SLAVLIT 284) Major structural and semantic changes from the 10th to the 19th centuries. Recommended: 211, 212.
4-5 units, not given this year

SLAVLIT 187. Russian Poetry of the 18th and 19th Centuries
(Same as SLAVLIT 287) Required of majors in Russian language and literature; open to undergraduates who have completed three years of Russian, and to graduate students. The major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev. In Russian.
3-4 units, not given this year

SLAVLIT 188. Russian Poetry
Required of majors in Russian literature. Developments in 19th- and 20th-century Russian poetry including symbolism, acmeism, futurism, and literature of the absurd. Emphasis is on close readings of individual poems. Discussions in Russian.
3-4 units, Spr (Staff)

SLAVLIT 189A. Honors Research
Senior honors students enroll for 5 units in Winter while writing the honors thesis, and may enroll in 189B for 2 units in Spring while revising the thesis. Prerequisite: DLCL 189.
5 units, Win (Staff), Spr (Staff)

SLAVLIT 189B. Honors Research
Open to juniors with consent of adviser while drafting honors proposal. Open to senior honors students while revising honors thesis. Prerequisites for seniors: 189A, DLCL 189.
2 units, Aut (Staff), Spr (Staff)

SLAVLIT 199. Individual Work for Undergraduates
Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SLAVIC LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SLAVLIT 200A. Introduction to Russian Literary Scholarship: Russian Formalism and Structuralism
Required of first-year Slavic graduate students and honors students. Elements of literary work and principles of literary history. 20th-century Russian literary scholarship emphasizing Russian formalism and structuralism. The relationship of literary studies with the other areas of humanistic research such as linguistics, history, art criticism, semiotics, and cultural studies. Bibliographic and archival research.
3-4 units, not given this year

SLAVLIT 200B. Introduction to Slavic Bibliography and Archival Research
1 unit, not given this year

SLAVLIT 203. Academic Russian
How to read and analyze secondary sources, formulate arguments, and present intellectual work in Russian. In Russian. Prerequisite: four years of Russian or equivalent.
3 units, Spr (Staff)

SLAVLIT 211. Introduction to Old Church Slavic
The first written language of the Slavic people. Grammar. Primarily a skills course, with attention to the historical context of Old Church Slavic.
4 units, Win (Timberlake, A)

SLAVLIT 212. Old Russian and Old Church Slavic
Continuation of 211. Readings in additional canonical Old Church Slavic texts, following the Church Slavic tradition as it develops in early Rus (Kiev, Novgorod). Selections from the Primary Chronicle, Boris and Gleb, The Life of Theodosius. The general issues of writing and the reception of Byzantine culture in early Rus.
3 units, not given this year

SLAVLIT 215. Russian Poetry after Brodsky
The Bronze Age of Russian poetry in the 70s-80s as a time of enthusiasm for poetic diction and achievement, attempts to reclaim connections with Russian and European traditions, and avant garde experimentation. The new metaphysics, the problem of the poet's self, new forms, and the limitations of the poetic domain. Poets include Leonid Aronzon, Victor Krivulin, Elena Shvartz, Ivan Zhdanov, Petr Cheigin, Gennadii Aigui, and Leonid Gubanov. Readings in Russian. Undergraduates require consent of instructor.
3-4 units, not given this year

SLAVLIT 224. The Russian Postmodern Novel
What is the place of postmodernism in Russia? The course aims to answer the question by engaging with theories of postmodernity (Baudrillard, Barthes, Derrida) and through close reading of three gems of Russian postmodern literature: Vladimir Sorokin's Marina's Thirtieth Love, Sasha Sokolov's Astrophobia, and Viktor Pelevin's Buddha's Little Finger. Novels read in Russian.
3-4 units, Win (Skakov, N)

SLAVLIT 225. Readings in Russian Realism
Open to graduate students and advanced undergraduates. Russian realist and naturalist prose emerged in a historical context that fostered specific ideas about the function and form of the literary word. Readings from Turgenev, Goncharov, Leskov, Saltykov-Shchedrin, Dostoevsky, Garshin, Tolstoy, Chekhov, Gorky, Bunin. Discussions in English.
4 units, not given this year

SLAVLIT 226. Bakhtin and His Legacy
Quests for my own word are in fact quests for a word that is not my own, a word that is more than myself, writes Mikhail Bakhtin

towards the end of his life. It was this ceaseless pursuit of another word that allowed Bakhtin, one of the most distinguished literary critics of the 20th century, to author several influential literary theory concepts, many of which deal with the ideas of multiplicity, diversity and unfinalizability. The seminar explores these core concepts through close reading of key texts in English and investigates their reverberations in the writings of other thinkers such as Lotman, Kristeva, de Man, and Derrida.

3-4 units, not given this year

SLAVLIT 229. Poetry as System: Introduction to Theory and Practice of Russian Verse

(Same as SLAVLIT 129) The history and theory of Russian versification from the 17th to the 20th century. Prerequisite: reading knowledge of Russian.

4 units, not given this year

SLAVLIT 232. Formalism, Semiotics, Bakhtin: Key Texts

Graduate seminar. The main texts of the two influential Russian literary theory groups: formalism (Viktor Shklovsky, Yiurii Tynianov, Roman Jakobson, and Boris Eikhenbaum) and the Moscow-Tartu school of semiotics (Yiurii Lotman and Boris Uspensky). Key essays of Mikhail Bakhtin, who arguably represents the most influential one-man movement in the history of literary theory.

3-4 units, Aut (Skakov, N)

SLAVLIT 269. Pushkin and the Golden Age

Graduate seminar. The formation of a simultaneously imperial and Enlightenment culture under Catherine the Great, and how Pushkin and his contemporaries realized its potentials and contradictions. Literary texts in light of other verbal discourses and artistic media; the field of 18th-century and imperial studies in Russia. Undergraduates require consent of instructor.

3 units, not given this year

SLAVLIT 270. Pushkin

Major poems and prose with detailed examination of his cultural milieu. Emphasis is on changes in the understanding of literary concepts relevant to this period of Russian literature (poetic genres, the opposition between poetry and prose, romanticism). (Staff)

2-3 units, not given this year

SLAVLIT 272. Osip Mandelstam: from Acmeism to Postmodernism

Mandelstam's oeuvre and Russian modernism: poetry, thought, culture and politics, criticism and scholarship). Russian symbolism (Ivanov, Bely, Blok, Annensky, Kuzmin); acmeism/futurism; reception; Mandelstam in Soviet civilization; poet's social function; memory, biography, and cultural theory; acmeist paradigm in the late Soviet/post-Soviet poetry (Sots-Art, Kibirov, Gandlevsky, Rubinshtein, et al.). Open to graduate students and advanced undergraduates familiar with and interested in Russian literary history, Russian, and/or modernist poetry.

2-4 units, Aut (Freidin, G)

SLAVLIT 279. Literature from Old Rus' and Medieval Russia

(Same as SLAVLIT 179) From earliest times through the 17th century. The development of literary and historical genres, and links among literature and art, architecture, and religious culture. Readings in English; graduate students read in original.

4 units, Spr (Zhivov, V)

SLAVLIT 283. Readings in the Russian Press

(Same as SLAVLIT 183) For students at the fifth-year Russian level. Advanced language training based on Russian newspapers and magazines. Discussion of issues regarding the Russian media and reading articles of a typical Russian press format.

4 units, not given this year

SLAVLIT 284. The History of the Russian Literary Language

(Same as SLAVLIT 184) Major structural and semantic changes from the 10th to the 19th centuries. Recommended: 211, 212.

4-5 units, not given this year

SLAVLIT 287. Russian Poetry of the 18th and 19th Centuries

(Same as SLAVLIT 187) Required of majors in Russian language and literature; open to undergraduates who have completed three years of Russian, and to graduate students. The major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev. In Russian.

3-4 units, not given this year

SLAVLIT 299. Individual Work for Graduate Students

For graduate students in Slavic working on theses or engaged in special work. Prerequisite: written consent of instructor.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SLAVLIT 310. Civilizing Process: Paradigms of Society and Culture in Modern Russian Literature and Film

Texts representing theoretical models of society and culture in confrontation with works of Russian fiction and film. Emphasis is on Norbert Elias's civilizing process and related theories. Topics: body and desire (Freud, Bakhtin); manners and civilizing process (Elias, Cuddihy, Lotman); symbolic forms, ritual, and systems (Geertz, Zorin); identities and practices (de Certeau, Bourdieu); subcultures (Hebdidge). Authors include Mayakovsky, Babel, Mandelstam, Bulgakov, Platonov, Zoshchenko, Erofeev, Pelevin, Trifonov, and Petrushevskaia; film makers: Mamin and Rogozhkin. Recommended: knowledge of Russian.

2-4 units, not given this year

SLAVLIT 399. Advanced Research Seminar in Russian Literature

Follow-up to 200- or 300-series seminars, as needed. May be repeated for credit.

2-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SLAVLIT 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SLAVLIT 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOCIOLOGY (SOC) COURSES

UNDERGRADUATE COURSES IN SOCIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SOC 1. Introduction to Sociology

Concepts, methods, and theoretical orientations. Sociological imagination illustrated by recent theory and research. Possible topics: the persistence of class cleavages; ethnic, racial, and gender inequalities; religious beliefs and the process of secularization; functions and dysfunctions of educational institutions; criminology and social deviance; social movements and social protest; production and reproduction of culture; rise of organizational society. GER:DB-SocSci

5 units, Aut (Szelenyi, S)

SOC 15N. The Transformation of Socialist Societies

(Stanford Introductory Seminar) Preference to freshmen. The impact of societal organization on the lives of ordinary people in socialist societies and in the new societies arising through the processes of political, economic, and social transformation. Do the concepts of democratization and marketization suffice to characterize ongoing changes? Enrollment limited to 16. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Tuma, N)

SOC 16N. African Americans and Social Movements

(Stanford Introductory Seminar) Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women¿s right, LGBT rights, environmental movement, and contemporary political conservativism.

3 units, Spr (Fields, C)

SOC 22N. The Roots of Social Protest

(Stanford Introductory Seminar) Preference to freshmen. The conditions under which social protest occurs and the emergence, success, and viability of contemporary social movements. Examples include women's civil rights, ecology, and antiwar and anti-globilization movements in the U.S. and elsewhere. Sociological theories to explain the timing, location, and causes of mobilization; how researchers evaluate these theories. Comparison of tactics, trajectories, and outcomes. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Olzak, S)

SOC 45Q. Understanding Race and Ethnicity in American Society

(Stanford Introductory Seminar) Preference to sophomores. Historical overview of race in America, race and violence, race and

socioeconomic well-being, and the future of race relations in America. Enrollment limited to 16. GER:DB-SocSci

5 units, Aut (Snipp, C)

SOC 100ASB. Pre-field Course for Alternative Spring Break

Limited to students participating in the Alternative Spring Break program. See http://asb.stanford.edu for more information.

1 unit, Win (Staff)

SOC 106. Political Sociology

(Same as SOC 206) The body of state rules and institutions that work in generating legitimate and illegitimate policy claims. Interests and identities that challenged the capacity of the national state to produce effective policies. Economic processes above the national level have that undermine the role of the state as the arena for the composition of disparate interests. GER:DB-SocSci

5 units, not given this year

SOC 107. China After Mao

(Same as SOC 207) China's post-1976 recovery from the late Mao era; its reorientation toward an open market-oriented economy; the consequences of this new model and runaway economic growth for standards of living, social life, inequality, and local governance; the political conflicts that have accompanied these changes. GER:DB-SocSci

5 units, not given this year

SOC 108. Political & Historical Sociology

(Same as SOC 208) The differences between historical and sociological analysis of past events. The difference between constructing sociological explanations and describing past events. Topics include: the rise of Christianity, the mafia in a Sicilian village, the trade network of the East India Company. GER:DB-SocSci

5 units, Spr (Staff)

SOC 109. Sociology of Terrorism

(Same as PUBLPOL 119, SOC 209) Multidisciplinary, including psychology, sociology, political science,and economics. Comparison of terrorist organizations and movements across institutions, places, and times; their motives, tactics, financing, and organization. Guest lecturers. Sources include movies, novels, and research literature. GER:DB-SocSci

5 units, Spr (Meyersson Milgrom, E)

SOC 109D. Relationships in Contemporary America

Research and theory on personal relationships in modern U.S. society. Topics include friendship, sibling relationships, marriage, cohabiting unions, non-committed sexual unions and family.

5 units, Sum (Shafer, E)

SOC 110. Politics and Society

(Same as SOC 210) (Graduate students register for 210.) Themes of political sociology, conceptions of power and state structures throughout history, the origins and expansion of the modern state, linkages between state and society, impact of the modern world system on national policies, internal distribution of power and authority, structure of political group formation and individual participation in modern states, and future trends of politics and society in a globalized world. Emphasis is on developing conceptual understandings of state, society, and politics in the modern world. GER:DB-SocSci

5 units, not given this year

SOC 110D. Analysis for the Social Sciences

Practical introduction to social science analysis. Work in small groups on analysis of a social science puzzle (an unexpected or counterintuitive fact) by identifying possible social mechanisms behind the puzzle, examining them with techniques of social science research and proposing a plausible explanation.

5 units, Sum (Staff)

SOC 111. State and Society in Korea

(Same as SOC 211) 20th-century Korea from a comparative historical perspective. Colonialism, nationalism, development, state-society relations, democratization, and globalization with reference to the Korean experience. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Staff)

SOC 114. Economic Sociology

(Same as SOC 214) (Graduate students register for 214.) The sociological approach to production, distribution, consumption, and markets, emphasizing the impact of norms, power, social structure, and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: consumption, labor markets, organization of professions such as law and medicine, the economic role of informal networks, industrial organization, including the structure and history of the computer and popular music industries, business alliances, capitalism in non-Western societies, and the transition from state socialism in E. Europe and China. GER:DB-SocSci

5 units, Aut (Granovetter, M)

SOC 115. Topics in Economic Sociology

(Same as SOC 315) (Graduate students register for 315.) Discussion of topics initially explored in 114/214, with emphasis on countries and cultures outside N. America. Possible topics: families and ethnic groups in the economy, corporate governance and control, corporate strategy, relations among firms in industrial districts and business groups, the impact of national institutions and cultures on economic outcomes, transitions from state socialism and the role of the state in economic development. Possible case studies: the U.S., Germany, Italy, Britain, France, Brazil, Korea, India, Japan, and China. Prerequisite: 114/214 or 314. GER:DB-SocSci

5 units, Win (Granovetter, M)

SOC 117A. China Under Mao

(Same as SOC 217A) (Graduate students register for 217A.) The transformation of Chinese society from the 1949 revolution to the eve of China's reforms in 1978: creation of a socialist economy, reorganization of rural society and urban workplaces, emergence of new inequalities of power and opportunity, and new forms of social conflict during Mao's Cultural Revolution of 1966-69 and its aftermath. GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

SOC 118. Social Movements and Collective Action

(Same as SOC 218) Why social movements arise, who participates in them, the obstacles they face, the tactics they choose, and how to gauge movement success or failure. Theory and empirical research. Application of concepts and methods to social movements such as civil rights, environmental justice, antiglobalization, and anti-war. GER:DB-SocSci

5 units, not given this year

SOC 119. Understanding Large-Scale Societal Change: The Case of the 1960s

(Same as SOC 219) The demographic, economic, political, and cultural roots of social change in the 60s; its legacy in the present U.S. GER:DB-SocSci

5 units, not given this year

SOC 120. Interpersonal Relations

(Same as SOC 220) (Graduate students register for 220.) Forming ties, developing norms, status, conformity, deviance, social exchange, power, and coalition formation; important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups. GER:DB-SocSci

5 units, Win (Ridgeway, C)

SOC 121. The Individual in Social Structure: Foundations in Sociological Social Psychology

Dynamics of the relationship between the individual and social structure, the relationship between the individual and immediate social context, and relationships between individuals. Focus is on the dominant theoretical perspectives in sociological social psychology: social structure and personality, structural social psychology, and symbolic interactionism.

5 units, not given this year

SOC 123. Sex and Love in Modern Society

(Same as SOC 223) Social influences on private intimate relations involving romantic love and sexuality. Topics include the sexual revolution, contraception, dating, hook-ups, cohabitation, sexual orientation, and changing cultural meanings of marriage, gender, and romantic love. GER:DB-SocSci, EC-Gender

5 units, not given this year

SOC 126. Introduction to Social Networks
(Same as SOC 226) (Graduate students register for 226.) Theory, methods, and research. Concepts such as density, homogeneity, and centrality; applications to substantive areas. The impact of social network structure on individuals and groups in areas such as communities, neighborhoods, families, work life, and innovations. GER:DB-SocSci

5 units, not given this year

SOC 127. Bargaining, Power, and Influence in Social Interaction
(Same as SOC 227) (Graduate students register for 227.) Research and theoretical work on bargaining, social influence, and issues of power and justice in social settings such as teams, work groups, and organizations. Theoretical approaches to the exercise of power and influence in social groups and related issues in social interaction such as the promotion of cooperation, effects of competition and conflict, negotiation, and intergroup relations. Enrollment limited to 40. GER:DB-SocSci

5 units, not given this year

SOC 128. Introduction to Social Network Analysis
(Same as SOC 228) (Graduate students register for SOC 228.) Theory and methods of network analysis in sociology (with an emphasis on social movements), anthropology, history, social psychology, economics, political science, and public health. Prerequisite: basic mathematics.

5 units, Aut (Parigi, P)

SOC 129X. Urban Education
(Same as EDUC 112X, EDUC 212X, SOC 229X) (Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education. GER:DB-SocSci

3-4 units, Spr (Carter, P)

SOC 130. Education and Society
(Same as EDUC 120C, EDUC 220C, SOC 230) The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling. GER:DB-SocSci

4-5 units, Aut (Ramirez, F)

SOC 132. Sociology of Education: The Social Organization of Schools
(Same as EDUC 110, EDUC 310, SOC 332) Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy. GER:DB-SocSci

4 units, Win (Carter, P)

SOC 133. Law and Wikinomics: The Economic and Social Organization of the Legal Profession
(Same as SOC 333) (Graduate and Law students enroll in 333.) Seminar. Emphasis is on the labor market for large-firm lawyers, including the market for entry-level lawyers, attorney retention and promotion practices, lateral hiring of partners, and increased use of forms of employment such as the non-equity form of partnership. Race and gender discrimination and occupational segregation; market-based pressure tactics for organizational reform. Students groups collect and analyze data about the profession and its markets. Multimedia tools for analysis and for producing workplace reforms. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Win (Dauber, M)

SOC 134. Education, Gender, and Development
(Same as EDUC 197) Theories and perspectives from the social sciences relevant to the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of girls and women and the role of development organizations and processes. (SSPEP) GER:EC-Gender

4 units, Spr (Wotipka, C)

SOC 135. Poverty, Inequality, and Social Policy in the United States
(Same as SOC 235) Causes and consequences. Effects of antipoverty policies, and debates over effective social policies. Focus is on how poverty and inequality are experienced by families, children, and communities. Topics include welfare reform and labor market policies, education, and community-based antipoverty strategies. GER:DB-SocSci

5 units, Spr (Szelenyi, S)

SOC 136. Sociology of Law
(Same as SOC 236) (Graduate students register for 236) Major issues and debates. Topics include: historical perspectives on the origins of law; rationality and legal sanctions; normative decision making and morality; cognitive decision making; crime and deviance; the law in action versus the law on the books; organizational responses to law in the context of labor and employment; the roles of lawyers, judges, and juries; and law and social change emphasizing the American civil rights movement. GER:DB-SocSci

5 units, Win (Dauber, M)

SOC 136A. Law and Society
(Same as SOC 236A) Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work.

5 units, not given this year

SOC 136B. Advanced Topics in Sociology of Law
(Same as SOC 236B) (Same as LAW 538.) Historical perspectives on the origins of law, rationality and legal sanctions, law on the books versus the law in action, crime and deviance, school desegregation, privitization of prisons, American civil rights, file sharing, jury decision making, the role of lawyers and judges, and cynicism about the American legal system.

5 units, not given this year

SOC 137. Inequality and Access to Justice
(Same as SOC 237) Sources of inequalities and contemporary attempts to respond to them with innovative programs and other reforms. Case studies of problems and solutions, taking examples from criminal justice, civil justice and human rights.

5 units, Win (Sandefur, R)

SOC 138. American Indians in Comparative Historical Perspective
(Same as SOC 238) (Graduate students register for 238.) Demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians, 1600-1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty. GER:DB-SocSci, EC-AmerCul

5 units, Win (Snipp, C)

SOC 139. American Indians in Contemporary Society
(Same as SOC 239) (Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs. Recommended: 138 or a course in American history. GER:DB-SocSci, EC-AmerCul

5 units, Spr (Snipp, C)

SOC 140. Introduction to Social Stratification
(Same as SOC 240) (Graduate students register for 240.) The main classical and modern explanations of the causes of social, economic, and political inequality. Issues include: power; processes that create and maintain inequality; the central axes of inequality in contemporary societies (race, ethnicity, class, and gender); the consequences of inequality for individuals and groups; and how social policy can mitigate and exacerbate inequality. Cases include technologically simple groups, the Indian caste system, and the modern U.S. GER:DB-SocSci

5 units, Spr (Staff)

SOC 141. Controversies about Inequality
(Same as SOC 241) (Graduate students register for 241.) Debate format involving Stanford and guest faculty. Forms of inequality including racial, ethnic, and gender stratification; possible policy interventions. Topics such as welfare reform, immigration policy, affirmative action, discrimination in labor markets, sources of

income inequality, the duty of rich nations to help poor nations, and causes of gender inequality. GER:DB-SocSci

5 units, Aut (Grusky, D)

SOC 142. Sociology of Gender

(Same as SOC 242) (Graduate students register for 242.) Gender inequality in contemporary American society and how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Analytical levels of explanation for gender inequalities: socialization, interaction processes, and socioeconomic processes; arguments and evidence for each approach. The social consequences of gender inequality such as the feminization of poverty, and problems of interpersonal relations. GER:EC-Gender

5 units, Win (Correll, S)

SOC 144. Inequality and the Workplace

(Same as SOC 244) How characteristics of workplaces, such as hiring practices, workforce diversity, organizational policies and legal mandates, produce variation in inequality. Examines the sources, extent, and consequences of workplace inequality across gender, racial and ethnic lines. Topics include earnings, social status, geographical location, and opportunities for people in the workforce.

5 units, not given this year

SOC 145. Race and Ethnic Relations

(Same as SOC 245) (Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. The processes that render ethnic and racial boundary markers, such as skin color, language, and culture, salient in interaction situations. Why only some groups become targets of ethnic attacks. The social dynamics of ethnic hostility and ethnic/racial protest movements. GER:DB-SocSci, EC-AmerCul

5 units, Win (Snipp, C)

SOC 146. Introduction to Comparative Studies in Race and Ethnicity

(Same as CSRE 196C, ENGLISH 172D, PSYCH 155) How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. GER:DB-SocSci, EC-AmerCul

5 units, Win (Markus, H; Moya, P)

SOC 147A. Comparative Ethnic Conflict

(Same as SOC 247A) Causes and consequences of racial and ethnic conflict, including nationalist movements, ethnic genocide, civil war, ethnic separatism, politics, indigenous peoples' movements, and minority rights movements around the world. GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

SOC 148. Racial Identity

(Same as SOC 248) The construction and meanings of racial identities in the U.S. Attention to multiracial identities and the shifting boundaries of racial categories in contemporary America. GER:DB-SocSci, EC-AmerCul

5 units, not given this year

SOC 149. The Urban Underclass

(Same as SOC 249, URBANST 112) (Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor. GER:DB-SocSci, EC-AmerCul

5 units, Win (Rosenfeld, M)

SOC 155. The Changing American Family

(Same as SOC 255) Family change from historical, social, demographic, and legal perspectives. Extramarital cohabitation, divorce, later marriage, interracial marriage, and same-sex cohabitation. The emergence of same-sex marriage as a political issue. Are recent changes in the American family really as dramatic as they seem? Theories about what causes family systems to change. GER:DB-SocSci, EC-AmerCul

5 units, Aut (Rosenfeld, M)

SOC 160. Formal Organizations

(Same as SOC 260) (Graduate students register for 260.) The roles of formal organizations in production processes, market transactions, and social movements; and as sources of income and ladders of mobility. Relationships of modern organizations to environments and internal structures and processes. Concepts, models, and tools for analyzing organizational phenomena in contemporary societies. Sources include the literature and case studies. GER:DB-SocSci

5 units, Spr (Zhou, X)

SOC 161. The Social Science of Entrepreneurship

(Same as SOC 261) (Graduate students register for 261.) Who is likely to become an entrepreneur and where is entrepreneurship likely to occur? Classic and contemporary theory and research. Interaction with expert practitioners in creating entrepreneurial opportunities including venture and corporate capitalists. The role of culture, markets, hierarchies, and networks. Market creation and change, and factors that affect success of new organizations. Field projects on entrepreneurial environments such as technology licensing offices, entrepreneurial development organizations, venture capital firms, and corporate venturing groups. GER:DB-SocSci

5 units, Spr (Thornton, P)

SOC 162. Markets and Governance

(Same as SOC 262) Social and political forces that shape market outcomes. The emergence and creation of markets, how markets go wrong, and the roles of government and society in structuring market exchange. Applied topics include development, inequality, globalization, and economic meltdown.

5 units, Spr (Young, C)

SOC 164. Immigration and the Changing United States

(Same as SOC 264) The role of race and ethnicity in immigrant group integration in the U.S. Topics include: theories of integration; racial and ethnic identity formation; racial and ethnic change; immigration policy; intermarriage; hybrid racial and ethnic identities; comparisons between contemporary and historical waves of immigration. GER:DB-SocSci

5 units, Spr (Jimenez, T)

SOC 165. Seminar on the Everday Lives of Immigrants

(Same as SOC 265) Everyday experience of immigrants and the immigrant second generation through the ethnographic lens. Ethnographies that focus on the immigrant experience. Limited enrollment.

5 units, not given this year

SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society

(Same as SOC 266) Contemporary sociological issues affecting Mexican-origin people in the U.S. Topics include: the immigrant experience, immigration policy, identity, socioeconomic integration, internal diversity, and theories of incorporation. GER:DB-SocSci

5 units, Aut (Jimenez, T)

SOC 167A. Asia-Pacific Transformation

(Same as SOC 267A) Post-WW II transformation in the Asia-Pacific region, with focus on the ascent of Japan, the development of newly industrialized capitalist countries (S. Korea and Taiwan), the emergence of socialist states (China and N. Korea), and the changing relationship between the U.S. and these countries. GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

SOC 168. Global Organizations: Managing Diversity

(Same as PUBLPOL 168, SOC 268) Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: 102, MS&E 180, or SOC 160. GER:DB-SocSci

5 units, Win (Meyersson Milgrom, E)

SOC 170. Classics of Modern Social Theory

(Same as SOC 270) (Graduate students register for 270). Preference to Sociology majors. Contributions of Marx, Weber, and Durkheim to contemporary sociology. Topics: the problem of social order and the nature of social conflict; capitalism and bureaucracy; the relationship between social structure and politics; the social sources of religion and political ideology; and the evolution of modern societies. Examples from contemporary research illus-

trate the impact of these traditions. Limited enrollment. GER:DB-SocSci

5 units, Aut (McDermott, M)

SOC 180A. Foundations of Social Research

(Same as SOC 280A) Formulating a research question, developing hypotheses, probability and non-probability sampling, developing valid and reliable measures, qualitative and quantitative data, choosing research design and data collection methods, challenges of making causal inference, and criteria for evaluating the quality of social research. Emphasis is on how social research is done, rather than application of different methods. Limited enrollment; preference to Sociology and Urban Studies majors, and Sociology coterms. GER:DB-SocSci

5 units, Aut (McClintock, E), Spr (McClintock, E)

SOC 180B. Evaluation of Evidence

(Same as SOC 280B) Methods for analyzing and evaluating data in sociological research: comparative historical methods, ethnographic observation, quantitative analysis of survey data, experimentation, and simulation. Emphasis is on application of these methods through small data analysis projects. Limited enrollment; preference to Sociology majors. GER:DB-SocSci

5 units, Win (Rosenfeld, M)

SOC 181B. Sociological Methods: Statistics

(Same as SOC 281B) (Graduate students register for 281B.) Statistical methods of relevance to sociology: contingency tables, correlation, and regression.

5 units, not given this year

SOC 190. Undergraduate Individual Study

Prior arrangement required.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 191. Undergraduate Directed Research

Work on a project of student's choice under supervision of a faculty member. Prior arrangement required.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 192. Undergraduate Research Apprenticeship

Work in an apprentice-like relationship with faculty on an ongoing research project. Prior arrangement required.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 193. Undergraduate Teaching Apprenticeship

Prior arrangement required.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 196. Senior Thesis

Work on an honors thesis project under faculty supervision (see description of honors program). Must be arranged early in the year of graduation or before.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 200. Junior/Senior Seminar for Majors

For Sociology majors. Capstone course in which sociological problems are framed, linked to theories, and answers pursued through research designs. Independent research. How to formulate a research question; how to integrate theory and methods. Prerequisites: SOC 170, 180B.

5 units, Aut (McDermott, M), Spr (McDermott, M)

SOC 201. Preparation for Senior Project

(Same as URBANST 201) First part of capstone experience for Urban Studies majors pursuing an internship-based research project or honors thesis. Assignments culminate in a research proposal, which may be submitted for funding. Students also identify and prepare for a related internship, normally to begin in Spring Quarter in URBANST 201B or in Summer. Research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Service Learning Course (certified by Haas Center).

5 units, Win (Kahan, M)

SOC 202. Preparation for Honors Thesis

(Same as URBANST 202) Primarily for juniors in Sociology; sophomores who plan to be off-campus Winter Quarter of their junior year may register with consent of instructor. Students write a research prospectus and grant proposal, which may be submitted for funding. Research proposal in final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. WIM

5 units, Win (McAdam, D)

SOC 234. Research Seminar on Access to Justice

(Same as SOC 334) The functions and dysfunctions of modern legal systems. Topics include: official statements of the U.S. and the EU about the rights of parties to civil disputes; the roles of lawyers as gatekeepers and facilitators; the filtering process by which injuries and experiences become the basis for legal claims; access to and use of courts; the balance of power and advantage between individual persons and organizations in disputes. Prerequisite: advanced undergraduate or graduate standing, or consent of instructor.

1-5 units, not given this year

SOC 252. Current Social Change: Austria, Europe and the USA

(Same as SOC 352) For graduate students and advanced undergraduates. Theoretical classification and comparative analysis of current European and American societies. Structures of and megatrends in the developements of population, family, education, work, class, gender and ethnicity, democracy, and social policy.

3-5 units, Win (Staff)

SOC 253. Rise, Current Challenges and Transformations of the Welfare State

(Same as SOC 353) For graduate students and advanced undergraduates. Theoretical classification and comparative analysis of welfare regimes in Europe and North America. Systems like accident, health, unemployement and pension insurance, family subsidies and public welfare. Social policy reform past the background of current socioeconomic change.

3-5 units, Spr (Staff)

GRADUATE COURSES IN SOCIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SOC 206. Political Sociology

(Same as SOC 106) The body of state rules and institutions that work in generating legitimate and illegitimate policy claims. Interests and identities that challenged the capacity of the national state to produce effective policies. Economic processes above the national level have that undermine the role of the state as the arena for the composition of disparate interests.

5 units, not given this year

SOC 207. China After Mao

(Same as SOC 107) China's post-1976 recovery from the late Mao era; its reorientation toward an open market-oriented economy; the consequences of this new model and runaway economic growth for standards of living, social life, inequality, and local governance; the political conflicts that have accompanied these changes.

5 units, not given this year

SOC 208. Political & Historical Sociology

(Same as SOC 108) The differences between historical and sociological analysis of past events. The difference between constructing sociological explanations and describing past events. Topics include: the rise of Christianity, the mafia in a Sicilian village, the trade network of the East India Company.

5 units, Spr (Staff)

SOC 209. Sociology of Terrorism

(Same as PUBLPOL 119, SOC 109) Multidisciplinary, including psychology, sociology, political science,and economics. Comparison of terrorist organizations and movements across institutions, places, and times; their motives, tactics, financing, and organization. Guest lecturers. Sources include movies, novels, and research literature.

5 units, Spr (Meyersson Milgrom, E)

SOC 210. Politics and Society

(Same as SOC 110) (Graduate students register for 210.) Themes of political sociology, conceptions of power and state structures throughout history, the origins and expansion of the modern state, linkages between state and society, impact of the modern world system on national policies, internal distribution of power and authority, structure of political group formation and individual participation in modern states, and future trends of politics and society in a globalized world. Emphasis is on developing conceptual understandings of state, society, and politics in the modern world.

5 units, not given this year

SOC 211. State and Society in Korea
(Same as SOC 111) 20th-century Korea from a comparative historical perspective. Colonialism, nationalism, development, state-society relations, democratization, and globalization with reference to the Korean experience.
5 units, Win (Staff)

SOC 214. Economic Sociology
(Same as SOC 114) (Graduate students register for 214.) The sociological approach to production, distribution, consumption, and markets, emphasizing the impact of norms, power, social structure, and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: consumption, labor markets, organization of professions such as law and medicine, the economic role of informal networks, industrial organization, including the structure and history of the computer and popular music industries, business alliances, capitalism in non-Western societies, and the transition from state socialism in E. Europe and China.
5 units, Aut (Granovetter, M)

SOC 217A. China Under Mao
(Same as SOC 117A) (Graduate students register for 217A.) The transformation of Chinese society from the 1949 revolution to the eve of China's reforms in 1978: creation of a socialist economy, reorganization of rural society and urban workplaces, emergence of new inequalities of power and opportunity, and new forms of social conflict during Mao's Cultural Revolution of 1966-69 and its aftermath.
5 units, not given this year

SOC 218. Social Movements and Collective Action
(Same as SOC 118) Why social movements arise, who participates in them, the obstacles they face, the tactics they choose, and how to gauge movement success or failure. Theory and empirical research. Application of concepts and methods to social movements such as civil rights, environmental justice, antiglobalization, and anti-war.
5 units, not given this year

SOC 219. Understanding Large-Scale Societal Change: The Case of the 1960s
(Same as SOC 119) The demographic, economic, political, and cultural roots of social change in the 60s; its legacy in the present U.S.
5 units, not given this year

SOC 220. Interpersonal Relations
(Same as SOC 120) (Graduate students register for 220.) Forming ties, developing norms, status, conformity, deviance, social exchange, power, and coalition formation; important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups.
5 units, Win (Ridgeway, C)

SOC 223. Sex and Love in Modern Society
(Same as SOC 123) Social influences on private intimate relations involving romantic love and sexuality. Topics include the sexual revolution, contraception, dating, hook-ups, cohabitation, sexual orientation, and changing cultural meanings of marriage, gender, and romantic love.
5 units, not given this year

SOC 224A. Traditions of Microsociology
(Same as EDUC 312A) The educational applications of sociological and social psychological theory and research to interaction processes in schools. Readings include: foundational works by Mead, Schutz, and Simmel; contemporary work by Goffman, Homans, Merton, Blau, and Harold. Readings span empirical settings such as work, classrooms, gangs, primate societies, and children's games. Topics: processes of influence, role differentiation, identity formation, social mechanisms, and intra/inter group dynamics of peer relations. Methods for observation and analysis of small groups. (SSPEP)
4 units, not given this year

SOC 224B. Microsociology: Social Structure and Interaction
(Same as EDUC 312B) How to interpret interpersonal situations using microsociological theories. Focuses on the role of intention, identity, routines, scripts, rituals, conceptual frameworks, talk and emotions in social interaction. Processes by which interactions reverberate outward to transform groups and social structures. Special consideration will be placed on organizational contexts like schools, workplaces and policy decision arenas.
4 units, Aut (McFarland, D)

SOC 226. Introduction to Social Networks
(Same as SOC 126) (Graduate students register for 226.) Theory, methods, and research. Concepts such as density, homogeneity, and centrality; applications to substantive areas. The impact of social network structure on individuals and groups in areas such as communities, neighborhoods, families, work life, and innovations.
5 units, not given this year

SOC 227. Bargaining, Power, and Influence in Social Interaction
(Same as SOC 127) (Graduate students register for 227.) Research and theoretical work on bargaining, social influence, and issues of power and justice in social settings such as teams, work groups, and organizations. Theoretical approaches to the exercise of power and influence in social groups and related issues in social interaction such as the promotion of cooperation, effects of competition and conflict, negotiation, and intergroup relations. Enrollment limited to 40.
5 units, not given this year

SOC 228. Introduction to Social Network Analysis
(Same as SOC 128) (Graduate students register for SOC 228.) Theory and methods of network analysis in sociology (with an emphasis on social movements), anthropology, history, social psychology, economics, political science, and public health. Prerequisite: basic mathematics.
5 units, Aut (Parigi, P)

SOC 229X. Urban Education
(Same as EDUC 112X, EDUC 212X, SOC 129X) (Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.
3-4 units, Spr (Carter, P)

SOC 230. Education and Society
(Same as EDUC 120C, EDUC 220C, SOC 130) The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.
4-5 units, Aut (Ramirez, F)

SOC 231. World, Societal, and Educational Change: Comparative Perspectives
(Same as EDUC 136, EDUC 306D) Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.
4-5 units, Win (Martin, P)

SOC 235. Poverty, Inequality, and Social Policy in the United States
(Same as SOC 135) Causes and consequences. Effects of antipoverty policies, and debates over effective social policies. Focus is on how poverty and inequality are experienced by families, children, and communities. Topics include welfare reform and labor market policies, education, and community-based antipoverty strategies.
5 units, Spr (Szelenyi, S)

SOC 236. Sociology of Law
(Same as SOC 136) (Graduate students register for 236) Major issues and debates. Topics include: historical perspectives on the origins of law; rationality and legal sanctions; normative decision making and morality; cognitive decision making; crime and deviance; the law in action versus the law on the books; organizational responses to law in the context of labor and employment; the roles of lawyers, judges, and juries; and law and social change emphasizing the American civil rights movement.
5 units, Win (Dauber, M)

SOC 236A. Law and Society
(Same as SOC 136A) Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work.

5 units, not given this year

SOC 236B. Advanced Topics in Sociology of Law
(Same as SOC 136B) (Same as LAW 538.) Historical perspectives on the origins of law, rationality and legal sanctions, law on the books versus the law in action, crime and deviance, school desegregation, privitization of prisons, American civil rights, file sharing, jury decision making, the role of lawyers and judges, and cynicism about the American legal system.

5 units, not given this year

SOC 237. Inequality and Access to Justice
(Same as SOC 137) Sources of inequalities and contemporary attempts to respond to them with innovative programs and other reforms. Case studies of problems and solutions, taking examples from criminal justice, civil justice and human rights.

5 units, Win (Sandefur, R)

SOC 238. American Indians in Comparative Historical Perspective
(Same as SOC 138) (Graduate students register for 238.) Demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians, 1600-1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty.

5 units, Win (Snipp, C)

SOC 239. American Indians in Contemporary Society
(Same as SOC 139) (Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs. Recommended: 138 or a course in American history.

5 units, Spr (Snipp, C)

SOC 240. Introduction to Social Stratification
(Same as SOC 140) (Graduate students register for 240.) The main classical and modern explanations of the causes of social, economic, and political inequality. Issues include: power; processes that create and maintain inequality; the central axes of inequality in contemporary societies (race, ethnicity, class, and gender); the consequences of inequality for individuals and groups; and how social policy can mitigate and exacerbate inequality. Cases include technologically simple groups, the Indian caste system, and the modern U.S.

5 units, Spr (Staff)

SOC 241. Controversies about Inequality
(Same as SOC 141) (Graduate students register for 241.) Debate format involving Stanford and guest faculty. Forms of inequality including racial, ethnic, and gender stratification; possible policy interventions. Topics such as welfare reform, immigration policy, affirmative action, discrimination in labor markets, sources of income inequality, the duty of rich nations to help poor nations, and causes of gender inequality.

5 units, Aut (Grusky, D)

SOC 242. Sociology of Gender
(Same as SOC 142) (Graduate students register for 242.) Gender inequality in contemporary American society and how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Analytical levels of explanation for gender inequalities: socialization, interaction processes, and socioeconomic processes; arguments and evidence for each approach. The social consequences of gender inequality such as the feminization of poverty, and problems of interpersonal relations.

5 units, Win (Correll, S)

SOC 244. Inequality and the Workplace
(Same as SOC 144) How characteristics of workplaces, such as hiring practices, workforce diversity, organizational policies and legal mandates, produce variation in inequality. Examines the sources, extent, and consequences of workplace inequality across gender, racial and ethnic lines. Topics include earnings, social status, geographical location, and opportunities for people in the workforce.

5 units, not given this year

SOC 245. Race and Ethnic Relations
(Same as SOC 145) (Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. The processes that render ethnic and racial boundary markers, such as skin color, language, and culture, salient in interaction situations. Why only some groups become targets of ethnic attacks. The social dynamics of ethnic hostility and ethnic/racial protest movements.

5 units, Win (Snipp, C)

SOC 247A. Comparative Ethnic Conflict
(Same as SOC 147A) Causes and consequences of racial and ethnic conflict, including nationalist movements, ethnic genocide, civil war, ethnic separatism, politics, indigenous peoples' movements, and minority rights movements around the world.

5 units, not given this year

SOC 248. Racial Identity
(Same as SOC 148) The construction and meanings of racial identities in the U.S. Attention to multiracial identities and the shifting boundaries of racial categories in contemporary America.

5 units, not given this year

SOC 249. The Urban Underclass
(Same as SOC 149, URBANST 112) (Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor.

5 units, Win (Rosenfeld, M)

SOC 255. The Changing American Family
(Same as SOC 155) Family change from historical, social, demographic, and legal perspectives. Extramarital cohabitation, divorce, later marriage, interracial marriage, and same-sex cohabitation. The emergence of same-sex marriage as a political issue. Are recent changes in the American family really as dramatic as they seem? Theories about what causes family systems to change.

5 units, Aut (Rosenfeld, M)

SOC 257. Causal Inference in Quantitative Educational and Social Science Research
(Same as EDUC 255B) Quantitative methods to make causal inferences in the absence of randomized experiment including the use of natural and quasi-experiments, instrumental variables, regression discontinuity, matching estimators, longitudinal methods, fixed effects estimators, and selection modeling. Assumptions implicit in these approaches, and appropriateness in research situations. Students develop research proposals relying on these methods. Prerequisites: exposure to quantitative research methods; multivariate regression.

3-5 units, Win (Reardon, S)

SOC 258. Applied Quasi-Experimental Research in Education
(Same as EDUC 255C) Hands-on practice in analysis of data from experimental and quasi-experimental research designs, including: instrumental variables estimators; regression discontinuity estimators; difference-in-difference estimators; matching estimators; fixed effects estimators; and panel data methods including individual fixed effects models, lagged covariate adjustment models, growth models. Prerequisite: EDUC 255B, EDUC 257C, or SOC 257.

3-5 units, Spr (Reardon, S)

SOC 260. Formal Organizations
(Same as SOC 160) (Graduate students register for 260.) The roles of formal organizations in production processes, market transactions, and social movements; and as sources of income and ladders of mobility. Relationships of modern organizations to environments and internal structures and processes. Concepts, models, and tools for analyzing organizational phenomena in contemporary societies. Sources include the literature and case studies.

5 units, Spr (Zhou, X)

SOC 261. The Social Science of Entrepreneurship
(Same as SOC 161) (Graduate students register for 261.) Who is likely to become an entrepreneur and where is entrepreneurship likely to occur? Classic and contemporary theory and research. Interaction with expert practitioners in creating entrepreneurial

opportunities including venture and corporate capitalists. The role of culture, markets, hierarchies, and networks. Market creation and change, and factors that affect success of new organizations. Field projects on entrepreneurial environments such as technology licensing offices, entrepreneurial development organizations, venture capital firms, and corporate venturing groups.

5 units, Spr (Thornton, P)

SOC 262. Markets and Governance

(Same as SOC 162) Social and political forces that shape market outcomes. The emergence and creation of markets, how markets go wrong, and the roles of government and society in structuring market exchange. Applied topics include development, inequality, globalization, and economic meltdown.

5 units, Spr (Young, C)

SOC 264. Immigration and the Changing United States

(Same as SOC 164) The role of race and ethnicity in immigrant group integration in the U.S. Topics include: theories of integration; racial and ethnic identity formation; racial and ethnic change; immigration policy; intermarriage; hybrid racial and ethnic identities; comparisons between contemporary and historical waves of immigration.

5 units, Spr (Jimenez, T)

SOC 265. Seminar on the Everday Lives of Immigrants

(Same as SOC 165) Everyday experience of immigrants and the immigrant second generation through the ethnographic lens. Ethnographies that focus on the immigrant experience. Limited enrollment.

5 units, not given this year

SOC 266. Mexicans, Mexican Americans, and Chicanos in American Society

(Same as SOC 166) Contemporary sociological issues affecting Mexican-origin people in the U.S. Topics include: the immigrant experience, immigration policy, identity, socioeconomic integration, internal diversity, and theories of incorporation.

5 units, Aut (Jimenez, T)

SOC 267A. Asia-Pacific Transformation

(Same as SOC 167A) Post-WW II transformation in the Asia-Pacific region, with focus on the ascent of Japan, the development of newly industrialized capitalist countries (S. Korea and Taiwan), the emergence of socialist states (China and N. Korea), and the changing relationship between the U.S. and these countries.

5 units, not given this year

SOC 268. Global Organizations: Managing Diversity

(Same as PUBLPOL 168, SOC 168) Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: 102, MS&E 180, or SOC 160.

5 units, Win (Meyersson Milgrom, E)

SOC 270. Classics of Modern Social Theory

(Same as SOC 170) (Graduate students register for 270). Preference to Sociology majors. Contributions of Marx, Weber, and Durkheim to contemporary sociology. Topics: the problem of social order and the nature of social conflict; capitalism and bureaucracy; the relationship between social structure and politics; the social sources of religion and political ideology; and the evolution of modern societies. Examples from contemporary research illustrate the impact of these traditions. Limited enrollment.

5 units, Aut (McDermott, M)

SOC 273. Gender and Higher Education: National and International Perspectives

(Same as EDUC 273) The effects of interactions between gender and the structures of higher education; policies seeking changes in those structures. Topics: undergraduate and graduate education, faculty field of specialization, rewards and career patterns, sexual harassment, and the development of feminist scholarship and pedagogy.

4 units, not given this year

SOC 280A. Foundations of Social Research

(Same as SOC 180A) Formulating a research question, developing hypotheses, probability and non-probability sampling, developing valid and reliable measures, qualitative and quantitative data, choosing research design and data collection methods, challenges of making causal inference, and criteria for evaluating the quality of social research. Emphasis is on how social research is done, rather than application of different methods. Limited enrollment; preference to Sociology and Urban Studies majors, and Sociology coterms.

5 units, Aut (McClintock, E), Spr (McClintock, E)

SOC 280B. Evaluation of Evidence

(Same as SOC 180B) Methods for analyzing and evaluating data in sociological research: comparative historical methods, ethnographic observation, quantitative analysis of survey data, experimentation, and simulation. Emphasis is on application of these methods through small data analysis projects. Limited enrollment; preference to Sociology majors.

5 units, Win (Rosenfeld, M)

SOC 281B. Sociological Methods: Statistics

(Same as SOC 181B) (Graduate students register for 281B.) Statistical methods of relevance to sociology: contingency tables, correlation, and regression.

5 units, not given this year

SOC 300. Workshop: Teaching Development

For first-year Sociology doctoral students only. The principles for becoming an effective instructor, adviser, and mentor to undergraduates. Topics: ethics, course organization and syllabus development, test construction and grading, conflict resolution, common classroom problems, and University policies related to matters such as sexual harassment. Technologies and other topics related to making effective presentations, and campus resources to improve classroom performance. Roundtable discussions with faculty and advanced graduate students known for teaching excellence. Students may be asked to give a demonstration lecture.

2 units, Spr (Seo, P)

SOC 305. Graduate Proseminar

For first-year Sociology doctoral students only. Introduction and orientation to the field of Sociology.

1 unit, Aut (Olzak, S)

SOC 308. Social Demography

For graduate students and advanced undergraduates. Topics: models of fertility behavior, migration models, stable population theory, life table analysis, data sources, and measurement problems. How population behavior affects social processes, and how social processes influence population dynamics. Recommended: sociological research methods; basic regression analysis and log linear models.

4-5 units, Aut (Snipp, C)

SOC 309. Nations and Nationalism

The nation as a form of collective identity in the modern era. Major works in the study of nations and nationalism from comparative perspectives with focus on Europe and E. Asia.

4-5 units, not given this year

SOC 310. Political Sociology

Theory and research on the relationship between social structure and politics. Social foundations of political order, the generation and transformation of ideologies and political identities, social origins of revolutionary movements, and social consequences of political revolution. Prerequisite: doctoral student.

4-5 units, Spr (Staff)

SOC 311A. Workshop: Comparative Studies of Educational and Political Systems

(Same as EDUC 387A) Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. (SSPEP/ICE)

1-5 units, Aut (Ramirez, F)

SOC 311B. Workshop: Comparative Systems of Educational and Political Systems

(Same as EDUC 387B) Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. (SSPEP/ICE)

1-5 units, Win (Ramirez, F; Meyer, J)

SOC 311C. Workshop: Comparative Studies of Educational and Political Systems

(Same as EDUC 387C) Analysis of quantitative and longitudinal data on national educational systems and political structures. Pre-

requisite: consent of instructor. May be repeated for credit. (SSPEP/ICE)

1-5 units, Spr (Ramirez, F; Meyer, J)

SOC 312W. Workshop: Political Sociology, Social Movements, and Collective Action

Faculty and student presentations of ongoing research on topics including: social movement and organizations, and the relationship between them; democracy movements; legislative and policy outcomes; and collective action tactics, strategies, and trajectories. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

1-2 units, Aut (McAdam, D; Olzak, S; Walder, A), Win (McAdam, D; Olzak, S; Walder, A), Spr (McAdam, D; Olzak, S; Walder, A)

SOC 314. Economic Sociology

Classical and contemporary literature covering the sociological approach to markets and the economy, and comparing it to other disciplines. Topics: consumption, labor, professions, industrial organization, and the varieties of capitalism; historical and comparative perspectives on market and non-market provision of goods and services, and on transitions among economic systems. The relative impact of culture, institutions, norms, social networks, technology, and material conditions. Prerequisite: doctoral student status or consent of instructor.

4-5 units, Aut (Granovetter, M)

SOC 315. Topics in Economic Sociology

(Same as SOC 115) (Graduate students register for 315.) Discussion of topics initially explored in 114/214, with emphasis on countries and cultures outside N. America. Possible topics: families and ethnic groups in the economy, corporate governance and control, corporate strategy, relations among firms in industrial districts and business groups, the impact of national institutions and cultures on economic outcomes, transitions from state socialism and the role of the state in economic development. Possible case studies: the U.S., Germany, Italy, Britain, France, Brazil, Korea, India, Japan, and China. Prerequisite: 114/214 or 314.

5 units, Win (Granovetter, M)

SOC 315W. Workshop: Economic Sociology and Organizations

Theory, methods, and research in the sociology of the economy and of formal organizations, through presentations of ongoing work by students, faculty, and guest speakers, and discussion of recent literature and controversies. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

1-2 units, Aut (Granovetter, M; Zhou, X; Parigi, P), Win (Granovetter, M; Zhou, X; Parigi, P), Spr (Granovetter, M; Zhou, X; Parigi, P)

SOC 316. Historical and Comparative Sociology

Theory and research on macro-historical changes of sociological significance such as the rise of capitalism, the causes and consequences of revolutions, and the formation of the modern nation state and global world system. Methodological issues in historical and comparative sociology.

4-5 units, Win (Shin, G)

SOC 317W. Workshop: Social Networks

(Same as EDUC 317X) Yearlong workshop where doctoral students are encouraged to collaborate with peers and faculty who share an interest in researching the network dynamics, histories and theories of action that help explain particular social phenomena. Students present their own research and provide helpful feedback on others' work. Presentations may concern dissertation proposals, grants, article submissions, book proposals, datasets, methodologies and other texts. Repeatable for credit.

1-2 units, Aut (McFarland, D; Parigi, P), Win (McFarland, D; Parigi, P), Spr (McFarland, D; Parigi, P)

SOC 318. Social Movements and Collective Action

Topics: causes, dynamics, and outcomes of social movements; organizational dimensions of collective action; and causes and consequences of individual activism.

4-5 units, Win (Staff)

SOC 320. Foundations of Social Psychology

Major theoretical perspectives, and their assumptions and problems, in interpersonal processes and social psychology. Techniques of investigation and methodological issues. Perspectives: symbolic interaction, social structure and personality, and cognitive and group processes.

4-5 units, Win (Ridgeway, C)

SOC 321W. Workshop: Social Psychology and Social Structure

Advanced graduate student workshop in social psychology. Current theories and research agendas, recent publications, and presentations of ongoing research by faculty and students. May be repeated for credit. Prerequisite: consent of instructor.

1-2 units, Aut (Cook, K; Ridgeway, C; Correll, S), Win (Cook, K; Ridgeway, C; Correll, S), Spr (Cook, K; Ridgeway, C; Correll, S)

SOC 322. Social Interaction, Social Structure, and Social Exchange

Current theory and research on topics such as social cognition and identity, group processes, bargaining and negotiation, social justice, social dilemmas and exchange, and networks and collective action. The social exchange approach.

4-5 units, not given this year

SOC 323. Sociology of the Family

Sociological research on changing family forms. Topics include courtship, marriage, fertility, divorce, conflict, relationship skills and satisfaction, gender patterns, power relations within the family, and class and race differences in patterns.

4-5 units, not given this year

SOC 324. Social Networks

How the study of social networks contributes to sociological research. Application of core concepts to patterns of relations among actors, including connectivity and clusters, duality of categories and networks, centrality and power, balance and transitivity, structural equivalence, and blockmodels. Friendship and kinship networks, diffusion of ideas and infectious diseases, brokerage in markets and organizations, and patronage and political influence in historical contexts.

3-5 units, not given this year

SOC 327. Frontiers of Social Psychology

Advanced topics, current developments, theory, and empirical research. Possible topics include social identity processes, status beliefs and processes, social exchange, affect and social cohesion, legitimacy, social difference and inequality, norms, and social dilemmas.

1-5 units, not given this year

SOC 330. Sociology of Knowledge Creation

(Same as EDUC 120X, EDUC 320X) The sociology of knowledge creation explores systematic relationships between thought and social structure in order to examine how human beings construct, interpret, and view reality. How knowledge is socially constructed, patterned, and used, and how everyday and tacit forms of knowledge are achieved. Emphasis is on the creation and patterning of scientific paradigms, social science disciplines, and the field of education.

3-4 units, Win (McFarland, D)

SOC 331. The Conduct of Qualitative Inquiry

(Same as EDUC 327A) Two quarter sequence for doctoral students to engage in research that anticipates, is a pilot study for, or feeds into their dissertations. Prior approval for dissertation study not required. Students engage in common research processes including: developing interview questions; interviewing; coding, analyzing, and interpreting data; theorizing; and writing up results. Participant observation as needed. Preference to students who intend to enroll in 327C.

3-4 units, not given this year

SOC 332. Sociology of Education: The Social Organization of Schools

(Same as EDUC 110, EDUC 310, SOC 132) Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.

4 units, Win (Carter, P)

SOC 333. Law and Wikinomics: The Economic and Social Organization of the Legal Profession
(Same as SOC 133) (Graduate and Law students enroll in 333.) Seminar. Emphasis is on the labor market for large-firm lawyers, including the market for entry-level lawyers, attorney retention and promotion practices, lateral hiring of partners, and increased use of forms of employment such as the non-equity form of partnership. Race and gender discrimination and occupational segregation; market-based pressure tactics for organizational reform. Students groups collect and analyze data about the profession and its markets. Multimedia tools for analysis and for producing workplace reforms. May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Win (Dauber, M)

SOC 334. Research Seminar on Access to Justice
(Same as SOC 234) The functions and dysfunctions of modern legal systems. Topics include: official statements of the U.S. and the EU about the rights of parties to civil disputes; the roles of lawyers as gatekeepers and facilitators; the filtering process by which injuries and experiences become the basis for legal claims; access to and use of courts; the balance of power and advantage between individual persons and organizations in disputes. Prerequisite: advanced undergraduate or graduate standing, or consent of instructor.
1-5 units, not given this year

SOC 336. Sociology of Law
Sociological examination of law as a mechanism of social regulation and as a field of knowledge. Explores classical and contemporary theoretical and empirical contributions to the sociology of law. Law and social control, law and social change, social reality of the law, the profession and practice of law, legal mobilization, and the influence of race, gender, and social status in legal decisions and processes.
3-5 units, not given this year

SOC 338W. Workshop: Sociology of Law
(Same as LAW 581.) Required for joint degree J.D./Ph.D. students in Sociology in the first three years of program; open to Ph.D. students in Sociology and related disciplines. Empirical, sociological study of law and legal institutions. Topics such as the relation of law to inequality and stratification, social movements, organizations and institutions, political sociology and state development, and the social construction of disputes and dispute resolution processes. Research presentations. Career development issues. May be repeated for credit.
1-5 units, Win (Sandefur, R)

SOC 339. Gender Meanings and Processes
Current theories and research on the social processes, such as socialization, status processes, stereotyping, and cognition, that produce gender difference and inequality. Intersections of gender with race, class, and bodies. Applications to workplaces, schools, families, and intimate relationships. Prerequisite: Sociology doctoral student or consent of instructor
1-5 units, Spr (Correll, S)

SOC 340. Social Stratification
Classical and contemporary approaches to the unequal distribution of goods, status, and power. Modern analytic models of the effects of social contact, cultural capital, family background, and luck in producing inequality. The role of education in stratification. The causes and consequences of inequality by race and gender. The structure of social classes, status groupings, and prestige hierarchies in various societies. Labor markets and their role in inequality. The implications of inequality for individual lifestyles. The rise of the new class, the underclass, and other emerging forms of stratification. Prerequisite: Ph.D. student or consent of instructor.
4-5 units, Spr (Grusky, D)

SOC 341W. Workshop: Inequality
Causes, consequences, and structure of inequality; how inequality results from and shapes social classes, occupations, professions, and other aspects of the economy. Research presentations by students, faculty, and guest speakers. Discussion of controversies, theories, and recent writings. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.
1-2 units, Aut (Grusky, D; Correll, S), Win (Grusky, D; Correll, S; Tuma, N), Spr (Grusky, D; Correll, S; Tuma, N)

SOC 342B. Gender and Social Structure
The role of gender in structuring contemporary life. Social forces affecting gender at the psychological, interactional, and structural levels. Gender inequality in labor markets, education, the household, and other institutions. Theories and research literature.
4-5 units, not given this year

SOC 345. Seminar in Comparative Race and Ethnic Relations
Restricted to doctoral students. Factors that create, maintain, and diminish the salience of race and ethnic boundaries. Theoretical debates surrounding the emergence, persistence, and change in racial and ethnic boundaries, nationalism and sovereignty, and mobilization. Empirical evidence on race and ethnic tensions, conflict, and warfare. The relationship between democracy, immigration, and diversity.
4-5 units, not given this year

SOC 346. Workshop: Ethnography
Restricted to doctoral students. Student research employing ethnographic methods. May be repeated for credit. Prerequisite: consent of instructor.
1-2 units, not given this year

SOC 347. Race and Ethnicity in Society and Institutions
(Same as EDUC 315X) Primarily for doctoral students. Major theories and empirical research. Emphasis is on schooling and race, racial identity, urban issues, and the impact of immigration on race relations.
1-5 units, not given this year

SOC 348. Advanced Topics in the Sociology of Gender
Seminar for graduate students who have research projects in progress that focus on questions about gender and society. Research projects can be at any stage from the initial development to the final writing up of results. Focus is on questions posed by the research projects of the seminar participants. Readings include relevant background to each other's questions and present their own work in progress. A final paper reports the progress on the seminar member's research project.
3-5 units, Spr (Staff)

SOC 350W. Workshop: Migration, Race, Ethnicity and Nation
Current theories and research, recent publications, and presentations of ongoing research by faculty and students. May be repeated for credit. Prerequisite: consent of instructor.
1-3 units, Aut (McDermott, M; Jimenez, T), Win (McDermott, M; Jimenez, T), Spr (McDermott, M; Jimenez, T)

SOC 352. Current Social Change: Austria, Europe and the USA
(Same as SOC 252) For graduate students and advanced undergraduates. Theoretical classification and comparative analysis of current European and American societies. Structures of and megatrends in the developements of population, family, education, work, class, gender and ethnicity, democracy, and social policy.
3-5 units, Win (Staff)

SOC 353. Rise, Current Challenges and Transformations of the Welfare State
(Same as SOC 253) For graduate students and advanced undergraduates. Theoretical classification and comparative analysis of welfare regimes in Europe and North America. Systems like accident, health, unemployement and pension insurance, family subsidies and public welfare. Social policy reform past the background of current socioeconomic change.
3-5 units, Spr (Staff)

SOC 357. Immigration and Assimilation
Major theoretical debates and empirical applications in the study of immigrant assimilation. Topics include racial and ethnic identity, socioeconomic integration, political participation, and national identity. Companion to SOC 358.
3-5 units, not given this year

SOC 358. Sociology of Immigration
Topics include: the process of migration; historical perspectives; immigrant integration; transnationalism; immigration policy; labor; nations and nationalism.
1-5 units, Aut (Jimenez, T)

SOC 359. Organizations and Uncertainty
Organizations and environments characterized by institutional uncertainty. Beliefs at the roots of shared routines and institutional

myths are absent. Institutionalists and neo-institutionalists, organizations facing uncertain institutional environments.

3-5 units, Spr (Parigi, P)

SOC 361. Social Psychology of Organizations

Seminar. Social psychological theories and research relevant to organizational behavior. Current research topics; theories in micro-organizational behavior. Topics include models of attribution, choice and decision making, intergroup behavior, stereotyping, and social influence. Prerequisites: Ph.D student; graduate-level social psychology course.

4 units, Win (Miller, D)

SOC 361W. Workshop: Networks and Organizations

(Same as EDUC 361) For students doing advanced research. Group comments and criticism on dissertation projects at any phase of completion, including data problems, empirical and theoretical challenges, presentation refinement, and job market presentations. Collaboration, debate, and shaping research ideas. Prerequisite: courses in organizational theory or social network analysis.

1-3 units, Aut (Powell, W), Win (Powell, W), Spr (Powell, W)

SOC 362. Organization and Environment

Leading sociological approaches to analyzing relations of organizations and environments emphasizing dynamics. Theoretical formulations, research designs, and results of empirical studies.

4 units, Aut (Staff)

SOC 363. Social and Political Process in Organizations

Social psychological and sociological research at the meso, or intermediate between micro and macro, level of analysis. Topics vary from year to year, but usually include organizational routines and learning; mobility and and attainment processes; gender and race inequality and discrimination; social networks; cultural perspectives on organizations, and related topics. Prerequisite: Ph.D student.

4 units, Spr (Staff), alternate years, not given next year

SOC 363A. Seminar on Organizational Theory

(Same as EDUC 375A, MS&E 389) The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.

5 units, Aut (Powell, W)

SOC 363B. Seminar on Organizations: Institutional Analysis

(Same as EDUC 375B) Seminar. Key lines of inquiry on organizational change, emphasizing network, institutional, and evolutionary arguments.

3-5 units, not given this year

SOC 366. Organization Studies: Theories and Analyses

(Same as EDUC 288) Principles of organizational behavior and analysis; theories of group and individual behavior; organizational culture; and applications to school organization and design. Case studies.

5 units, Aut (Meyerson, D)

SOC 366A. Organizational Ecology

(Same as OB 601) This seminar examines theoretical and methodological issues in the study of the ecology of organizations. Particular attention is given to the dynamics that characterize the interface between organizational populations and their audiences.

4 units

SOC 367. Institutional Analysis of Organizations

Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis is on the effects of institutional systems on organizational structure.

3-5 units, not given this year

SOC 368W. Workshop: China Social Science

(Same as POLISCI 448R) For Ph.D. students in the social sciences and history. Research on contemporary society and politics in the People's Republic of China. May be repeated for credit. Prerequisite: consent of instructor.

1 unit, Aut (Walder, A; Oi, J), Win (Walder, A; Oi, J), Spr (Walder, A; Zhou, X; Oi, J)

SOC 369. Social Network Analysis

(Same as EDUC 316) Introduction to social network theory, methods, and research applications in sociology. Network concepts of interactionist (balance, cohesion, centrality) and structuralist (structural equivalence, roles, duality) traditions are defined and applied to topics in small groups, social movements, organizations, communities. Students apply these techniques to data on schools and classrooms. (SSPEP)

4-5 units, Aut (McFarland, D)

SOC 370A. Sociological Theory: Social Structure, Inequality, and Conflict

Restricted to doctoral students.The traditions of structural analysis derived from the work of Marx, Weber, and related thinkers. Antecedent ideas in foundational works are traced through contemporary theory and research on political conflict, social stratification, formal organization, and the economy.

5 units, Aut (Olzak, S)

SOC 370B. Social Interaction and Group Process

Theoretical strategies for the study of interaction, group, and network processes, including rational choice and exchange theory, the theory of action, symbolic interactionism, formal sociology, and social phenomenology. Antecedent ideas in foundational works and contemporary programs of theoretical research.

3-5 units, alternate years, not given this year

SOC 372. Theoretical Analysis and Design

Theoretical analysis and the logical elements of design, including the systematic analysis of the logical structure of arguments, the relationship of arguments to more encompassing theoretical or metatheoretical assumptions, the derivation of logical implications from arguments, assessments of theoretically significant problems or gaps in knowledge.

3-5 units, Aut (Zelditch, M)

SOC 374. Philanthropy and Civil Society

(Same as EDUC 374, POLISCI 334) Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.

1-3 units, Aut (Powell, W; Reich, R), Win (Powell, W; Reich, R), Spr (Powell, W; Reich, R)

SOC 376. Perspectives on Organization and Environment

Sociologists and organizational scholars have increasingly come to recognize that networks are not simply relevant as conduits for the flow of information and resources, but are critical determinants of identity, shaping preferences and influencing perceptions of the qualities that inhere in actors. Research that informs the link between networks and identity based on intellectual traditions such as social exchange theory, role theory, and economic and historical sociology.

4 units, Win (Staff)

SOC 377. Comparing Institutional Forms: Public, Private, and Nonprofit

(Same as EDUC 377, GSBGEN 346, PUBLPOL 317) Seminar. For students interested in the nonprofit sector, and those in the joint Business and Education program. The missions, functions, and capabilities of nonprofit, public, and private organizations. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials. Advanced undergraduates require consent of instructor.

4 units

SOC 378. Seminar on Institutional Theory and World Society

Sociological analyses of the rise and impact of the expanded modern world order, with its internationalized organizations and globalized discourse. Consequences for national and local society: education, political organization, economic structure, the environment, and science. The centrality of the individual and the rationalized organization as legitimated actors.

1-5 units, Win (Meyer, J)

SOC 380. Qualitative Methods

Priority to Sociology doctoral students. Emphasis is on observational and interview-based research. Limited enrollment.

3-5 units, Spr (McDermott, M)

SOC 381. Sociological Methodology I: Introduction

Enrollment limited to first-year Sociology doctoral students. Basic math and statistics. Types of variables, how to recode and transform variables, and how to manage different types of data sets.

How to use and think about weights. Introduction to statistical packages and programming. Introduction to multiple regression, and introduction to the interpretation of regression results.

5 units, Aut (Rosenfeld, M)

SOC 382. Sociological Methodology II: Multivariate Regression

Preference to Sociology doctoral students. Required for Ph.D. in Sociology. Enrollment limited to first-year Sociology doctoral students. Rigorous treatment of linear regression models, model assumptions, and various remedies for when these assumptions are violated. Introduction to panel data analysis. Enrollment limited to 15. Prerequisites: 381.

4-5 units, Win (Young, C)

SOC 383. Sociological Methodology III: Models for Discrete Outcomes

Required for Ph.D. in Sociology; enrollment limited to first-year Sociology doctoral students. The rationale for and interpretation of static and dynamic models for the analysis of discrete variables. Prerequisites: 381 and 382, or equivalents.

5 units, Spr (Zhou, X)

SOC 384. New Models and Methods in the Social Sciences

Two-week intensive introduction to new statistical approaches. Emphasis is on applications. Topics may include network models, multilevel models, latent class models, mixed methods, new qualitative methods, growth models, geostatistical tools, survey-based experiments, new methods for estimating causal effects, web-based surveys, advanced discrete choice models, and diffusion models.

2-5 units, Sum (Grusky, D)

SOC 385A. Research Practicum 1

Workshop on research methods for second year Sociology doctoral students. Ongoing student research, methodological problems, and possible solutions. Required for second year paper.

1 unit, Aut (Zhou, X)

SOC 385B. Research Practicum II

Continuation of 385A. Workshop on research methods for second year Sociology doctoral students. Ongoing student research, methodological problems, and possible solutions. Required for second year paper.

1 unit, Win (England, P)

SOC 388. Log-Linear Models

Analysis of categorical data with log-linear and negative binomial models. Measures of fit and hypothesis testing.

3-5 units, not given this year

SOC 389. Mixed Method Research Design and Analysis

Research designs that incorporate qualitative and quantitative analyses in a single project. The tension between thinking case-wise and variable-wise; how the focus on relationships between variables that is the hallmark of the quantitative approach can be brought into qualitative work.

3-5 units, not given this year

SOC 390. Graduate Individual Study

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 391. Graduate Directed Research

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 392. Research Apprenticeship

May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 393. Teaching Apprenticeship

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOC 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SOPHOMORE COLLEGE (SCS) COURSES

See Undergraduate Education section for more information.

BIO 10SC. Natural History, Marine Biology, and Research

Monterey Bay is home to the nation's largest marine sanctuary and also home to Stanford's Hopkins Marine Station. This course, which is based at Hopkins, explores the spectacular biology of Monterey Bay and the artistic and political history of the region. The course focuses on issues of conservation, sanctuary, and stewardship of the oceans and coastal lands. We will meet with conservationists, filmmakers, artists, authors, environmentalists, politicians, land-use planners, and lawyers, as well as scientists and educators, to learn what is being done to appreciate, protect, and study the coastline and near-shore waters at local and national levels. We will take a look at the discipline of marine biology to discover the range of topics and methods of research it embraces and to help define some of the larger issues in biology that loom in our future. The course emphasizes interactions and discussions between individuals, groups, and our guests; it is a total immersion experience. We wi

2 units, Aut (Thompson, S)

CS 10SC. Great Ideas in Computer Science

Computers have come to permeate many aspects of our lives, from how we communicate with each other to how we produce and consume information. And while it is all too easy to think of computing in terms of the products and applications we see emerging from technology companies, the intellectual foundations of computer science go much deeper. Indeed, beneath the surface of the tools we use, the social networks we engage in, and the web of information we search, lays a field rich with fascinating, intellectually exciting, and sometimes unexpectedly surprising ideas. In this seminar, we will explore several of the great ideas in computer science, looking at both challenging problems and their impact on real applications. From understanding how search engines on the Web work to looking at mathematical theories underlying social networks, from questioning whether a computer can be intelligent to analyzing the notion of what is even possible to compute, this seminar will take us on a ser

2 units, Aut (Sahami, M; Roberts, E)

DRAMA 11SC. Learning Theater: From Audience to Critic at the Oregon Shakespeare Festival

Who doesn't love going to a play: sitting in the darkened theater, an anonymous member of the audience waiting to be entertained, charmed, and challenged? But how many of us know enough about the details of the plays, their interpretation, their production, and acting itself, to allow us to appreciate fully the theatrical experience? In this seminar, we will spend 13 days in Ashland, Oregon, at the Oregon Shakespeare Festival (OSF), where we will attend these plays: Shakespeare's The Merchant of Venice, Twelfth Night, Hamlet, and Henry IV, Part One; Ping Chong's adaptation of Akira Kurosawa's Throne of Blood; Lisa Nottage's Ruined; Joseph Hanreddy and J.R. Sullivan's adaptation of Jane Austen's Pride and Prejudice; Joe Masteroff's She Loves Me (music by Jerry Bock, lyrics by Sheldon Harnick); and Richard Montoya and Culture Clash's American Night. We will also spend time backstage, meeting with actors, designers, and artistic and administrative directors of OSF.

2 units, Aut (Rehm, R; Paulson, L)

EARTHSYS 12SC. Environmental and Geological Field Studies in the Rocky Mountains

(Same as EESS 12SC, GES 12SC) The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This three-week field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources.

2 units, Aut (Chamberlain, P)

EE 10SC. Mathematics of the Information Age

Empedocles taught that the world is made of four elements; earth, air, fire, and water. And what of the quintessence? Physics banished the ether as that elusive fifth element, but our current age has settled on ""information"" as the element that permeates and connects the world. What is information? Can it be measured and manipulated like the other elements? The primary steps -- before circuits and chips and computers take charge -- are mathematical, and information became mathematical through the work of Claude

Shannon on problems in communication. Shannon laid the foundations for the digital revolution that has become part of our everyday lives. The mathematics of the information age is likewise a part of your everyday life, from images to iTunes to the Internet, and the mathematics is quite accessible. We will discuss the elements of information theory and how information is represented in different ways for different purposes.

2 units, Aut (Osgood, B)

EESS 12SC. Environmental and Geological Field Studies in the Rocky Mountains

(Same as EARTHSYS 12SC, GES 12SC) The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This three-week field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources. These broad topics are integrated into a coherent field-study as we examine earth/environmental science-related questions in three different settings: 1) the three-billion-year-old rocks and the modern glaciers of the Wind River Mountains of Wyoming; 2) the sediments

2 units, Aut (Chamberlain, P)

ETHICSOC 10SC. The Meaning of Life: Moral and Spiritual Inquiry through Literature

Short novels and plays will provide the basis for reflection on ethical values and the purpose of life. Some of the works to be studied are F. Scott Fitzgerald's The Great Gatsby, George Bernard Shaw's Major Barbara, Hermann Hesse's Siddhartha, Jane Smiley's Good Will, Robert Bolt's A Man for All Seasons, and John Steinbeck's Of Mice and Men. We will read for plot, setting, character, and theme using a two-text method- looking at the narrative of the literary work and students' own lives-rather than either deconstructing the literature or relating it to the author's biography and psychology. The questions we will ask have many answers. Why are we here? How do we find meaningful work? What can death teach us about life? What is the meaning of success? What is the nature of true love? How can one find balance between work and personal life? How free are we to seek our own destiny? What obligations do we have to others?

2 units, Aut (McLennan, W)

GES 12SC. Environmental and Geological Field Studies in the Rocky Mountains

(Same as EESS 12SC, EARTHSYS 12SC) The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This three-week field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources.

2 units, Aut (Chamberlain, P)

HISTORY 21SC. Celluloid America: Explorations in Film and History

In this course, we will explore the history and culture of the United States through film, examining both the history of this quintessentially American medium and the ways in which American history has been represented in movies. Topics include the invention of moving picture technology, the creation of cinema ""language,"" the rise and fall of the Hollywood studio system, the emergence and evolution of film genres (westerns, romantic comedies, film noir, science fiction, Blaxploitation, etc.), the quest for overseas markets for American movies, race and film, and the future of movies in the digital age. Among the films we will be discussing are Birth of a Nation, The Jazz Singer, Stagecoach, It Happened One Night, Citizen Kane, Casablanca, Invasion of the Body Snatchers, American Graffiti, Superfly, Taxi Driver, Blade Runner, Unforgiven, Bamboozled, Saving Private Ryan, Children of Men, and In the Valley of Elah. The course will include daily readings and discussions as well as a numb

2 units, Aut (Campbell, J)

HISTORY 22SC. A Tale of Two Cities: London and San Francisco

San Francisco and London are two of the world's best-loved and most-visited cities. They have certain things in common: both are ports, situated on the edge of continents; both are major commercial and cultural centres; and both have been shaped by immigration. Their differences are more obvious than their similarities, however, and these differences are to a large extent explained by their very different histories. London was founded by the Romans and was, for a period in its recent history, the capital of an Empire on which the sun famously never set; San Francisco did not emerge as a city until well into the 19th century and even now has something of the character of a ""city state"" rather than a national or state capital. Though often considered one of the most European of American cities, San Francisco is in fact laid out on the typically American grid plan; the planning of London is, by contrast, chaotic.

2 units, Aut (Tyack, G)

MATSCI 11SC. Energy Technologies for a Sustainable Future

Wondering what the buzz is about sustainability, renewable energy, and clean fuels? Meeting the world's growing energy needs in a sustainable fashion is one of the most pressing problems of our time. This class will introduce the scope of the energy problem and define some of the options for sustainable energy. We will look into the scientific basis of sustainable energy technologies, such as solar cells, which convert the energy of the sun directly into electricity, and fuel cells, which convert chemical energy directly into electricity. Other topics will include biofuels, i.e., fuel derived from plant matter, and clean fuels such as hydrogen. The course will emphasize the fundamental science behind the devices and highlight some of the cutting-edge technological issues that are currently being explored. Assigned reading will include books on global energy issues as well as technical reading on the science and engineering of sustainable energy technologies. We will visit several local

2 units, Aut (Clemens, B)

POLISCI 10SC. American Foreign Policy and the Challenges of the Twenty-First Century

Investigation of foreign policy challenges and choices facing the Obama administration. Topics include: examination of domestic constraints such as public opinion; Congress and bureaucracy on foreign policy and international challenges of climate change and energy, nuclear policy, biological security; failing states and regional conflict; terrorism; global economic crisis; and the ongoing crises in the broader Middle East. Course includes a 48-hour simulation.

2 units, Aut (Stedman, S)

POLISCI 22SC. The Face of Battle

Our understanding of warfare often derives from the lofty perspective of political leaders and generals: what were their objectives and what strategies were developed to meet them? This top-down perspective slights the experience of the actual combatants and non-combatants caught in the crossfire. This course focuses on the complexity of the process by which strategy is translated into tactical decisions by the officers and foot soldiers on the field of battle. We will focus on three battles in American history: Gettysburg (July 1863), the Battle of Little Bighorn (June 1876), and the Battle of Lozano Ridge in Afghanistan (November 2003). In addition to reading major works on these battles and the conflicts in which they occurred, we will travel to Gettysburg, Pennsylvania, and the Little Bighorn battlefield in Montana.

2 units, Aut (Sagan, S)

SPANISH LANGUAGE (SPANLANG) COURSES

UNDERGRADUATE COURSES IN SPANISH LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SPANLANG 1. First-Year Spanish, First Quarter
Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world.
5 units, Aut (Staff), Win (Del Carpio, C), Spr (Reinhold, V)

SPANLANG 1A. Accelerated First-Year Spanish, Part 1
Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Spanish, or those with a strong background in another Romance language. 2A fulfills the University language requirement. Prerequisite: written and oral placement tests.
5 units, Aut (Ortiz Cuevas, C), Win (Ortiz Cuevas, C)

SPANLANG 2. First-Year Spanish, Second Quarter
Continuation of 1. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite 1.
5 units, Aut (Nissler, P), Win (Staff), Spr (Del Carpio, C)

SPANLANG 2A. Accelerated First-Year Spanish, Part 2
Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Spanish, or those with a strong background in another Romance language. 2A fulfills the University language requirement. Prerequisite: written and oral placement tests. Continuation of 1A. Fulfills the University language requirement. Prerequisite: 1A or written and oral placement tests.
5 units, Win (Won, H), Spr (Ortiz Cuevas, C)

SPANLANG 3. First-Year Spanish, Third Quarter
Continuation of 2. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite 2. Fulfills the University language requirement.
5 units, Aut (Reinhold, V), Win (Urruela, M), Spr (Staff)

SPANLANG 5A. Intensive First-Year Spanish, Part A
Goal is to engage in interactions with Spanish speakers in socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Stanford graduate students restricted to 9 units register for 205A,B,C.
5 units, Sum (Reinhold, V)

SPANLANG 5B. Intensive First-Year Spanish, Part B
Continuation of 5A.
5 units, Sum (Del Carpio, C)

SPANLANG 5C. Intensive First-Year Spanish, Part C
Continuation of 5B.
5 units, Sum (Junguito Camacho, M)

SPANLANG 10. Beginning Oral Communication
Additional pronunciation, vocabulary, and speaking skills. May be repeated once for credit. Prerequisite: one quarter of Spanish, demonstrated oral proficiency above the novice level; may be taken concurrently with 2, 2A, or 3.
2 units, Aut (Won, H), Win (Brates, V), Spr (Corso, I)

SPANLANG 11C. Second-Year Spanish: Cultural Emphasis, First Quarter
Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: one year of college Spanish or equivalent.
4-5 units, Aut (Ashby, Z), Win (Urruela, M), Spr (Sanchez, K)

SPANLANG 11R. Second-Year Spanish: Emphasis on International Relations, First Quarter
Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: one year of college Spanish or equivalent.
4-5 units, Aut (Brates, V)

SPANLANG 12C. Second-Year Spanish: Cultural Emphasis, Second Quarter
Continuation of 11C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: 11 or equivalent.
4-5 units, Aut (Urruela, M), Win (Miano, A), Spr (Malik, C)

SPANLANG 12R. Second-Year Spanish: Emphasis on International Relations, Second Quarter
Continuation of 11R. Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: Prerequisite 11R or equivalent.
4-5 units, Win (Brates, V)

SPANLANG 13C. Second-Year Spanish: Cultural Emphasis, Third Quarter
Continuation of 12C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: 12 or equivalent.
4-5 units, Aut (Santana, C), Win (Molitoris, J), Spr (Won, H)

SPANLANG 13R. Second-Year Spanish: Emphasis on International Relations, Third Quarter
Continuation of 12R. Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: 12R or equivalent. Fulfills the IR major language requirement.
4-5 units, Spr (Brates, V)

SPANLANG 15. Intermediate Oral Communication
Emphasis is on interaction in Spanish locally and globally. Regional vocabularies and cultures at home and abroad. Interaction with local native Spanish speakers and communities globally via the Internet. May be repeated once for credit. Prerequisite: first-year Spanish and demonstrated oral proficiency above the low intermediate level.
3 units, Aut (Won, H), Win (Brates, V), Spr (Brates, V), Sum (Staff)

SPANLANG 15. Intermediate Oral Communication
(Same as SPANLANG 215) For grads only. Same as Summer session 15
3 units, Sum (Staff)

SPANLANG 21B. Second-Year Spanish for Heritage Language Students, First Quarter
Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Third quarter focus is on the development of written and oral styles and registers used in more formal settings.
3-5 units, Aut (Sierra, A)

SPANLANG 22B. Second-Year Spanish for Heritage Language Students, Second Quarter
Continuation of 21B. Emphasis is on ability to communicate orally and in writing. Continuation of 21B. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Third quarter focus is on the development of written and oral styles and registers used in more formal settings. Prerequisite 21B or equivalent.
3-5 units, Win (Sierra, A)

SPANLANG 23B. Second-Year Spanish for Heritage Language Students, Third Quarter
Continuation of 22B. Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Third quarter focus is on the development of written and oral styles and registers used in more formal settings. Prerequisite: 22B or equivalent.
3-5 units, Spr (Sierra, A)

SPANLANG 25A. Intensive Second-Year Spanish, Part A
Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: one year of college Spanish or equivalent.
4 units, Sum (Gonzalez Flores, F)

SPANLANG 25B. Intensive Second-Year Spanish, Part B
Continuation of 25A. Prerequisite: 25A or equivalent.
4 units, Sum (Nissler, P)

SPANLANG 25C. Intensive Second-Year Spanish, Part C
Continuation of 25B. Prerequisite: 25B or equivalent.
4 units, Sum (Builes, R)

SPANLANG 60A. Beginning Spanish Conversation
(AU)
1 unit, Aut (Urruela, M)

SPANLANG 60B. Intermediate Spanish Conversation
(AU)
1 unit, Win (Urruela, M)

SPANLANG 60C. Advanced Spanish Conversation
(AU)
1 unit, Spr (Staff)

SPANLANG 60K. Cooking Class
(AU)
1 unit, Win (Urruela, M)

SPANLANG 60M. Movie Series - Telenovelas
1 unit, Win (Urruela, M)

SPANLANG 60P. Yost Lecture Series
1 unit, Aut (Madison, V), Win (Madison, V), Spr (Madison, V)

SPANLANG 60S. Speaking Spanish
Spanish: Idioms, Expressions, and Slang.
1 unit, Spr (Urruela, M)

SPANLANG 60T. Teaching Spanish Conversation
(AU) (Staff)
1 unit, Aut (Urruela, M), Win (Urruela, M), Spr (Urruela, M)

SPANLANG 99. Language Specials
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SPANLANG 100. Advanced Oral Communication
For students who have completed second-year Spanish or who have oral skills above the intermediate level. Interactive activities require students to persuade, analyze, support opinions, and gather and interpret others' points of view. Focus is on vocabulary enrichment and idiomatic expressions. Cultural, literary, political, and journalistic readings. May be repeated once for credit. Prerequisite: 13 or equivalent.
3 units, Aut (Leni, E), Win (Catoira, L), Spr (Catoira, L)

SPANLANG 101. The Structure of Spanish
Criteria and skills to analyze Spanish grammatical structure. Identification of word functions in sentences and texts, types of sentences, and terminology. Structure of nouns, adjectives, and verbs, and their relationship with meaning. The differences between Spanish grammar as a formal system and in everyday life. Prerequisite: 13C, 13R, 23B, or equivalent. (Sierra)
3-5 units, Aut (Miano, A)

SPANLANG 102. Composition and Writing Workshop
Individual development of the ability to write in Spanish. Emphasis is on style and diction, and on preparing and writing essays on literary topics. Non-Spanish majors or minors may choose topics more closely related to their studies for projects. Prerequisite: two years of college Spanish or equivalent. WIM
3-5 units, Aut (Brates, V), Win (Miano, A), Spr (Brates, V)

SPANLANG 102B. Composition and Writing Workshop for Heritage Language Students
For students with a good understanding of written accents, spelling, and syntax. Focus is on the craft of writing with emphasis on brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Writing essays on literary topics. Non-Spanish majors or minors may choose topics related to their studies. Prerequisite: 23B or equivalent.
3-5 units, not given this year

SPANLANG 121M. Spanish for Medical Students
(Same as HRP 280) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on taking the medical history. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.
3 units, Aut (Corso, I)

SPANLANG 122M. Spanish for Medical Students
(Same as HRP 281) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on performing a physical examination. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.
3 units, Win (Corso, I)

SPANLANG 123M. Spanish for Medical Students
(Same as HRP 282) Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on different specialties and medical conditions. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.
3 units, Spr (Corso, I)

SPANLANG 131M. Spanish for Heritage and Foreign Language Pre-Med and Public Health Students
For pre-med or public health students who grew up in homes where Spanish is spoken or for students who possess a considerable command of Spanish. Focus is on developing the ability to provide information on health-related topics to Spanish speakers in the U.S. Students participate in the organization and delivery of information on preventive health care in a workshop setting to a Spanish-speaking community.
3-4 units, not given this year

SPANLANG 199. Individual Reading
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SPANISH LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SPANLANG 1G. Accelerated First-Year Business Spanish, Part 1
For GSB students only. Limited enrollment.
4 units, Win (Reinhold, V)

SPANLANG 2G. Accelerated First-Year Business Spanish, Part 2
Continuation of 1G. For GSB students only. Limited enrollemnt
4 units, Spr (Reinhold, V)

SPANLANG 3G. Spanish for Business Professionals
For GSB students only. Limited enrollment.
4 units, Aut (Reinhold, V)

SPANLANG 50. Reading Spanish
For students who have already taken Spanish for at least one year or have superior reading proficiency in another Romance language. Emphasis is on academic texts. Fulfills University reading requirements for advanced degrees if students earn a grade of 'B.'
3 units, Win (Sierra, A)

SPANLANG 205A. Intensive First-Year Spanish, Part A
For Stanford graduate students restricted to 9 units. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping

the production of oral and written texts in the Spanish- and English-speaking world.
3-5 units, Sum (Staff)

SPANLANG 205B. Intensive First-Year Spanish, Part B
Continuation of 205A. For Stanford graduate students restricted to 9 units. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite 205A.
3-5 units, Sum (Staff)

SPANLANG 205C. Intensive First-Year Spanish
Continuation of 205B. For Stanford graduate students restricted to 9 units.For Stanford graduate students restricted to 9 units. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite 205B.
3-5 units, Sum (Staff)

SPANLANG 215. Intermediate Oral Communication
(Same as SPANLANG 15) For grads only. Same as Summer session 15
3 units, Sum (Staff)

SPANLANG 394. Graduate Studies in Spanish Conversation
Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

SPANLANG 395. Graduate Studies in Spanish
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

SPECIAL LANGUAGE PROGRAM (SPECLANG) COURSES

UNDERGRADUATE COURSES IN SPECIAL LANGUAGE PROGRAM

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SPECLANG 75. Greek Culture, Ideals, and Themes
Introduction to Greek culture and its global influence in a social historical context, through images from its past and institutions in contemporary Greek society. Limited enrollment. GER:DB-Hum, EC-GlobalCom
3 units, Spr (Prionas, E)

SPECLANG 105A. Intermediate Albanian, First Quarter
3 units, Aut (Bacaj, T)

SPECLANG 105B. Intermediate Albanian, Second Quarter
3 units, Win (Bacaj, T)

SPECLANG 105C. Intermediate Albanian, Third Quarter
3 units, Spr (Bacaj, T)

SPECLANG 107A. Beginning Bulgarian, First Quarter
3 units, Aut (Staff)

SPECLANG 107B. Beginning Bulgarian, Second Quarter
3 units, Win (Staff)

SPECLANG 107C. Beginning Bulgarian, Third Quarter
3 units, Spr (Staff)

SPECLANG 112A. Intermediate Hungarian Conversation, First Quarter
3 units, Aut (Szoke, E)

SPECLANG 112B. Intermediate Hungarian Conversation, Second Quarter
3 units, Win (Szoke, E)

SPECLANG 129A. Beginning Ukrainian, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Ukrainian culture.
3 units, Aut (Jarboe, L)

SPECLANG 129B. Beginning Ukrainian, Second Quarter
Continuation of 129A.
3 units, Win (Jarboe, L)

SPECLANG 129C. Beginning Ukrainian, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Ukrainian culture.
3 units, Spr (Jarboe, L)

SPECLANG 130A. Intermediate Ukrainian, First Quarter
Continuation of 129C.
3 units, Aut (Jarboe, L)

SPECLANG 130B. Intermediate Ukrainian, Second Quarter
Continuation of 130A.
3 units, Win (Jarboe, L)

SPECLANG 130C. Intermediate Ukrainian, Third Quarter
Continuation of 130B.
3 units, Spr (Jarboe, L)

SPECLANG 144A. Beginning Tagalog, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Tagalog culture.
3 units, Aut (Staff)

SPECLANG 144B. Beginning Tagalog, Second Quarter
Continuation of 144A.
3 units, Win (Seno, J)

SPECLANG 144C. Beginning Tagalog, Third Quarter
Continuation of 144B.
3 units, Spr (Seno, J)

SPECLANG 145A. Intermediate Tagalog, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency. Fulfills the University language requirement.
3 units, Aut (Staff)

SPECLANG 145B. Intermediate Tagalog, Second Quarter
Continuation of 145A.
3 units, Win (Seno, J)

SPECLANG 145C. Intermediate Tagalog, Third Quarter
Continuation of 145B.
3 units, Spr (Seno, J)

SPECLANG 146A. Advanced Tagalog, First Quarter
3 units, Aut (Staff)

SPECLANG 146B. Advanced Tagalog, Second Quarter
3 units, Win (Seno, J)

SPECLANG 146C. Advanced Tagalog, Third Quarter
3 units, Spr (Seno, J)

SPECLANG 150A. Beginning Vietnamese, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Vietnamese culture.
3 units, Aut (Nguyen, D)

SPECLANG 150B. Beginning Vietnamese, Second Quarter
Continuation of 150A.
3 units, Win (Nguyen, D)

SPECLANG 150C. Beginning Vietnamese, Third Quarter
Continuation of 150B.
3 units, Spr (Nguyen, D)

SPECLANG 151A. Intermediate Vietnamese, First Quarter
Continuation of 150C. Fulfills the University language requirement.
3 units, Aut (Nguyen, D)

SPECLANG 151B. Intermediate Vietnamese, Second quarter
Continuation of 151A.
3 units, Win (Nguyen, D)

SPECLANG 151C. Intermediate Vietnamese, Third Quarter
Continuation of 151B.
3 units, Spr (Nguyen, D)

SPECLANG 152A. Beginning Hindi, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hindi culture.
4 units, Aut (Desai, S)

SPECLANG 152B. Beginning Hindi, Second Quarter
Continuation of 152A.
4 units, Win (Desai, S)

SPECLANG 152C. Beginning Hindi, Third Quarter
Continuation of 152B. Fulfills the University language requirement.
4 units, Spr (Desai, S)

SPECLANG 153A. Intermediate Hindi, First Quarter
Second year sequence requires completion of first year or consent of the instructor. Focus on expanding all language skills, mastering grammar patterns and new vocabulary through authentic readings, writing essays, oral presentations and the use of multimedia-based materials. Focus on cultural proficiency.
4 units, Aut (Desai, S)

SPECLANG 153B. Intermediate Hindi, Second Quarter
Continuation of 153A.
4 units, Win (Desai, S)

SPECLANG 153C. Intermediate Hindi, Third Quarter
Continuation of 153B.
4 units, Spr (Desai, S)

SPECLANG 154A. Advanced Hindi, First Quarter
Continuation of 153C.
4 units, Aut (Staff)

SPECLANG 154B. Advanced Hindi, Second Quarter
Continuation of 154A.
4 units, Win (Anushree, A)

SPECLANG 154C. Advanced Hindi, Third Quarter
Continuation of 154B.
4 units, Spr (Anushree, A)

SPECLANG 164A. Beginning Czech, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Czech culture.
3 units, Aut (Dusatko, J)

SPECLANG 164B. Beginning Czech, Second Quarter
Continuation of 164A.
3 units, Win (Dusatko, J)

SPECLANG 164C. Beginning Czech, Third Quarter
Continuation of 164B.
3 units, Spr (Dusatko, J)

SPECLANG 165A. Intermediate Czech, First Quarter
Continuation of 164C. Fulfills the University language requirement.
3 units, Aut (Dusatko, J)

SPECLANG 165B. Intermediate Czech, Second Quarter
Continuation of 165A.
3 units, Win (Dusatko, J)

SPECLANG 165C. Intermediate Czech, Third Quarter
Continuation of 165B.
3 units, Spr (Dusatko, J)

SPECLANG 167A. Beginning Polish, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Polish culture.
3 units, Aut (Szudelski, G)

SPECLANG 167B. Beginning Polish, Second Quarter
Continuation of 167A.
3 units, Win (Szudelski, G)

SPECLANG 167C. Beginning Polish, Third Quarter
Continuation of 167B.
3 units, Spr (Szudelski, G)

SPECLANG 168A. Intermediate Polish, First Quarter
Continuation of 167C. Fulfills the University language requirement.
3 units, Aut (Szudelski, G)

SPECLANG 168B. Intermediate Polish, Second Quarter
Continuation of 168A.
3 units, Win (Szudelski, G)

SPECLANG 168C. Intermediate Polish, Third Quarter
Continuation of 168B.
3 units, Spr (Szudelski, G)

SPECLANG 170A. Beginning Modern Greek, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Greek culture.
4 units, Aut (Prionas, E)

SPECLANG 170B. Beginning Modern Greek, Second Quarter
Continuation of 170A.
4 units, Win (Prionas, E)

SPECLANG 170C. Beginning Modern Greek, Third Quarter
Continuation of 170B. Emphasis on speaking, reading, writing and listening. Student-centered, interactive approach focuses on mastering the basic grammar structures and basic vocabulary through a multimodal approach. Introduction to the Greek culture. Fulfills the University language requirement.
4 units, Spr (Prionas, E)

SPECLANG 171B. Intermediate Modern Greek, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
4 units, Win (Prionas, E)

SPECLANG 171C. Intermediate Modern Greek, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
4 units, Spr (Prionas, E)

SPECLANG 173A. Beginning Hungarian, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hungarian culture.
3 units, Aut (Szoke, E), Win (Szoke, E)

SPECLANG 173B. Beginning Hungarian, Second Quarter
Continuation of 173A.
3 units, Win (Szoke, E)

SPECLANG 174A. Beginning Quechua, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Quechua culture.
3 units, Aut (Fajardo, J)

SPECLANG 174B. Beginning Quechua, Second Quarter
Continuation of 174A.
3 units, Win (Fajardo, J)

SPECLANG 176B. Beginning Thai, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Thai culture.
3 units, Win (Moore, R)

SPECLANG 177A. Intermediate Thai, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Staff)

SPECLANG 177B. Intermediate Thai, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Staff)

SPECLANG 177C. Intermediate Thai, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Spr (Moore, R)

SPECLANG 178A. Beginning Sign Language, First Quarter
Comprehension and production skills; cultural awareness necessary for communication. Limited enrollment.
4 units, Aut (Haas, C)

SPECLANG 178B. Beginning Sign Language, Second Quarter
continuation of 178A.
4 units, Win (Haas, C)

SPECLANG 178C. Beginning Sign Language, Third Quarter
Continuation of 178B. Fulfills the University language requirement.
4 units, Spr (Haas, C)

SPECLANG 179A. Intermediate Sign Language, First Quarter
Additional functional structures, lexical items, and history. Limited enrollment.
4 units, Aut (Haas, C)

SPECLANG 179B. Intermediate Sign Language, Second Quarter
Continuation of 179A. Limited enrollment.
4 units, Win (Haas, C)

SPECLANG 179C. Intermediate Sign Language, Third Quarter
Continuation of 179B. Limited enrollment.
4 units, Spr (Haas, C)

SPECLANG 183A. Beginning Sanskrit, First Quarter
Sanskrit script and literary readings.
3 units, Aut (Porta, F)

SPECLANG 183B. Beginning Sanskrit, Second Quarter
Sanskrit script and literary readings.
3 units, Win (Porta, F)

SPECLANG 183C. Beginning Sanskrit, Third Quarter
Sanskrit script and literary readings.
3 units, Spr (Porta, F)

SPECLANG 186A. Beginning Serbo-Croatian, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Serb and Croat culture.
3 units, Aut (Rakicevic, B)

SPECLANG 186B. Beginning Serbo-Croatian, Second Quarter
Continuation of 186A.
3 units, Win (Rakicevic, B)

SPECLANG 186C. Beginning Serbo-Croatian, Third Quarter
Continuation of 186B.
3 units, Spr (Rakicevic, B)

SPECLANG 189A. Beginning Hawaiian, First Quarter
4 units, Aut (Peralto, S)

SPECLANG 189B. Beginning Hawaiian, Second Quarter
4 units, Win (Peralto, S)

SPECLANG 189C. Beginning Hawaiian, Third Quarter
4 units, Spr (Peralto, S)

SPECLANG 192A. Beginning Kazakh, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Kazakh culture.
3 units, Aut (Kunanbaeva, A)

SPECLANG 192B. Beginning Kazakh, Second Quarter
Continuation of 192A.
3 units, Win (Kunanbaeva, A)

SPECLANG 192C. Beginning Kazakh, Third Quarter
Continuation of 192B.
3 units, Spr (Kunanbaeva, A)

SPECLANG 193A. Intermediate Kazakh, First Quarter
Continuation of 192C. Fulfills the University language requirement.
3 units, Aut (Kunanbaeva, A)

SPECLANG 193B. Intermediate Kazakh, Second Quarter
Continuation of 193A.
3 units, Win (Kunanbaeva, A)

SPECLANG 193C. Intermediate Kazakh, Third Quarter
Continuation of 193B.
3 units, Spr (Kunanbaeva, A)

SPECLANG 198Q. Modern Greece in Film and Literature
(Stanford Introductory Seminar) Preference to sophomores. Cultural and literary highlights. Filmmakers include Kakoyannis, Dassen, Boulmetis, Angelopoulos, and Scorsese; readings from Eugenides, Gage, Kavafis, Kazantzakis, Samarakis, Seferis, and Elytis. GER:DB-Hum, DB-Hum, EC-GlobalCom
3-5 units, Aut (Prionas, E)

SPECLANG 215A. Modern Greek for Heritage Language Learners, First Quarter
For students of Greek background. Sources include authentic texts, multimedia materials, and Greek media.
2-4 units, Aut (Prionas, E)

SPECLANG 215B. Modern Greek for Heritage Language Learners, Second Quarter
Continuation of 215A.
2-4 units, Win (Prionas, E)

SPECLANG 238A. Beginning Uzbek, First Quarter
3 units, Aut (Kunanbaeva, A)

SPECLANG 238B. Beginning Uzbek, Second Quarter
Continuation of 238A.
3 units, Win (Kunanbaeva, A)

SPECLANG 238C. Beginning Uzbek, Third Quarter
Continuation of 238B.
3 units, Spr (Kunanbaeva, A)

SPECLANG 241A. Ukrainian for Speakers of a Slavic Language, First Quarter
3 units, Aut (Jarboe, L)

SPECLANG 241B. Ukrainian for Speakers of a Slavic Language, Second Quarter
Continuation of 241A.
3 units, Win (Staff)

SPECLANG 241C. Ukrainian for Speakers of a Slavic Language, Third Quarter
Continuation of 241B.
3 units, not given this year

SPECLANG 247. Introduction to Siouan Language and Culture I
Three dialects of the Siouan language: Dakota, Nakota, and Lakota. The focus is on the Lakota dialect with accompanying notation on when it is appropriate to use the other two dialects. Immersion techniques relying on cultural context, such as use of songs as poetry including current usage on Utube of Round Dance songs by today's youth to illustrate the adaptation of cultural ways to fit today's world. Dakota/Lakota grammar, Dakota/Lakota texts, andintroduction to a writing system. Definition of what oral culture means and the role of memory in the preservation of a way of life.
5 units, Win (Shaw, D)

SPECLANG 247A. Beginning Lakota, First Quarter
4 units, Aut (Staff)

SPECLANG 247B. Beginning Lakota, Second Quarter
4 units, Win (Staff)

SPECLANG 247C. Beginning Lakota, Third Quarter
4 units, Spr (Staff)

SPECLANG 248. Introduction to Siouan Language and Culture II
Focused approach on one cultural aspect of Dakota/Nakota/Lakota culture through the analysis of Dakota/Nakota /Lakota words in the lyrics of songs sung in the Sundance.
5 units, Spr (Shaw, D)

SPECLANG 250A. Beginning Romanian, First Quarter
3 units, Aut (Negip-Schatt, S)

SPECLANG 250B. Beginning Romanian, Second Quarter
3 units, Win (Negip-Schatt, S)

SPECLANG 250C. Beginning Romanian, Third Quarter
3 units, Spr (Negip-Schatt, S)

SPECLANG 251A. Intermediate Romanian, First Quarter
3 units, Aut (Negip-Schatt, S)

SPECLANG 251B. Intermediate Romanian, Second Quarter
3 units, Win (Negip-Schatt, S)

SPECLANG 251C. Intermediate Romanian, Third Quarter
3 units, Spr (Negip-Schatt, S)

SPECLANG 252A. Advanced Romanian, First Quarter
3 units, Aut (Negip-Schatt, S)

SPECLANG 252B. Advanced Romanian, Second Quarter
3 units, Win (Negip-Schatt, S)

SPECLANG 252C. Advanced Romanian, Thrid Quarter
3 units, Spr (Negip-Schatt, S)

SPECLANG 254A. Advanced Hungarian, First Quarter
3 units, Aut (Szoke, E)

SPECLANG 254B. Advanced Hungarian, second Quarter
3 units, Win (Szoke, E)

SPECLANG 254C. Advanced Hungarian, Third Quarter
3 units, Win (Staff), Spr (Szoke, E)

GRADUATE COURSES IN SPECIAL LANGUAGE PROGRAM

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SPECLANG 297. Directed Reading
Prerequisite: consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff), by arrangement

SPECLANG 395. Graduate Studies in Special Language
Prerequisite: consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

STANFORD INTRODUCTORY SEMINARS

See Undergraduate Education section for more information. F = preference to freshmen.

AA 113N. Structures: Why Things Don't (and Sometimes Do) Fall Down
(Stanford Introductory Seminar) Preference to freshmen. How structures created by nature or built by human beings keep things up and keep things in. Topics: nature's structures from microorganisms to large vertebrae; buildings from ancient dwellings to modern skyscrapers; spacecraft and airplanes; boats from ancient times to America's Cup sailboats, and how they win or break; sports equipment; and biomedical devices including bone replacements and cardiovascular stents. How composite materials are used to make a structure light and strong. GER:DB-EngrAppSci
3 units, Win (Springer, G)

AA 116N. Electric Automobiles and Aircraft
(Stanford Introductory Seminar) (Same as EE 25Q) Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption. It has crucial impacts on climate change, air pollution, resource depletion, and national security. Students wishing to address these issues will need to reconsider how we move, finding sustainable transportation solutions. This course will provide an introduction to the issue, covering the past and present of transportation and its impacts; examining alternative fuel proposals; and digging deeper into the most promising option: battery electric vehicles. Energy requirements of air, ground, and maritime transportation; design of electric motors, power control systems, drive trains, and batteries; and technologies for generating renewable energy. Two fun opportunities for hands-on experiences with electric cars. Prerequisites: Introduction to calculus and Physics AP or elementary mechanics.
3 units, Aut (Cox, D; Enge, P)

AMSTUD 35N. A Union of Diversities: Charles Ives and American Musical Traditions
(Stanford Introductory Seminar) (Same as MUSIC 35N) Preference to freshmen. The life and work of Charles Ives, and the polarized reception his compositions received. Music includes Ives' Victorian songs and his symphonic works; his philosophical and political writings, historic recordings, oral and photographic histories, and live performances. Hands-on work with original manuscripts and editions. Recommended: ability to read music. GER:DB-Hum
3 units, Spr (Barth, G)

AMSTUD 114N. Visions of the 1960s
(Stanford Introductory Seminar) Preference to sophomores. Introduction to the ideas, sensibility, and, to a lesser degree, the politics of the American 60s. Topics: the early 60s vision of a beloved community; varieties of racial, generational, and feminist dissent; the meaning of the counterculture; and current interpretive perspectives on the 60s. Film, music, and articles and books. GER:DB-Hum, EC-AmerCul
5 units, Aut (Gillam, R)

ANTHRO 22N. Ethnographies of North America: An Introduction to Cultural and Social Anthropology
(Stanford Introductory Seminar) Preference to freshmen. Ethnographic look at human behavior, including cultural transmission, social organization, sex and gender, culture change, and related topics in N. America. Films. GER:DB-SocSci
3-4 units, Win (Wilcox, M)

ANTHRO 25N. Contemporary Japanese Popular Culture
(Stanford Introductory Seminar) This is a seminar focusing on the intersection between politics and popular culture in contemporary Japan. It will survey a range of social and political implications of practices of popular culture. Topics include representations of gender in J-pop, manga, and anime, the otaku culture and its pathologization. Students will be introduced to theories of popular culture in general, and a variety of contemporary anthropological studies on Japanese popular culture in particular as well.
1-3 units, Aut (Inoue, M)

ANTHRO 26N. Hauntings, Visions, and Prophecy
(Stanford Introductory Seminar) This course explores the conditions under which people have experiences that they identify as ¿supernatural¿: experiences of something that is not physically present. We will explore the cultural and psychological dimensions of this very real phenomenon. We will not, however, make ontological judgments about whether something which is experienced as externally present is in fact externally present: in other words, this is a class about culture and psychology, not about metaphysics. We will do experimental work, using our selves and fellow classmates, as subjects, to understand who, when and how people have experiences that they deem ¿super¿natural.
3-5 units, Win (Luhrmann, T)

APPPHYS 78Q. Tools of Nanotechnology
(Stanford Introductory Seminar) Preference to sophomores. Topics include: current and future applications of nanotechnology, nanofabrication tools, nanoscale characterization and manipulation tools, scanning probe microscopy (SPM), Stanford nanotechnology research examples, hands-on activities, research lab tours. Prerequisite: high school physics. GER:DB-EngrAppSci
3 units, Aut (Beetz, T)

APPPHYS 79N. Energy Options for the 21st Century
(Stanford Introductory Seminar) Preference to freshmen. Choices for meeting the future energy needs of the U.S. and the world. Basic physics of energy sources, technologies that might be employed, and related public policy issues. Trade-offs and societal impacts of different energy sources. Policy options for making rational choices for a sustainable world energy economy. GER:DB-EngrAppSci
3 units, Aut (Fox, J; Geballe, T)

ASNAMST 74N. Race and Ethnicity in Contemporary American Fiction: Boundaries and Border Crossings
(Stanford Introductory Seminar) (Same as ENGLISH 74N) The question of ""place"" and ""locality"" in studies of identity and racial formation. Goal is to engage and examine texts with a critical eye both toward the social contexts represented and to the imaginative aesthetic techniques that American writers of color offer to bring their fictional worlds to life. Theme of border hopping and boundary crossing in works by authors including Charles Johnson, Toni Morrison, Alejandro Morales, Julie Otsuka, Stephen Graham Jones, and Lan Samantha Chang. GER:DB-Hum
3 units, Win (Sohn, S)

BIOC 118Q. Genomics and Medicine
(Stanford Introductory Seminar) Preference to sophomores. Knowledge gained from sequencing human, bacterial, and viral genomes and implications for medicine and biomedical research. Novel diagnoses (chips, SNPs and gene expression) and treatment of diseases including gene therapy, stem cell therapy, and rational drug design. Ethical implications of stem cell therapy and uses of genetic information. Use of genome and disease databases to determine gene function in disease, diagnosis, and potential treatments. See http://biochem118.stanford.edu/. GER:DB-EngrAppSci
3 units, Aut (Brutlag, D)

BIOE 70Q. Medical Device Innovation
(Stanford Introductory Seminar) Preference to sophomores. Survey of innovative technologies and medical devices used in multiple medical specialties. Guest lecturers include Stanford Medical School physicians, entrepreneurs, and venture capitalists. Focus on how to identify clinical needs and design device solutions to address those needs. Fundamentals of starting a company. Field trips to local medical device companies and design house. No previous engineering training required.
3 units, Spr (Mandato, J)

BIO 2N. Photons, Biological Photosynthesis, and Quantum Mechanics
(Stanford Introductory Seminar) Light driven reactions are fundamental to life on earth. Examination of basic properties of light, the role of light in photosynthesis, pertinent aspects of quantum mechanics, and the harnessing of light in bio- and nanotechnology. Discussion will emphasize intuitive understanding. High school biology and physics required. GER:DB-NatSci
3 units, Aut (Schnitzer, M)

BIO 3N. Views of a Changing Sea: Literature & Science
(Stanford Introductory Seminar) The state of a changing world ocean, particularly in the eastern Pacific, will be examined through

historical and contemporary fiction, non-fiction and scientific publications. Issues will include harvest and mariculture fisheries, land-sea interactions and oceanic climate change in both surface and deep waters. GER:DB-NatSci

3 units, Spr (Gilly, W)

BIO 4N. Personalized Genomic Medicine

(Stanford Introductory Seminar) Exploration of the exciting new field of personalized genomic medicine. Personalized medicine is based on the idea that each person's unique genome sequence can be used to predict risk of acquiring specific diseases, and to make more informed medical choices. Learn about the fascinating science behind these approaches; where they are heading in the future; and the ethical implications such technology presents. Lectures will be augmented with hands-on experience in exploring and analyzing a real person's genome.

3 units, Aut (Fraser, H)

BIO 8N. Human Evolution

(Stanford Introductory Seminar) A survey of the anatomical and behavioral evidence for human evolution and of the increasingly important information from molecular genetics. Emphasis on the split between the human and chimpanzee lines 6-7 million years ago, the appearance of the australopiths by 4.1 million years ago, the emergence of the genus Homo about 2.5 million years ago, the spread of Homo from Africa 1.7-1.6 million years ago, the subsequent divergence of Homo into different species on different continents, and the expansion of fully modern humans (Homo sapiens) from Africa about 50,000 years ago to replace the Neanderthals and other non-modern Eurasians.

5 units, Win (Klein, R)

BIO 14N. Plants and Civilization

(Stanford Introductory Seminar) Preference to freshmen. The role of plants in the development of civilization. Topics: the use of forests, woodlands, and grazing lands; centers of origins and spread of crops; viticulture, and wine and beer making; the spice route and the age of exploration; the use of plants as medicine; the global spread of weeds; engineering plants for the future; the importance of tea, coffee, chocolate, sugar, potatoes, natural dyes, and rubber in societal affairs and change. GER:DB-NatSci

3 units, Win (Mooney, H)

BIO 23N. FACEBUG: The Social Life of Microbes

(Stanford Introductory Seminar) Exploration of three crucial aspects of microbial life. First, examine how the unseen microbial majority is responsible for critical but under-appreciated aspects of the biology of the planet. Second, investigate the array of current genomic and imaging tools available to probe microscopic organisms in the environment. Last, we will research the importance of microbial communities and social dynamics in ecological and human health settings. GER:DB-NatSci

3 units, Aut (Bhaya, D)

BIO 26N. Maintenance of the Genome

(Stanford Introductory Seminar) Preference to freshmen. Focus is on DNA repair systems that monitor the genome to ensure genomic stability in the face of natural endogenous threats to DNA and those due to radiation and genotoxic environmental chemicals. Redundancy of the genetic message ensured by complementary DNA strands facilitates recovery of information by excision repair when one of the strands is damaged. Predisposition to cancer is often a consequence of defective DNA repair. Relevance for oncology, aging, developmental biology, environmental health, and neurobiology. GER:DB-NatSci

3 units, Spr (Hanawalt, P)

BIO 31Q. Ants: Behavior, Ecology, and Evolution

(Stanford Introductory Seminar) Preference to sophomores. Behavior: the organization of colonies, how they operate without central control, how they resemble other complex systems like brains. Ecology: how populations of colonies change, comparing the ecology of a species in SW American desert and invasive Argentine ants. Evolution: why are there so many species of ants; how are they alike, how do they differ, and why? Ants as the theme for exploring how to do research in animal behavior, ecology, and evolution. Research project will be on the invasive Argentine ant: its distribution on campus, foraging trails, and nest structure.

3 units, Spr (Gordon, D)

BIO 33N. Conservation Science and Practice

(Stanford Introductory Seminar) Preference to freshmen. Interdisciplinary. The science and art of conservation today. The forces that are driving change in Earth's atmosphere, lands, waters, and variety of life forms. Which broad dimensions of the biosphere, and which elements of ecosystems, most merit protection? The prospects for, and challenges in, making conservation economically attractive and commonplace. Field trip; project. GER:DB-NatSci

3 units, Spr (Daily, G)

BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution

(Stanford Introductory Seminar) (Same as GENE 109Q) Preference to sophomores. Concepts of genomics, high-throughput methods of data collection, and computational approaches to analysis of data. The social, ethical, and economic implications of genomic science. Students may focus on computational or social aspects of genomics.

3 units, Win (Altman, R)

CHEMENG 35N. Renewable Energy for a Sustainable World

(Stanford Introductory Seminar) Preference to freshmen. An overall world energy assessment, projections, and technologies. How to assess good and bad potential impacts of leading renewable energy candidates: benefit versus impact ratio using quantitative cradle-to-grave approach. Technologies suitable for near-term application in developing economic systems. Governmental policies, governmental versus private sector investments, raw materials supply issues, and impact of cultural influences on technology choices and speed of implementation. GER:DB-EngrAppSci

3 units, Aut (Swartz, J)

CHEMENG 60Q. Environmental Regulation and Policy

(Stanford Introductory Seminar) Preference to sophomores. How environmental policy is formulated in the U.S. How and what type of scientific research is incorporated into decisions. How to determine acceptable risk, the public's right to know of chemical hazards, waste disposal and clean manufacturing, brownfield redevelopment, and new source review regulations. The proper use of science and engineering including media presentation and misrepresentation, public scientific and technical literacy, and emotional reactions. Alternative models to formulation of environmental policy. Political and economic forces, and stakeholder discussions. GER:DB-EngrAppSci

3 units, Aut (Robertson, C; Libicki, S)

CHEMENG 70Q. Masters of Disaster

(Stanford Introductory Seminar) Preference to sophomores. For students interested in science, engineering, politics, and the law. Learn from past disasters to avoid future ones. How disasters can be tracked to failures in the design process. The roles of engineers, artisans, politicians, lawyers, and scientists in the design of products. Failure as rooted in oversight in adhering to the design process. Student teams analyze real disasters and design new products presumably free from the potential for disastrous outcomes. GER:DB-EngrAppSci

3 units, Aut (Robertson, C; Moalli, J)

CHEMENG 80Q. Art, Chemistry, and Madness: The Science of Art Materials

(Stanford Introductory Seminar) Preference to sophomores. Chemistry of natural and synthetic pigments in five historical palettes: earth (paleolithic), classical (Egyptian, Greco-Roman), medieval European (Middle Ages), Renaissance (old masters), and synthetic (contemporary). Composite nature of paints using scanning electron microscopy images; analytical techniques used in art conservation, restoration, and determination of provenance; and inherent health hazards. Paintings as mechanical structures. Hands-on laboratory includes stretching canvas, applying gesso grounds, grinding pigments, preparing egg tempera paint, bamboo and quill pens, gilding and illumination, and papermaking. GER:DB-EngrAppSci

3 units, Spr (Frank, C; Loesch-Frank, S)

CHEM 24N. Nutrition and History

(Stanford Introductory Seminar) Preference to freshmen. Intended to broaden the introductory chemistry experience. The biochemical basis of historically important nutritional deficiencies (vitamins, minerals, starvation, metabolic variants that predispose to disease) and environmental toxins is related to physiological action and the sociological, political, and economic consequences of its effect on

human populations. Prerequisite: high school chemistry. Recommended: 31A,B, or 31X, or 33.

3 units, Spr (Huestis, W)

CHEM 25N. Science in the News

(Stanford Introductory Seminar) Preference to freshmen. Possible topics include: diseases such as avian flu, HIV, and malaria; environmental issues such as climate change, atmospheric pollution, and human population; energy sources in the future; evolution; stem cell research; nanotechnology; and drug development. Focus is on the scientific basis for these topics as a basis for intelligent discussion of societal and political implications. Sources include the popular media and scientific media for the nonspecialist, especially those available on the web.

3 units, Aut (Andersen, H)

CHEM 25Q. Science-in-Theatre: A New Genre?

(Stanford Introductory Seminar) (Same as DRAMA 25N) Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Frankensteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment.

3 units, Win (Djerassi, C)

CHEM 26N. The What, Why, How and wow's of Nanotechnology

(Stanford Introductory Seminar) Preference to freshmen. Introduction to nanotechnology with discussion of basic science at the nanoscale, its difference from molecular and macroscopic scales, and implications and applications. Developments in nanotechnology in the past two decades, from imaging and moving single atoms on surfaces to killing cancer cells with nanoscale tools and gadgets. GER:DB-NatSci

3 units, Spr (Dai, H)

CHICANST 117N. Film, Nation, Latinidad

(Stanford Introductory Seminar) (Same as CSRE 117N, ILAC 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

3-4 units, Spr (Yarbro-Bejarano, Y)

CHINGEN 70N. Marvelous Creatures: Animals and Humans in Chinese Literature

(Stanford Introductory Seminar) Preference to freshmen. Read novels and short stories as well as view films that feature an array of marvelous creatures from late imperial times to the contemporary era. What animal imageries and metaphors can reveal about the Chinese and how they relate to the natural, supernatural, and human worlds across the centuries. GER:DB-Hum, EC-GlobalCom

3-4 units, Spr (Lee, H)

CEE 31Q. Accessing Architecture Through Drawing

(Stanford Introductory Seminar) Preference to sophomores. Drawing architecture provides a deeper understanding of the intricacies and subtleties that characterize contemporary buildings. How to dissect buildings and appreciate the formal elements of a building, including scale, shape, proportion, colors and materials, and the problem solving reflected in the design. Students construct conventional architectural drawings, such as plans, elevations, and perspectives. Limited enrollment. GER:DB-EngrAppSci

4 units, Aut (Barton, J), Win (Barton, J)

CEE 32Q. Place: Making Space Now

(Stanford Introductory Seminar) This seminar argues that architects are ultimately ""place-makers"" and questions what that means in the contemporary world. The idea of contemporary place-making will include a critique of the history of modern place-making through an examination of modern form, a discussion of ""non-places"" and the role of cyber technologies in making space and place, as well as the nature of ""in-between spaces"".

3 units, Spr (Barton, J; Beischer, T)

CEE 70N. Water, Public Health, and Engineering

(Stanford Introductory Seminar) Preference to sophomores. Linkages between water, wastewater and public health, with an emphasis on engineering interventions. Topics include the history of water and wastewater infrastructure development in the U.S. and Europe; evolution of epidemiological approaches for water-related health challenges; biological and chemical contaminants in water and wastewater and their management; and current trends and challenges in access to water and sanitation around the world. How to identify ways in which freshwater contributes to human health; exposure routes for water- and sanitation-illness; how to classify these illnesses by pathogen type and their geographic distribution; how to identify the health and economic consequences of water- and sanitation-related illnesses; costs and benefits of curative and preventative interventions; and how to interpret data related to epidemiological concepts. No previous experience in engineering is required. GER:DB-EngrAppSci

3 units, Spr (Davis, J)

CEE 80N. The Art of Structural Engineering

(Stanford Introductory Seminar) Preference to freshmen. The history of modern bridges, buildings, and other large-scale structures. Students learn about modern structures, the social context in which they are built and their symbolic value. Principles of structural engineering and calculating efficiency and safety taught through case studies. Field trip to Bay Area landmark and hands-on exercises including building and testing a model bridge. Students from all backgrounds welcome. GER:DB-EngrAppSci

4 units, Aut (Billington, S)

CLASSART 21Q. Eight Great Archaeological Sites in Europe

(Stanford Introductory Seminar) Preference to sophomores. Focus is on excavation, features and finds, arguments over interpretation, and the place of each site in understanding the archaeological history of Europe. Goal is to introduce the latest archaeological and anthropological thought, and raise key questions about ancient society. The archaeological perspective foregrounds interdisciplinary study: geophysics articulated with art history, source criticism with analytic modeling, statistics interpretation. A web site with resources about each site, including plans, photographs, video, and publications, is the basis for exploring. GER:DB-Hum

3-5 units, Aut (Shanks, M)

CLASSGEN 5N. The Nile and its Life-cycles

(Stanford Introductory Seminar) Studying the Nile River, in all its aspects involving antiquity. Particular focus on the period between 500 BC and AD 500, with limited materials before and after said period. Is it useful or misleading to think of the river itself as ancient? What happens when we consider the Nile spatially as a whole? Since only a part of the river flows through Egypt we will also focus on Ethiopia, the Sudan and equatorial Africa, which were also objects of ancient Greek and Roman fascination.

3-5 units, Aut (Parker, G)

CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent

(Stanford Introductory Seminar) (Same as DRAMA 12N) Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of Antigone by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. GER:DB-Hum, EC-Gender

3-5 units, Aut (Rehm, R)

CLASSGEN 16N. New Worlds from Homer to Columbus

(Stanford Introductory Seminar) Preference to sophomores. What did the ancient Greeks and Romans imagine far away places and peoples to be like? What did they think the world looked like? What was the modern afterlife of these ancient travel experiences? Focus on Greek and Roman travels and encounters with alien peoples and exotic places (from Homer's Odyssey to the Roman historian Tacitus' descriptions of Britain and German), accounts of the New World and its peoples by both explorers and missionaries (from Columbus to Las Casas) and visual representations.

3-5 units, Spr (Ceserani, G)

CLASSGEN 24N. Sappho: Erotic Poetess of Lesbos

(Stanford Introductory Seminar) Preference to freshmen. Sappho's surviving fragments in English; traditions referring to or fantasizing about her disputed life. How her poetry and legend inspired women authors and male poets such as Swinburne, Baudelaire, and Pound. Paintings inspired by Sappho in ancient and modern times,

and composers who put her poetry to music. GER:DB-Hum, EC-Gender

4-5 units, Win (Peponi, A)

CLASSHIS 24N. The Roman Empire: Its Grandeur and Fall
(Stanford Introductory Seminar) (Same as HISTORY 11N) Preference to Freshmen. Prerequisite: IHUM 69A. Explore themes on the Roman Empire and its decline from the 1st through the 5th centuries C.E.. What was the political and military glue that held this diverse, multi-ethnic empire together? What were the bases of wealth and how was it distributed? What were the possibilities and limits of economic growth? How integrated was it in culture and religion? What were the causes and consequences of the conversion to Christianity? Why did the Empire fall in the West? How suitable is the analogy of the U.S. in the 21st century?

3 units, Spr (Saller, R)

COMM 118Q. Theories of Film Practice
(Stanford Introductory Seminar) Preference to sophomores. How theory connects with practice in the production of film and television. Film and television from the perspectives of practitioners who have theorized about their work in directing, editing, screenwriting, cinematography, and sound, and social scientists whose research has explored similar issues empirically.

4 units, Win (Breitrose, H)

COMPLIT 10N. Shakespeare and Performance in a Global Context
(Stanford Introductory Seminar) Preference to freshmen. The problem of performance including the performance of gender through the plays of Shakespeare. In-class performances by students of scenes from plays. The history of theatrical performance. Sources include filmed versions of plays, and readings on the history of gender, gender performance, and transvestite theater. GER:DB-Hum, EC-Gender

3 units, Spr (Parker, P)

COMPLIT 11Q. Shakespeare, Playing, Gender
(Stanford Introductory Seminar) Preference to sophomores. Focus is on several of the best and lesser known plays of Shakespeare, on theatrical and other kinds of playing, and on ambiguities of both gender and playing gender. Topics: transvestism inside and outside the theater, medical and other discussions of sex changes from female to male, hermaphrodites, and fascination with the monstrous. GER:DB-Hum, EC-Gender

3 units, Win (Staff)

COMPLIT 40Q. Aesthetics of Dissent: the Case of Islamic Iran
(Stanford Introductory Seminar) Censorship, Borges tells us, is the mother of metaphors. The Islamic regime in Iran censors all aesthetic production in the country. But Iranian dissident artists, from film-makers and fiction writers to composers in a thriving underground musical scene, have cleverly found ways to fight these draconian measures. They have developed an impressive body of work that is as sophisticated in style as it is rich in its discourse of democracy and dissent. The purpose of the seminar is to understand the aesthetic tropes of dissent in Iran, and the social and theological roots of rules of censorship. Masterpieces of post-revolutionary film, fiction, and music will be discussed in the context of tumultuous history of dissent in Islamic Iran.

3 units, Aut (Milani, A)

COMPLIT 41N. Borderlands of Literature and Culture
(Stanford Introductory Seminar) In this seminar we will focus on the transnational themes of memory, identity, and US-Mexico border thinking and writing. We will explore the transnational poetry, autoethnographies, short stores, novels, and rock en español musics/videos by Americo Paredes, Gloria Anzaldua, Sandra Cisneros, Guillermo Gomez-Pena, Alicia Gaspar de Alba, Carlos Fuentes, Elly Guerra, and Cafe Tacuba, among others.

3-4 units, Aut (Saldivar, J)

COMPLIT 41Q. Ethnicity and Literature
(Stanford Introductory Seminar) Preference to sophomores. What is meant by ethnic literature? How is ethnic writing different from non-ethnic writing, or is there such a thing as either? How does ethnicity as an analytic perspective affect the way literature is read by ethnic peoples? Articles and works of fiction; films on ethnic literature and cultural politics. How ethnic literature represents the nexus of social, historical, political, and personal issues. GER:DB-Hum, EC-AmerCul

5 units, Spr (Palumbo-Liu, D)

COMPLIT 51N. Comparative Fictions of Ethnicity
(Stanford Introductory Seminar)

5 units, Win (Staff)

COMPMED 81N. Comparative Anatomy and Physiology of Mammals
(Stanford Introductory Seminar) Preference to freshmen. Emphasis is on a comparative approach to anatomy and physiology of a wide range of mammals, the unique adaptations of each species in terms of its anatomical, and behavioral characteristics, and how these species interact with human beings and other animals. Dissection required. Class size is limited to 16. GER:DB-NatSci

3 units, Win (Bouley, D)

COMPMED 83N. Horse Medicine
(Stanford Introductory Seminar) Preference to freshmen. The most common equine diseases, ranging from colic to lameness are reviewed using problem-oriented approach. Topics include: equine infectious diseases, care of the newborn foal, medical emergencies, and neurological disorders. A lab on the physical and neurological examination of the horse at the Red Barn.

1-2 units, Spr (Staff)

COMPMED 84Q. Globally Emerging Zoonotic Diseases
(Stanford Introductory Seminar) Preference to sophomores. Infectious diseases impacting veterinary and human health around the world today. Mechanisms of disease, epidemiology, and underlying diagnostic, treatment and control principles associated with these pathogens.

3 units, Spr (Felt, S)

COMPMED 87Q. Introduction to the Mouse in Biomedical Research
(Stanford Introductory Seminar) Preference to sophomores. Focus is on the laboratory mouse, one of the most widely used models for biomedical research. Topics include the natural history and origin of the laboratory mouse; characteristics of commonly used strains; mouse anatomy, physiology, and husbandry; common mouse diseases and their effects on research; coat color genetics; and genetically engineered mouse technology. Demonstrations and hands-on experience with necropsy, mouse handling, and research techniques.

3 units, Aut (Nagamine, C)

CSRE 28N. The Cultural Shaping of Mental Health and Illness
(Stanford Introductory Seminar) (Same as PSYCH 28N) This seminar examines how our cultural ideas and practices shape our conceptions, perceptions, experiences, and treatment of emotional wellness and distress. We will read and discuss empirical research and case studies from psychology, anthropology, sociology, and medicine. Course requirements include weekly reading and thought papers, weekly discussion, and a final research project and presentation.

3 units, Win (Tsai, J)

CSRE 117N. Film, Nation, Latinidad
(Stanford Introductory Seminar) (Same as CHICANST 117N, ILAC 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

3-4 units, Spr (Yarbro-Bejarano, Y)

CSRE 160N. Latino/Latina Performance in the United States
(Stanford Introductory Seminar) (Same as DRAMA 17N) Preference to freshmen. This course will introduce works by U.S. Latino and Latina performance artists producing from the margins of the mainstream Euro-American theater world. We will examine how performance art serves as a kind of dramatized political forum for Latino/a artists, producing some of the most transgressive explorations of queer and national/ethnic identities in the U.S. today. By the course¿s conclusion, each student will create and perform in a staged reading of an original performance piece. GER:DB-Hum, EC-AmerCul

3 units, Win (Moraga, C)

CS 21N. Can Machines Know? Can Machines Feel?
(Stanford Introductory Seminar) Preference to freshmen. Can mental attitudes attributed to people and sometimes to animals, including knowledge, belief, desire, and intention, also be ascribed to machines? Can light sensors have a belief? Can a pool cleaning robot or tax-preparation software have an intention? If not, why

not? If yes, what are the rules of such ascription, and do they vary between human beings and machines? Sources include philosophy, neuroscience, computer science, and artificial intelligence. Topics: logic, probability theory, and elements of computation. Students present a paper. GER:DB-EngrAppSci

3 units, Spr (Shoham, Y)

CS 45N. Computers and Photography: From Capture to Sharing

(Stanford Introductory Seminar) Preference to freshmen with exerience in photography and use of computers. How a photographer creates photos, makes them available for computer viewing, reliably stores them, organizes them, tags them, searches them, and distributes them online. Access to a digital SLR camera and to PhotoShop Elements or equivalent software is required; no programming experience required. Digital SLRs and editing software will be provided to those students who do not wish to use their own.

3-4 units, Aut (Garcia-Molina, H)

CS 73N. The Business of the Internet

(Stanford Introductory Seminar) Preference to freshmen. Issues in Internet history, technology, and public policy are discussed as well as the Internet's impact on commerce, education, government, and health care. Writing for the web. Participants develop a substantial website. GER:DB-EngrAppSci

3 units, Spr (Wiederhold, G; Barr, A; Tessler, S)

CS 74N. Digital Dilemmas

(Stanford Introductory Seminar) Preference to freshmen. Issues where policy decision making requires understanding computer and communications technology. Technology basics taught in non-technology terms. Topics include consumer privacy, government surveillance, file sharing and intellectual property, and electronic voting. GER:DB-EngrAppSci

3 units, Aut (Dill, D)

DLCL 70N. From Vampires to Bathroom Walls: Folklore and Literature

(Stanford Introductory Seminar) In the early 19th century, some Europeans started seeing the stories and songs of illiterate peasants as folklore to be collected, preserved, and perhaps transformed into new literature, art, and music. These folktales, such as legends of vampires, continue to inspire artists. The idea of folklore has expanded to include the shared practices or utterances of any group with at least one linking factor, including latrinalia (wall writings in a public bathroom). Sources include folklore from German, English, Russian, and Yiddish sources, and theoretical essays. Students collect living folklore, and analyze and present it.

4 units, Spr (Safran, G)

DRAMA 10N. Arts and Ideas: 20th Century Art in Conflict

(Stanford Introductory Seminar) The second quarter of Art & Ideas builds on the examples of Modernism students in Arts and Ideas studied in the first quarter. The Frosh Seminar ¿20th-Century Art in Conflict¿ will focus on drama and film that experiments with new possibilities of form, shaping the direction of later artistic practice. We will trace how the political and aesthetic concerns of the 20th century reflect and exploit new technologies, both in theater and film, altering the position and function of author, actor, director, and audience.

4 units, Spr (Rehm, R)

DRAMA 11N. Dramatic Tensions: Theater and the Marketplace

(Stanford Introductory Seminar) Preference to freshmen. Tension between artistic and commercial forces in modern theater; the conflicted state of the art form. Sources include major and emerging contemporary figures in commercial, fringe, and nonprofit theater in the U.S. and UK. Visits with writers, directors, and dramaturges. GER:DB-Hum

3-4 units, Aut (Freed, A)

DRAMA 12N. Antigone: From Ancient Democracy to Contemporary Dissent

(Stanford Introductory Seminar) (Same as CLASSGEN 6N) Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of Antigone by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. GER:DB-Hum, EC-Gender

3-5 units, Aut (Rehm, R)

DRAMA 13N. Law and Drama

(Stanford Introductory Seminar) Preference to Freshmen.Beyond the obvious traits that make a good (court room) drama, theater and jurisprudence have much more in common. Just as drama is engaged not only in entertainment but also in examination of social conventions and mechanisms, so law is not only concerned with dispensing justice but with shaping and maintaining a viable human community. In this class we will read and discuss a series of plays in which court proceedings are at the center of dramatic action and concluding with an investigation of the new genre of documentary drama.

3-5 units, Aut (Jakovljevic, B)

DRAMA 17N. Latino/Latina Performance in the United States

(Stanford Introductory Seminar) (Same as CSRE 160N) Preference to freshmen. This course will introduce works by U.S. Latino and Latina performance artists producing from the margins of the mainstream Euro-American theater world. We will examine how performance art serves as a kind of dramatized political forum for Latino/a artists, producing some of the most transgressive explorations of queer and national/ethnic identities in the U.S. today. By the course¿s conclusion, each student will create and perform in a staged reading of an original performance piece. GER:DB-Hum, EC-AmerCul

3 units, Win (Moraga, C)

DRAMA 25N. Science-in-Theatre: A New Genre?

(Stanford Introductory Seminar) (Same as CHEM 25Q) Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Frankensteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment.

3 units, Win (Djerassi, C)

DRAMA 180Q. Noam Chomsky: The Drama of Resistance

(Stanford Introductory Seminar) Preference to sophomores. Chomsky's ideas and work which challenge the political and economic paradigms governing the U.S. Topics include his model for linguistics; cold war U.S. involvements in S.E. Asia, the Middle East, Central and S. America, the Caribbean, and Indonesia and E. Timor; the media, terrorism, ideology, and culture; student and popular movements; and the role of resistance. GER:DB-Hum

3-5 units, Aut (Rehm, R)

EARTHSYS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration

(Stanford Introductory Seminar) (Same as EESS 38N, GES 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci

3 units, Win (Dunbar, R)

EARTHSYS 43Q. Environmental Problems

(Stanford Introductory Seminar) (Same as GES 43Q) Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to timber and mining practices, acid rain, and subsurface disposal of nuclear waste. GER:DB-NatSci

3 units, Win (Loague, K)

EARTHSYS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough

(Stanford Introductory Seminar) (Same as EESS 46N) Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries,

and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's Changes in a California Estuary: A Profile of Elkhorn Slough. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.
3 units, Spr (Francis, C)

EARTHSYS 57Q. Climate Change from the Past to the Future
(Stanford Introductory Seminar) (Same as EESS 57Q) Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.
3 units, Aut (Chamberlain, P)

ECON 11N. Understanding the Welfare System
(Stanford Introductory Seminar) Preference to freshmen. Welfare reform legislation and the devolution revolution. The transfer of responsibility for antipoverty programs to the states. How recent reforms change the welfare system and who is likely to be affected. Food stamps, AFDC, TANF, SSI, and Medicaid. Income transfer programs such as earned income tax credit and income taxes, and labor market regulations such as minimum wages and overtime rules. Economic principles to understand the effectiveness of these programs and their consequences on the behavior of families. Pre- or corequisite: ECON 1. Recommended: basic understanding of labor markets, taxes, and transfers.
2 units, Aut (MaCurdy, T)

ECON 17N. Energy, the Environment, and the Economy
(Stanford Introductory Seminar) Preference to freshmen. The relationship between environmental quality and production and consumption of energy. Can environmentally-friendly energy production and consumption compete with conventional sources? How to estimate and compare environmental impact costs of nonrenewable sources such as fossil fuels and nuclear power versus renewable sources such as solar and wind power. Implicit subsidies in conventional energy sources and the environmental costs of these subsidies. Regulatory and legal barriers to more environmentally friendly energy sources.
2 units, Spr (Wolak, F)

EE 14N. Things about Stuff
(Stanford Introductory Seminar) Preference to freshmen. The stories behind disruptive inventions such as the telegraph, telephone, wireless, television, transistor, and chip are as important as the inventions themselves, for they elucidate broadly applicable scientific principles. Focus is on studying consumer devices; projects include building batteries, energy conversion devices and semiconductors from pocket change. Students may propose topics and projects of interest to them. The trajectory of the course is determined in large part by the students themselves. GER:DB-EngrAppSci
3 units, Aut (Lee, T)

EE 15N. The Art and Science of Engineering Design
(Stanford Introductory Seminar) The goal of this seminar is to introduce freshmen to the design process associated with an engineering project. The seminar will consist of a series of lectures. The first part of each lecture will focus on the different design aspects of an engineering project, including formation of the design team, developing a project statement, generating design ideas and specifications, finalizing the design, and reporting the outcome. Students will form teams to follow these procedures in designing a term project of their choice over the quarter. The second part of each lecture will consist of outside speakers, including founders of some of the most exciting companies in Silicon Valley, who will share their experiences about engineering design. On-site visits to Silicon Valley companies to showcase their design processes will also be part of the course. The seminar serves three purposes: (1) it introduces students to the design process of turning an idea into a final GER:DB-EngrAppSci
3 units, Win (Goldsmith, A; Le, M)

EE 17N. Engineering the Micro and Nano Worlds: From Chips to Genes
(Stanford Introductory Seminar) Preference to freshmen. The first part is hands-on micro- and nano-fabrication including the Stanford Nanofabrication Facility (SNF) and the Stanford Nanocharacterization Laboratory (SNL) and field trips to local companies and other research centers to illustrate the many applications; these include semiconductor integrated circuits ('chips'), DNA microarrays, microfluidic bio-sensors and microelectromechanical systems (MEMS). The second part is to create, design, propose and execute a project. Most of the grade will be based on the project. By the end of the course you will, of course, be able to read critically a New York Times article on nanotechnology. More importantly you will have experienced the challenge (and fun) of designing, carrying out and presenting your own experimental project. As a result you will be better equipped to choose your major. This course can complement (and differs from) the seminars offered by Profs Philip Wong and Hari Manohar GER:DB-EngrAppSci
3 units, Spr (Pease, R)

EE 21N. What is Nanotechnology?
(Stanford Introductory Seminar) Nanotechnology is an often used word and it means many things to different people. Scientists and Engineers have some notion of what nanotechnology is, societal perception may be entirely different. In this course, we start with the classic paper by Richard Feynman (""There's Plenty of Room at the Bottom""), which laid down the challenge to the nanotechnologists. Then we discuss two classic books that offer a glimpse of what nanotechnology is: Engines of Creation: The Coming Era of Nanotechnology by Eric Drexler, and Prey by Michael Crichton. Drexler's thesis sparked the imagination of what nano machinery might do, whereas Crichton's popular novel channeled the public's attention to this subject by portraying a disastrous scenario of a technology gone astray. We will use the scientific knowledge to analyze the assumptions and predictions of these classic works. We will draw upon the latest research advances to illustrate the possibilities and impossibilitie GER:DB-EngrAppSci
3 units, Win (Wong, P)

EE 25Q. Electric Automobiles and Aircraft
(Stanford Introductory Seminar) (Same as AA 116N) Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption. It has crucial impacts on climate change, air pollution, resource depletion, and national security. Students wishing to address these issues will need to reconsider how we move, finding sustainable transportation solutions. This course will provide an introduction to the issue, covering the past and present of transportation and its impacts; examining alternative fuel proposals; and digging deeper into the most promising option: battery electric vehicles. Energy requirements of air, ground, and maritime transportation; design of electric motors, power control systems, drive trains, and batteries; and technologies for generating renewable energy. Two fun opportunities for hands-on experiences with electric cars. Prerequisites: Introduction to calculus and Physics AP or elementary mechanics.
3 units, Aut (Cox, D; Enge, P)

EE 60N. Man versus Nature: Coping with Disasters Using Space Technology
(Stanford Introductory Seminar) (Same as GEOPHYS 60N) Stanford Introductory Seminar. Preference to freshman. Natural hazards, such as earthquakes, volcanoes, floods, hurricanes, and fires, affect the lives of thousands of people worldwide everyday. Over the past twenty years developments in spaceborne imaging technology have made it possible to monitor and respond to such disasters much more rapidly than in the past, saving lives and money. Additionally, greater understanding of the physical processes involved allows us to anticipate and plan for mitigation of the consequences of the disasters. In this course we will explore these new tools, how they are applied to natural disasters, and learn how the remotely-sensed data are manipulated and analyzed. The technical material consists of a summary of basic geophysical properties of the Earth, their physical characteristics that can be sensed remotely, and the design of satellite systems to measure these phenomena and predict/mitigate natural hazards. GER:DB-EngrAppSci
4 units, Aut (Zebker, H)

ENGR 159Q. Japanese Companies and Japanese Society
(Stanford Introductory Seminar) (Same as MATSCI 159Q) Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course. GER:DB-SocSci

3 units, Spr (Sinclair, R)

ENGLISH 14Q. Tis All in Pieces: John Donne and the Early Modern World
(Stanford Introductory Seminar) One of the most innovative and dramatic poets in literary history, John Donne's writing bears the marks of the changes that were occurring on the threshold of the modern world, in such areas as science, astronomy, religion, exploration, theatre, and art. Donne's dramatic realism exerted a shaping influence on: modern poets as Browning, Eliot, and Rich; on contemporary composers such as Bob Dylan, Van Morrison, and Benjamin Britten; and on Pulitzer Prize-winning playwright Margaret Edson. Topics include Donne's work within the vibrant historical and cultural milieu of the early modern world and related developments in early modern art and theatre. GER:DB-Hum

2-3 units, Win (Brooks, H)

ENGLISH 22N. Virginia Woolf: Art and Politics
(Stanford Introductory Seminar) Introduction to Woolf's diverse oeuvres: her novels, essays, short stories, diaries, and letters focusing on how she devised an art form shaped by political consciousness but not subordinate to it. How, for Woolf, were art and politics, the private and the public, the artist and the activist conjoined. Navigation of the multiple intersections of Woolf's artistic experimentation and sociopolitical consciousness from 1917 to 1941. GER:DB-Hum

3 units, Aut (Staveley, A)

ENGLISH 62N. Eros in Modern American Poetry
(Stanford Introductory Seminar) Preference to freshmen. Anne Carson, treating love from Sappho to Socrates, shows how the Greeks derived their philosophy from the erotic poetic tradition. Readings include: Carson's poetry which locates erotic desire in the larger context of the desire for knowledge; classic Japanese haiku masters such as Basho; and William Carlos Williams, Louise Bogan, and C.K. Williams. GER:DB-Hum

3 units, Spr (Fields, K)

ENGLISH 65N. Contemporary Women Fiction Writers
(Stanford Introductory Seminar) Preference to freshmen. Novels and story collections by women writers whose work explores: domestic and global politics; love, sexuality, and orientation; and spirituality and its meanings. Readings includes Dandicant, Eisenberg, Munro, Morrison, O'Brien, and Erdrich. GER:DB-Hum

3 units, Aut (Tallent, E)

ENGLISH 73N. Conflict and Resolution in the Novel
(Stanford Introductory Seminar) Preference to freshmen. The social work of the novel, its strategies for articulating difference, and its capacity to objectify points of view and posit resolutions to ideological disputes. The novel as an artistic device, part of material history, and style of social consciousness. Its relationship to language and cultural systems of representation. Readings from Franz Kafka, Milan Kundera, Toni Morrison, Umberto Eco, and John Coetzee. GER:DB-Hum

3 units, Aut (Shloss, C)

ENGLISH 74N. Race and Ethnicity in Contemporary American Fiction: Boundaries and Border Crossings
(Stanford Introductory Seminar) (Same as ASNAMST 74N) The question of ""place"" and ""locality"" in studies of identity and racial formation. Goal is to engage and examine texts with a critical eye both toward the social contexts represented and to the imaginative aesthetic techniques that American writers of color offer to bring their fictional worlds to life. Theme of border hopping and boundary crossing in works by authors including Charles Johnson, Toni Morrison, Alejandro Morales, Julie Otsuka, Stephen Graham Jones, and Lan Samantha Chang. GER:DB-Hum

3 units, Win (Sohn, S)

ENGLISH 77N. Living in the Past: Italy in the Anglo-American Imagination
(Stanford Introductory Seminar) Preference to freshmen. Italy as metaphor, in depictions by British and American writers from Shakespeare and Byron to D.H.Lawrence and Robert Hellenga. GER:DB-Hum

3 units, Win (Evans, M)

ENGLISH 81N. Lyric Voice
(Stanford Introductory Seminar) Lyric poetry asks its reader to imagine a speaking voice. But whose voice inhabits the lyric poem? How have historical developments ¿ such as new printing technologies, the rise of liberal individualism, or the emergence of sound recording - influenced our sense of how a lyric should sound? Treatment of poems from a variety of historical periods while stressing the crucial role of the poetry of British Romanticism in shaping the modern sense of the lyric voice. GER:DB-Hum

3 units, Spr (Rovee, C)

ENGLISH 82Q. Shakespeare's Plays
(Stanford Introductory Seminar) Preference to sophomores. Eight representative plays; sonnets. Student papers provide topics for discussion. Students direct and perform scenes from the plays studied. GER:DB-Hum

5 units, Aut (Rebholz, R)

ENGLISH 103Q. Reading and Writing Poetry about Science
(Stanford Introductory Seminar) (Same as STS 103Q) Preference to sophomores. Students will study recent poetry inspired by the phenomena and history of the sciences in order to write such poems themselves. These poems bring sensuous human experience to bear on biology, ecology, neuroscience, physics, astronomy, and geology, as well as on technological advances and missteps. Poets such as Mark Doty, Jody Gladding, Albert Goldbarth, Jorie Graham, Sarah Lindsay, Adrienne Rich, W.S. Merwin, and C. K. Williams. Grounding in poetics, research in individually chosen areas of science, weekly analytical and creative writing. Enrollment limited to 12.

4 units, Win (Roberts, E; Rusk, L)

EESS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration
(Stanford Introductory Seminar) (Same as EARTHSYS 38N, GES 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci

3 units, Win (Dunbar, R)

EESS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough
(Stanford Introductory Seminar) (Same as EARTHSYS 46N) Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's Changes in a California Estuary: A Profile of Elkhorn Slough. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.

3 units, Spr (Francis, C)

EESS 57Q. Climate Change from the Past to the Future
(Stanford Introductory Seminar) (Same as EARTHSYS 57Q) Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.

3 units, Aut (Chamberlain, P)

FEMST 188N. Imagining Women: Writers in Print and in Person
(Stanford Introductory Seminar) Gender roles, gender relations and sexual identity explored in contemporary literature and conversation with guest authors. Poetry and narrative examining relationships between race and gender set in 19th-21st centuries in The Phillippines, Jamaica, Japan, China and various parts of the U.S. Expository writing and oral skills are emphasized. Writing experience not necessary. GER:DB-Hum, EC-Gender
4-5 units, Win (Miner, V)

FEMST 191Q. Writing Women's Lives
(Stanford Introductory Seminar) Creative writing through dialogue focusing on prose about the lives of women in different cultures and generations. Novels, short stories, and micro-narrative including fiction and memoir. Students produce work using research, memory, imagination, and metaphor.
2 units, Aut (Miner, V)

FRENGEN 55N. After Epic: Romance, Lyric, and Novelistic Responses in Western European Literature
(Stanford Introductory Seminar) Stanford Introductory Seminar. Preference to freshmen. Exploration of the quest in diverse genres: medieval romance (Chrétien de Troyes), Ovidian fables (Marie de France), allegorical dream quests (Roman de la Rose), and the novel (Cervantes¿ Don Quixote). How do stories of bodily transformation or animal fables challenge epic narratives of patriarchy or moral transcendence, and grand narratives of civilization? How does the art of courtly love and medieval allegory replace the mythology of classical epics? Focus on close analysis of primary texts with secondary research.
3-4 units, Spr (Galvez, M)

FRENGEN 190Q. Parisian Cultures of the 19th and Early 20th Centuries
(Stanford Introductory Seminar) Preference to sophomores. Political, social, and cultural events in Paris from the Napoleonic era and the Romantic revolution to the 30s. The arts and letters of bourgeois, popular, and avant garde cultures. Illustrated with slides. GER:DB-Hum
4 units, Win (Bertrand, M)

GENE 109Q. Genomics: A Technical and Cultural Revolution
(Stanford Introductory Seminar) (Same as BIOMEDIN 109Q) Preference to sophomores. Concepts of genomics, high-throughput methods of data collection, and computational approaches to analysis of data. The social, ethical, and economic implications of genomic science. Students may focus on computational or social aspects of genomics.
3 units, Win (Altman, R)

GES 1BN. Introductory to Geology: California Desert Field Geology
(Stanford Introductory Seminar) California's Death Valley and Owens Valley are used as natural laboratories for studying active geologic processes and a billion years of earth history: ancient ocean sediments, mountain building, earthquake faulting, glacial landscapes, volcanic eruptions, hot springs and ore deposits, prehistoric climate changes, and historic human impacts. The course culminates in a 6-day field trip to these areas during Spring Break. Class lectures provide the basics of plate tectonics and physical geology. Laboratory exercises involve rock identification and interpreting topographic and geologic maps and remote sensing imagery. Camping and moderate hiking required. Limited enrollment. Only one of GES 1A, 1B, or 1C may be taken for credit. Recommended: high school chemistry. GER:DB-NatSci
4 units, Win (Mahood, G)

GES 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration
(Stanford Introductory Seminar) (Same as EESS 38N, EARTHSYS 38N) Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include The Worst Journey in the World by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) GER:DB-NatSci
3 units, Win (Dunbar, R)

GES 39N. Forensic Geoscience: Stanford CSI
(Stanford Introductory Seminar) Preference to freshmen. Geological principles, materials, and techniques indispensable to modern criminal investigations. Basic earth materials, their origin and variability, and how they can be used as evidence in criminal cases and investigations such as artifact provenance and environmental pollution. Sources include case-based, simulated forensic exercises and the local environments of the Stanford campus and greater Bay Area. Local field trips; research presentation and paper. GER:DB-NatSci
3 units, Aut (Maher, K)

GES 40N. Diamonds
(Stanford Introductory Seminar) Preference to freshmen. Topics include the historyof diamonds as gemstones, prospecting and mining, and their often tragic politics. How diamond samples provide clues for geologists to understand the Earth's deep interior and the origins of the solar system. Diamond's unique materials properties and efforts in synthesizing diamonds. GER:DB-NatSci
3 units, Spr (Mao, W)

GES 43Q. Environmental Problems
(Stanford Introductory Seminar) (Same as EARTHSYS 43Q) Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to timber and mining practices, acid rain, and subsurface disposal of nuclear waste. GER:DB-NatSci
3 units, Win (Loague, K)

GES 55Q. The California Gold Rush: Geologic Background and Environmental Impact
(Stanford Introductory Seminar) Preference to sophomores. Topics include: geologic processes that led to the concentration of gold in the river gravels and rocks of the Mother Lode region of California; and environmental impact of the Gold Rush due to population increase, mining operations, and high concentrations of arsenic and mercury in sediments from hard rock mining and milling operations. Recommended: introductory geology. GER:DB-NatSci
3 units, Win (Bird, D)

GEOPHYS 60N. Man versus Nature: Coping with Disasters Using Space Technology
(Stanford Introductory Seminar) (Same as EE 60N) Stanford Introductory Seminar. Preference to freshman. Natural hazards, such as earthquakes, volcanoes, floods, hurricanes, and fires, affect the lives of thousands of people worldwide everyday. Over the past twenty years developments in spaceborne imaging technology have made it possible to monitor and respond to such disasters much more rapidly than in the past, saving lives and money. Additionally, greater understanding of the physical processes involved allows us to anticipate and plan for mitigation of the consequences of the disasters. In this course we will explore these new tools, how they are applied to natural disasters, and learn how the remotely-sensed data are manipulated and analyzed. The technical material consists of a summary of basic geophysical properties of the Earth, their physical characteristics that can be sensed remotely, and the design of satellite systems to measure these phenomena and predict/mitigate natural hazards. GER:DB-EngrAppSci
4 units, Aut (Zebker, H)

GERGEN 104N. Resistance Writings in Nazi Germany
(Stanford Introductory Seminar) Preference to sophomores. The letters and diaries of individuals who resisted Nazi oppression and paid with their lives. Readings include the Scholl diaries, Bonhoeffer¿s letters and his Ethics, and letter exchanges from other crucial figures. No knowledge of German required; students may read texts in original if able. GER:DB-Hum

3 units, Win (Bernhardt, E)

GERGEN 122Q. The Culture of Pessimism in 19th- and 20th-Century Europe
(Stanford Introductory Seminar) European culture long relied on a narrative of inexorable human progress. Starting in the 19th century, this triumphalist narrative was shadowed by another tradition that rejected such trust in progress. The pessimistic tradition in Europe in literature, philosophy, the study of history, anthropology, and psychology; the distinction between pessimism in the fields of morality, culture, and intellectual life. Authors include Giacomo Leopardi, Arthur Schopenhauer, Lautréamont, T. S. Eliot, and Sigmund Freud. GER:DB-Hum

3-5 units, Spr (Daub, A)

GERLIT 123N. The Brothers Grimm and Their Fairy Tales
(Stanford Introductory Seminar) Preference to freshmen. Historical, biographical, linguistic, and literary look at the Kinder- and Hausmärchen of Jacob and Wilhelm Grimm. Readings from the fairy tales, plus materials in other media such as film and the visual arts. Small group performances of dramatized fairy tales. In German. Prerequisite: GERLANG 3 or equivalent. GER:DB-Hum

1-4 units, Spr (Robinson, O)

HRP 89Q. Introduction to Cross Cultural Issues in Medicine
(Stanford Introductory Seminar) Preference to sophomores. Introduction to social factors that impact health care delivery, such as ethnicity, immigration, language barriers, and patient service expectations. Focus is on developing a framework to understand culturally unique and non-English speaking populations in the health care system. GER:EC-AmerCul

3 units, Win (Corso, I)

HISTORY 6N. Utopia: History of Nowhere Land
(Stanford Introductory Seminar) What would the perfect society be? How would work be organized, and education, honor and profit be distributed? How would children be raised, and who would govern? Such questions have engaged philosophers, revolutionaries, and dreamers in every historical age. Examines utopian literature from ancient Greece through the modern age, focusing on the early modern period. GER:DB-Hum

4 units, Win (Stokes, L)

HISTORY 11N. The Roman Empire: Its Grandeur and Fall
(Stanford Introductory Seminar) (Same as CLASSHIS 24N) Preference to Freshmen. Prerequisite: IHUM 69A. Explore themes on the Roman Empire and its decline from the 1st through the 5th centuries C.E.. What was the political and military glue that held this diverse, multi-ethnic empire together? What were the bases of wealth and how was it distributed? What were the possibilities and limits of economic growth? How integrated was it in culture and religion? What were the causes and consequences of the conversion to Christianity? Why did the Empire fall in the West? How suitable is the analogy of the U.S. in the 21st century?

3 units, Spr (Saller, R)

HISTORY 20Q. Russia in the Early Modern European Imagination
(Stanford Introductory Seminar) Preference to sophomores. The contrast between the early modern image of Europe as free, civilized, democratic, rational, and clean against the notion of New World Indians, Turks, and Chinese as savage. The more difficult, contemporary problem regarding E. Europe and Russia which seemed both European and exotic. Readings concerning E. Europe and Russia from the Renaissance to the Enlightenment; how they construct a positive image of Europe and conversely a negative stereotype of E. Europe. Prerequisite: PWR 1. GER:DB-Hum, EC-GlobalCom

5 units, Win (Kollmann, N)

HISTORY 31Q. British History Revealed by the Arts of the 20th Century
(Stanford Introductory Seminar) Discusses various art forms as works of their own but more importantly in the context of this course how they relate to British society. Students will select a particular work of art within the genre for the week-- building, novel, poem, image, musical piece, movie, etc.-- and report how it illuminates the history of Britain in the first half of the 20th century. Preference to sophomores, then freshman.

4 units, Spr (Stansky, P)

HISTORY 35N. Industrial Revolution: History, Ethics & Consequences of Mod. Economic Development
(Stanford Introductory Seminar) Explores the enduring controversies surrounding the transformation of the British economy in the 18th century. Using iron, coal, steam, and cotton as examples, we will explore the historical and economic debates about its reach, speed, and relationship to other aspects of British and world history. Topics include: the social, political, environmental, and cultural consequences in Britain and the expanding British empire as well as an ethical assessment of the Industrial Revolution and the lessons it has offered for the theory and practice of economic development ever since. Readings will include historical and economic literature as well as contemporary accounts. GER:DB-SocSci

5 units, Spr (Satia, P)

HISTORY 36N. Gay Autobiography
(Stanford Introductory Seminar) Preference to freshmen. Gender, identity, and solidarity as represented in nine autobiographies: Isherwood, Ackerley, Duberman, Monette, Louganis, Barbin, Cammermeyer, Gingrich, and Lorde. To what degree do these writers view sexual orientation as a defining feature of their selves? Is there a difference between the way men and women view identity? What politics follow from these writers' experiences? GER:DB-Hum, EC-Gender

4 units, Spr (Robinson, P)

HISTORY 48Q. South Africa: Contested Transitions
(Stanford Introductory Seminar) Preference to sophomores. The inauguration of Nelson Mandela as president in May 1994 marked the end of an era and a way of life for S. Africa. The changes have been dramatic, yet the legacies of racism and inequality persist. Focus: overlapping and sharply contested transitions. Who advocates and opposes change? Why? What are their historical and social roots and strategies? How do people reconstruct their society? Historical and current sources, including films, novels, and the Internet. GER:DB-Hum, EC-GlobalCom

3 units, Win (Samoff, J)

HISTORY 58N. Thomas Jefferson and His World
(Stanford Introductory Seminar) Thomas Jefferson was the most cosmopolitan American of his age, yet he was also the one member of his generation about whom Americans continue to have the most vexed feelings. This seminar explores the many facets of Jefferson's life and personality, considering such topics as his political ideas and actions, his ideas about religion, education, property, race, and slavery, and the problem of applying moral judgment to historical actors.

4 units, Win (Rakove, J)

HISTORY 62N. The Atomic Bomb in Policy and History
(Stanford Introductory Seminar) Preference to freshmen. Emphasis is on declassified files from WW II and recent interpretations. Why did the U.S. drop A-bombs on Japan? Were there viable alternatives, and, if so, why were they not pursued? What did the use of the A-bombs mean then and later? How have postwar interpreters explained, and justified or criticized, the A-bombings? Approaches from history, international relations, American studies, political science, and ethics address the underlying conceptions, the roles of evidence, the logic and models of explanation, ethical values, and cultural/social influences. GER:DB-SocSci

5 units, Spr (Bernstein, B)

HISTORY 82N. Modern Islamic Movements
(Stanford Introductory Seminar) Muslim political mobilization in local and global settings. Topics include: Pan-Islam, the Muslim Brothers, Khomeinism, Hezbollah, al-Qaeda, the Taliban, and the geopolitics of social movements.

5 units, Aut (Crews, R)

HISTORY 95N. Mapping the World: Cartography and the Modern Imagination
(Stanford Introductory Seminar) Preference to freshmen. Focus is on cutting-edge research. Topics: the challenge of grasping the globe as a whole; geography's roots in empire; maps as propaganda and as commodities; the cultural production of scale; and the car-

tography of imaginery worlds.Sources include resources in the Green Library Special Collections and in the Stanford Spatial History Lab. GER:DB-SocSci

5 units, Spr (Wigen, K)

HUMBIO 82Q. The Omnivore's Dilemma - Or Is It?

(Stanford Introductory Seminar) The omnivore's dilemma- making the right food choices from the vast number possible. The health implications of our food choices. Why we make these choices- the positive and negative influences of the food industry, research in nutritional science, and public health policies and the resulting confusion about what we should eat. Discussion-based class with readings including ""In Defense of Food"" by M. Pollan and primary reference materials. Introduction to the scientific literature in human nutrition.

3 units, Aut (Endemann, G)

HUMBIO 84Q. Social Justice, Responsibility, Health

(Stanford Introductory Seminar) Preference to sophomores. Reducing health disparities among segments of the US population is an over-arching goal of the Centers for Disease Control and Prevention (CDC). Evidence for and cause of existing health disparities; criteria for calling a health disparity unjust; and assignment of responsibility for maintaining or recovering good health. Service Learning Course (certified by Haas Center).

4 units, Aut (Heaney, C)

HUMBIO 86Q. Love as a Force for Social Change

(Stanford Introductory Seminar) Preference to sophomores. Biological, psychological, religious, social and cultural perspectives on the concept of love. How love is conceptualized across cultures; love as the basis of many religions; different kinds of love; the biology of love; love as sickness; love and sex; the languages of love including art, literature, music, and poetry. Emphasis is on writing. Oral presentation. A requirement of this class is participation in public blogs.

3 units, Win (Murray, A)

HUMBIO 90Q. Contemporary Issues in Human Experimentation

(Stanford Introductory Seminar) Preference to sophomores. The guiding principles currently used to protect human subjects in terms of informed consent and protection of privacy; ethical issues relating to compensatory mechanisms for inherent risks; historical perspective and the development of the current mechanisms to safeguard the privacy and integrity of the individual; examples of use/abuse of human experimentation during medieval, Nazi, and modern times. Guest speakers currently performing human experiments or involved in approving such experimentation.

3 units, Aut (Constantinou, C)

HUMBIO 91Q. Neuroethology: The Neural Control of Behavior

(Stanford Introductory Seminar) Preference to sophomores. Animal behavior offers insights about evolutionary adaptations. The origins of the study of animal behavior and its development to the present. Discussion of original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat. GER:DB-NatSci

3 units, Aut (Fernald, R)

HUMBIO 96Q. Injustice, Advocacy and Courage: The Path of Everyday Heroes

(Stanford Introductory Seminar) This course will study the paradigms of people of courage, action and energy who have fought against injustice by advocating for causes against great odds and at personal risk. The focus will be on everyday people who have taken action, often at great personal risk, not for ambition, but because of their convictions and steadfast commitment to their beliefs.

3 units, Win (Abrams, W)

HUMBIO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine

(Stanford Introductory Seminar) (Same as ORTHO 97Q) Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.

3 units, Aut (Matheson, G), Win (Matheson, G), Spr (Matheson, G)

HUMBIO 99Q. Becoming a Doctor: Readings from Medical School, Medical Training, Medical Practice

(Stanford Introductory Seminar) Preference to sophomores. For students considering medicine as a career. Goal is to acquaint students with medical school, training in medicine and surgery, and the practice of medicine and surgery. Topics include: how to pick a medical school and a residency; how medicine affects family life, especially children; the differences between surgical and medical specialties; the advantages and disadvantages among academic/teaching, pure research, group practice, HMO, hospital staff, or private practice; malpractice concerns; and financial considerations.

3 units, Aut (Zaroff, L)

ILAC 114N. Lyric Poetry

(Stanford Introductory Seminar) Preference to freshmen. For students who have successfully completed two years of college Spanish. Elements and expressive devices of lyric poetry: multidimensional language, denotation, connotation, image, metaphor, symbol, allegory, paradox, irony, meaning, idea, rhythm, and meter. Poets of Spain and Latin America of the late 19th and early 20th century including G. A. Bécquer, Rosalía de Castro, Rubén Darío, Miguel de Unamuno, Antonio Machado, García Lorca, Pablo Neruda, and Gabriela Mistral. In English and Spanish.

3-5 units, Aut (Predmore, M)

ILAC 117N. Film, Nation, Latinidad

(Stanford Introductory Seminar) (Same as CHICANST 117N, CSRE 117N) Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

3-4 units, Spr (Yarbro-Bejarano, Y)

ILAC 193Q. Spaces and Voices of Brazil through Film

(Stanford Introductory Seminar) (Same as PORTLANG 193Q) How a country is perceived and defines itself is a result of complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed, but has conserved some defining traits. Introduction to the history, culture, politics, and artistic production of Brazil through feature films, documentaries, and readings. Movies include Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September. In English. GER:DB-Hum, EC-GlobalCom

3-4 units, Aut (Wiedemann, L)

JEWISHST 15N. Travels through the Afterlife

(Stanford Introductory Seminar) (Same as RELIGST 15N) Since the beginning of civilization, humans have refused to believe that physical death is the end of life and have sought in various ways to travel into the afterlife. We cannot know what lies beyond death, but there are other kinds of insights to be learned from these otherworldly journeys. The first part of the course will explore the origins and history of the afterlife, going back in time to ancient Egypt, Mesopotamia, Israel, Greece, and medieval Europe to survey these cultures' view of death and what lies beyond it. The second part of the course will investigate what has happened to belief in the afterlife in modern American culture. Our ultimate goal is to confront one of the most difficult aspects of life--our fear of death and oblivion--and also to explore the power of thought and imagination to move beyond the confines of mortality. GER:DB-Hum

4 units, Aut (Weitzman, S)

LINGUIST 5N. What's Your Accent? Investigations in Acoustic Phonetics

(Stanford Introductory Seminar) Preference to freshmen. Phonetic variation across accents of English; experimental design; practical experience examining accents of seminar participants; acoustic analysis of speech using Praat. GER:DB-SocSci

3 units, Win (Sumner, M)

LINGUIST 83N. Translation
(Stanford Introductory Seminar) Preference to sophomores. What is a translation? The increased need for translations in the modern world due to factors such as tourism and terrorism, localization and globalization, diplomacy and treaties, law and religion, and literature and science. How to meet this need; different kinds of translation for different purposes; what makes one translation better than another; why some texts are more difficult to translate than others. Can some of this work be done by machines? Are there things that cannot be said in some languages? GER:DB-SocSci
3 units, Aut (Kay, M)

MS&E 22Q. The Flaw of Averages
(Stanford Introductory Seminar) Uncertain assumptions in business and public policy are often replaced with single ¿best guess¿ or average numbers. This leads to a fallacy as fundamental as the belief that the earth is flat, which I call the Flaw of Averages. It states, in effect, that: plans based on average assumptions are wrong on average. This class will discuss mitigations of the flaw of averages using simulation and other methods from probability management.
3 units, Aut (Savage, S)

MS&E 92Q. International Environmental Policy
(Stanford Introductory Seminar) Preference to sophomores. Science, economics, and politics of international environmental policy. Current negotiations on global climate change, including actors and potential solutions. Sources include briefing materials used in international negotiations and the U.S. Congress.
4 units, Win (Weyant, J)

MS&E 93Q. Nuclear Weapons, Energy, Proliferation, and Terrorism
(Stanford Introductory Seminar) Preference to sophomores. What are nuclear weapons; what do they do? How are they different from other weapons? What drives proliferation of nuclear weapons? Why do countries want them? Can they be eliminated? What about Iran and North Korea? What role does nuclear energy play? Can it help combat global climate change? What are the risks of nuclear terrorism? Recommended: a course in international relations, engineering, or physical science. GER:DB-EngrAppSci, DB-EngrAppSci
3 units, Spr (Hecker, S)

MATSCI 81N. Bioengineering Materials to Heal the Body
(Stanford Introductory Seminar) Preference to freshmen. How scientists and engineers are designing new materials for surgeon to use in replacing body parts such as heart tissue or the spinal cord. How cells, in the body and transplanted stem cells, communicate with implanted materials. Real-world examples of materials developed for tissue engineering and regenerative medicine therapies. Students identify a clinically important disease or injury that requires a better material, research approaches to the problem, and debate possible engineering solutions. GER:DB-EngrAppSci
3 units, Win (Heilshorn, S)

MATSCI 159Q. Japanese Companies and Japanese Society
(Stanford Introductory Seminar) (Same as ENGR 159Q) Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course. GER:DB-SocSci
3 units, Spr (Sinclair, R)

MATH 87Q. Mathematics of Knots, Braids, Links, and Tangles
(Stanford Introductory Seminar) Preference to sophomores. Types of knots and how knots can be distinguished from one another by means of numerical or polynomial invariants. The geometry and algebra of braids, including their relationships to knots. Topology of surfaces. Brief summary of applications to biology, chemistry, and physics.
3 units, Win (Wieczorek, W)

ME 12N. The Jet Engine
(Stanford Introductory Seminar) Preference to freshmen. How a jet engine works; the technologies and analytical techniques required to understand them. Dynamics, thermodynamics, turbomachinery, combustion, advanced materials, cooling technologies, and control systems. Visits to research laboratories, examination of a partially disassembled engine, and probable operation of a small jet engine. Prerequisites: high school physics. GER:DB-EngrAppSci
3 units, Aut (Eaton, J)

ME 14N. How Stuff Is Made
(Stanford Introductory Seminar) The design and engineering of products and processes. Machined, fabric, food, and electrical goods. Tradeoffs in choice of serial, continuous, and batch fabrication. Final project: students research and create a web site about the engineering aspects of a product and its processes. Field trips to manufacturing facilities.
3 units, Aut (Pruitt, B)

ME 18Q. Teamology: Creative Teams and Individual Development
(Stanford Introductory Seminar) Preference to sophomores. Roles on a problem solving team that best suit individual creative characteristics. Two teams are formed for teaching experientially how to develop less conscious abilities from teammates creative in those roles. Reinforcement teams have members with similar personalities; problem solving teams are composed of people with maximally different personalities.
3 units, Aut (Wilde, D)

ME 21N. Renaissance Machine Design
(Stanford Introductory Seminar) Preference to freshmen. Technological innovations of the 1400s that accompanied the proliferation of monumental art and architecture by Brunelleschi, da Vinci, and others who designed machines and invented novel construction, fresco, and bronze-casting techniques. The social and political climate, from the perspective of a machine designer, that made possible and demanded engineering expertise from prominent artists. Hands-on projectsto provide a physical understanding of Renaissance-era engineering challenges and introduce the pleasure of creative engineering design. Technical background not required. GER:DB-EngrAppSci
3 units, Spr (Cutkosky, M)

ME 25N. Global Warming and Climate Change: Fact or Fiction
(Stanford Introductory Seminar) Preference to freshmen. Scientific arguments concerning debates between the view that anthropogenic activities are not causing global warming versus the view that these activities are responsible for a global warming that results in significant climate change. Consequences of increased demand for energy. Prerequisites: high school physics, chemistry, and biology.
3 units, Win (Bowman, C)

ME 26N. Think Like a Designer
(Stanford Introductory Seminar) Introduces students to techniques designers use to create highly innovative solutions across domains. The project-based class will emphasize approaches to problem identification and problem solving. Topics include need-finding, structured brainstorming, synthesis, rapid prototyping, and visual communication; field trips to a local design firm, a robotics lab, and a machining lab. A secondary goal of the seminar is to introduce students to the pleasures of creative design and hands-on development of tangible solutions.
3 units, Aut (Banerjee, S)

MED 70Q. Cancer and the Immune System
(Stanford Introductory Seminar) Preference to sophomores. Myths and facts surrounding the idea that the immune system is capable of recognizing malignant cells. The biological basis and function of effector arms of the immune system; how these mechanisms may be used to investigate the biological basis and potential therapy of cancer. How the immune system functions.
3 units, Win (Negrin, R)

MED 83Q. Ethical, Legal, and Social Dimensions of Stem Cell Research
(Stanford Introductory Seminar) Preference to sophomores. Ethical, legal, social, and economic dimensions of stem cell research such as the discovery of human embryonic stem cells and the international landscape of public policy. How stem cells work, their role in the upkeep of the human body, and current and future uses in medicine. Issues at the intersection of science and society such as human-animal hybrids, notions of justice in intellectual property law, distribution of health care, and the major ethical frameworks defining the debate.
3 units, Spr (Scott, C)

MED 88Q. Dilemmas in Current Medical Practice
(Stanford Introductory Seminar) Preference to sophomores. Social, political, scientific, and economic forces influencing medical practice. Spiraling costs, impaired access to health care, and disillusionment toward the health care system. Attempts by government and medical insurers to control costs through managed care and health maintenance organizations. Medical education and how it has affected the practice of medicine. Alternative health care, preventive medicine, and the doctor-patient relationship. The paradox of health in America: why do so many people who are healthy feel unhealthy? Mandatory observation of instructors in their medical practices.
3 units, Aut (Croke, J; Jones, H)

MED 108Q. Human Rights and Health
(Stanford Introductory Seminar) Preference to sophomores. History of human-rights law. International conventions and treaties on human rights as background for social and political changes that could improve the health of groups and individuals. Topics such as: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Possible optional opportunities to observe at community sites where human rights and health are issues. Guest speakers from national and international NGOs including Doctors Without Borders; McMaster University Institute for Peace Studies; UC Berkeley Human Rights Center; Kiva. PowerPoint presentation on topic of choice required.
3 units, Win (Laws, A)

MUSIC 13Q. Classical Music and Politics: Western Music in Modern China
(Stanford Introductory Seminar) Preference to sophomores. Social history, cultural studies, China studies, international relations, and music. From the Italian Jesuit, Matteo Ricci who presented a clavichord to the Chinese emperor to the emergence of a modern generation of Chinese musicians. GER:DB-Hum, EC-GlobalCom
3 units, Spr (Cai, J)

MUSIC 17N. The Operas of Mozart
(Stanford Introductory Seminar) Preference to freshmen. Four of Mozart's mature operas, the earliest works in the operatic repertoire never to go out of fashion. What accounts for this extraordinary staying power? Focus on the history of their composition, performance, and reception, and their changing significance from Mozart's time to the present. GER:DB-Hum
3 units, Win (Berger, K)

MUSIC 17Q. Perspectives in North American Taiko
(Stanford Introductory Seminar) Preference to sophomores. Taiko, or Japanese drum, is a newcomer to the American music scene. Emergence of the first N. American taiko groups coincided with increased Japanese American activism, and to some it is symbolic of Japanese American identity. N. American taiko is associated with Japanese American Buddhism. Musical, cultural, historical, and political perspectives of taiko. Hands-on drumming. Japanese music and Japanese American history, and relations among performance, cultural expression, community, and identity. GER:DB-Hum, EC-AmerCul
4 units, Spr (Sano, S; Uyechi, L)

MUSIC 32N. Sculpting with Sounds, Images, and Words
(Stanford Introductory Seminar) Preference to freshmen. Contemporary culture abounds in multimedia forms, in which sounds, images and words are interwoven in unique ways. What are their individual and combined powers? How would you harness them? Participants face these questions in creative projects as well as through in-class viewing, analysis and debates, readings, guest lectures and student presentations. The seminar is taught at the Center for Computer Research in Music and Acoustics where students have access to new media technologies. GER:DB-Hum, DB-Hum
3 units, Win (Kapuscinski, J)

MUSIC 35N. A Union of Diversities: Charles Ives and American Musical Traditions
(Stanford Introductory Seminar) (Same as AMSTUD 35N) Preference to freshmen. The life and work of Charles Ives, and the polarized reception his compositions received. Music includes Ives' Victorian songs and his symphonic works; his philosophical and political writings, historic recordings, oral and photographic histories, and live performances. Hands-on work with original manuscripts and editions. Recommended: ability to read music. GER:DB-Hum
3 units, Spr (Barth, G)

MUSIC 38N. Singing Early Music
(Stanford Introductory Seminar) Preference to freshmen. 15th- and 16th-century musical repertories and their contexts; performance practice. GER:DB-Hum
3 units, Aut (Rodin, J)

NENS 67N. Intracellular Trafficking and Neurodegeneration
(Stanford Introductory Seminar) Preference to freshmen. Cell structures and functions, the intracellular trafficking system that maintains exchanges of materials and information inside cells, and clinical features and pathologies of neurodegenerative diseases. Techniques for examining cellular and subcellular structures, especially cytoskeletons; functional insights generated from structural explorations. Prerequisite: high school biology.
3 units, Spr (Yang, Y)

NSUR 70Q. Experimental Stroke
(Stanford Introductory Seminar) Preference to sophomores. How stroke is studied in the laboratory; advances in stroke research over the last two decades; and future directions. Topics include: cellular and molecular mechanisms of neuronal death and survival in the brain after stroke, including necrosis, apoptosis, inflammation, and cell signaling pathways; experimental tools for stroke treatment, such as gene therapy, cell therapy, hypothermia, preconditioning, postconditioning, and other pharmacological treatments; the gap and barrier between laboratory research and clinical translation.
2 units, Spr (Zhao, H)

ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine
(Stanford Introductory Seminar) (Same as HUMBIO 97Q) Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.
3 units, Aut (Matheson, G), Win (Matheson, G), Spr (Matheson,)

PATH 103Q. Lymphocyte Migration
(Stanford Introductory Seminar) Preference to sophomores. How lymphocytes leave the blood stream and enter tissues to participate in immune surveillance and the development of inflammation. Known as lymphocyte migration, this process involves a complex series of adhesion, activation and diapedesis events. The cellular mechanisms involved in lymphocyte migration, including lymphocyte adhesion molecules that interact with their counter-receptors on endothelial cells, and molecules, including cytokines and chemokines, that attract or activate lymphocytes. The roles of these molecules in the development of human diseases such as asthma, type 1 diabetes, and multiple sclerosis.
1 unit, Spr (Staff)

PHIL 8N. Free Will and Responsibility
(Stanford Introductory Seminar) In what sense are we, or might we be free agents? Is our freedom compatible with our being fully a part of the same natural, causal order that includes other physical and biological systems? What assumptions about freedom do we make when we hold people accountable morally and/or legally? When we hold people accountable, and so responsible, can we also see them as part of the natural, causal order? Or is there a deep incompatibility between these two ways of understanding ourselves? What assumptions about our freedom do we make when we deliberate about what to do? Are these assumptions in conflict with seeing ourselves as part of the natural, causal order? We will explore these and related questions primarily by way of careful study of recent and contemporary philosophical research on these matters. GER:DB-Hum
4 units, Win (Bratman, M)

PHIL 10N. Traveling Through Time
(Stanford Introductory Seminar) Is time travel possible? Yes. We do it every day, at the rate of one minute per minute. Relativity

theory even suggests a sense in which we could travel to the distant future. But could we travel to the past? If so, why aren't there any time travelers around? If not, is that because of some law of physics or because the very idea of time travel is incoherent? Suppose I were to go back in time and try to save JFK. Would I be bound to fail? What would stop me? Couldn't I just try again? If I eventually succeeded, would I thereby create a new branch in time? Or can we make sense of the idea of changing the past? What would happen if I tried to prevent my parents from having kids? What went on in the last season of Lost? We'll try to answer questions like these by looking at classic and contemporary work in the physics and philosophy of time, as well as pertinent case studies in fiction and film. Special guest speakers from the future are hereby

3 units, Spr (Burgess, A)

PHIL 11N. Skepticism

(Stanford Introductory Seminar) Preference to freshmen. Historical and contemporary philosophical perspectives on the limits of human knowledge of a mind-independent world and causal laws of nature. The nature and possibility of a priori knowledge. GER:DB-Hum

3 units, Aut (De Pierris, G)

PHYSICS 18N. Revolution in Concepts of the Cosmos

(Stanford Introductory Seminar) Preference to freshmen. The evolution of concepts of the cosmos and its origin, from the Copernican heliocentric model to the current view based on Hubble's discovery of expansion of the Universe. Recent cosmological observations and the relevance of laboratory experiments in particle physics. One night of observations at the Stanford Observatory. GER:DB-NatSci

3 units, Win (Roodman, A)

PHYSICS 43N. Understanding Electromagnetic Phenomena

(Stanford Introductory Seminar) Preference to freshmen. Expands on the material presented in 43; applications of concepts in electricity and magnetism to everyday phenomena and to topics in current physics research. Corequisite: 43 or advanced placement.

1 unit, Spr (Laughlin, R)

PHYSICS 45N. Advanced Topics in Light and Heat

(Stanford Introductory Seminar) Preference to freshmen. Expands on the subject matter presented in 45 to include optics and thermodynamics in everyday life, and applications from modern physics and astrophysics. Corequisite: 45 or advanced placement.

1 unit, Aut (Romani, R)

PHYSICS 80N. The Technical Aspects of Photography

(Stanford Introductory Seminar) Preference to freshmen and sophomores with some background in photography. How cameras record photographic images on film and electronically. Technical photographic processes to use cameras effectively. Camera types and their advantages, how lenses work and their limitations, camera shutters, light meters and the proper exposure of film, film types, depth of focus, control of the focal plane and perspective, and special strategies for macro and night photography. View cameras and range finder technical cameras. Students take photographs around campus. Prerequisite: high school physics.

3 units, Spr (Osheroff, D)

PHYSICS 83N. Physics in the 21st Century

(Stanford Introductory Seminar) Preference to freshmen. Current topics at the frontier of modern physics. Topics include subatomic particles and the standard model, symmetries in nature, extra dimensions of space, string theory, supersymmetry, the big bang theory of the origin of the universe, black holes, dark matter, and dark energy of the universe. Why the sun shines. Cosmology and inflation. GER:DB-NatSci

3 units, Aut (Kallosh, R)

POLISCI 24N. The Politics of Communication

(Stanford Introductory Seminar) This course will explore how elected officials present and explain their work to constituents and how this communication shapes American politics. Elected officials use press releases, newsletters, press conferences, and public events to connect with their constituents. While almost none of this communication is formally required, it can have important consequences on what elected officials do in office and how constituents perceive their representatives¿ activities. We will explore the strategies elected officials use when communicating with constituents and identify the consequences of these strategies on the process of representation.

5 units, Win (Grimmer, J)

POLISCI 24Q. Law and Order

(Stanford Introductory Seminar) Preference to sophomores. The role of law in promoting social order. What is the rule of law? How does it differ from the rule of men? What institutions best support the rule of law? Is a state needed to ensure that laws are enforced? Should victims be allowed to avenge wrongs? What is the relationship between justice and mercy?

3 units, Aut (Rutten, A)

POLISCI 25N. The US Congress in Historical and Comparative Perspective

(Stanford Introductory Seminar) This course traces the development of legislatures from their medieval European origins to the present, with primary emphasis on the case of the U.S. Congress. Students will learn about the early role played by assemblies in placing limits on royal power, especially via the ¿power of the purse.¿ About half the course will then turn to a more detailed consideration of the U.S. Congress¿s contemporary performance, analyzing how that performance is affected by procedural legacies from the past that affect most democratic legislatures worldwide.

5 units, Spr (Cox, G)

POLISCI 42Q. The Rwandan Genocide

(Stanford Introductory Seminar) Between April and July of 1994 more than 800,000 Rwandans, mostly Tutsi but also moderate Hutus, were killed in the most rapid genocide the world has ever known. The percentage of Rwandans killed in a single day of the genocide was ten times greater than the percentage of Americans killed in the entire Vietnam war. What could bring humans to plan and carry out such an orgy of violence? Could it have been prevented? Why did the United States or any other major power not intervene to stop the killing? To what extent should the United Nations be held accountable for the failure to end the genocide? What were the consequences of the genocide for the region of Central Africa? How did international actors respond to the challenges of reconstructing Rwanda after the killings? What has happened to the perpetrators of the genocide? This course surveys scholarly and journalistic accounts of the genocide to seek answers to these questions. This seminar will

5 units, Spr (Stedman, S)

POLISCI 43N. Oil, Regime Change, and Conflict

(Stanford Introductory Seminar) Preference to sophomores. Relationships among dependence on oil export, democratization and authoritarian rule, and rising conflict. Case studies including Venezuela, Nigeria, Iran, Iraq, Chad, and Indonesia. The resource curse: the impact of oil on a country's political economy. The relationship between such economic dependence and regime type. Why oil exporting countries are more prone to conflict and civil war than other countries. Research paper.

5 units, Win (Karl, T)

POLISCI 44N. Everyday Political Life in the Authoritarian Middle East

(Stanford Introductory Seminar) Preference to freshmen. How individuals respond to state policy, use informal channels to influence politics, are subject to forms of repression, and challenge authoritarian government through Islamic and other types of organizations. Focus is on Egypt, Iraq, Syria, Yemen, and Iran.

5 units, Aut (Blaydes, L)

POLISCI 48N. Muslim Integration into France

(Stanford Introductory Seminar) Preference to freshmen. The specter of Islamized societies haunts Europe. Fears of a fifth column of terrorism and a challenge by a population of religious fanatics to a largely secularized continent are recurrent in political dialogue from Spain to Austria. Are these worries a result of everyday xenophobia common to situations of foreign immigration or whether certain immigrants from the Middle East, Turkey, South Asia and Africa face special challenges due to their Islamic heritage? Sources include survey and experimental data from France, claims made about this immigrant population, readings in French political discourse and the European political context. Final paper that compares analysis of the data and claims in the literature.

5 units, Aut (Laitin, D)

PORTLANG 193Q. Spaces and Voices of Brazil through Film
(Stanford Introductory Seminar) (Same as ILAC 193Q) How a country is perceived and defines itself is a result of complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed, but has conserved some defining traits. Introduction to the history, culture, politics, and artistic production of Brazil through feature films, documentaries, and readings. Movies include Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September. In English. GER:DB-Hum, EC-GlobalCom
3-4 units, Aut (Wiedemann, L)

PSYCH 7Q. Language Understanding by Children and Adults
(Stanford Introductory Seminar) How do we first learn to find meaning in strings of speech sounds? Understanding spoken language requires the rapid integration of acoustic information with linguistic knowledge and with conceptual knowledge based on experience with how things happen in the world. Topics include research on early development of language understanding and laboratory methods of how young children make sense of speech. Observations of preschool children and visits to Stanford laboratories. Might be repeatable for credit.
3 units, Aut (Fernald, A)

PSYCH 8N. The New Longevity
(Stanford Introductory Seminar) Adult development from the perspective of life-span theory, a conceptual framework that views development as a series of adaptations to physical, societal and individual resources and constraints. Students will learn about demographic and medical changes, ways that individuals typically change socially, emotionally and cognitively as they move through adulthood. An understanding of the conceptual foundations of the life-span approach and place aging of young people today in historical context. GER:DB-SocSci
3 units, Spr (Carstensen, L)

PSYCH 11N. Origin of Mental Life
(Stanford Introductory Seminar) Preference to freshmen. Mental life in infancy; how thinking originates. How do babies construe the objects, events, people, and language that surround them? Recent advances in psychological theory, hypotheses, and evidence about how the infant human mind develops. GER:DB-SocSci
3 units, Spr (Markman, E)

PSYCH 12N. Self Theories
(Stanford Introductory Seminar) Preference to freshmen. The impact of people's belief in a growing versus fixed self on their motivation and performance in school, business, sports, and relationships. How such theories develop and can be changed. GER:DB-SocSci
3 units, Aut (Dweck, C)

PSYCH 26N. Language Acquisition: Exploring the Minds of Children
(Stanford Introductory Seminar) Language is an extraordinary competence distinguishing humans from other species, yet there is debate about the role of biology in guiding language acquisition. Does language development follow an innate ¿bioprogram¿ or does it build on more general cognitive abilities, influenced by early experience? Topics include biological and experiential influences on the emergence of linguistic ability as children learn a first language. Discussions of theory and research, visits to Stanford laboratories and observations of very young language learners.
3 units, Win (Fernald, A)

PSYCH 28N. The Cultural Shaping of Mental Health and Illness
(Stanford Introductory Seminar) (Same as CSRE 28N) This seminar examines how our cultural ideas and practices shape our conceptions, perceptions, experiences, and treatment of emotional wellness and distress. We will read and discuss empirical research and case studies from psychology, anthropology, sociology, and medicine. Course requirements include weekly reading and thought papers, weekly discussion, and a final research project and presentation.
3 units, Win (Tsai, J)

RELIGST 10N. The Problem of God: Aquinas to the New Atheism
(Stanford Introductory Seminar) Critical inquiry the meaning and credibility of theistic belief through exemplary classic formulations, modern critics, and contemporary defenders. What has the idea of God meant to serious minds in the past? And in the modern or postmodern world? GER:DB-Hum
4 units, Win (Sockness, B)

RELIGST 11N. The Meaning of Life: Philosophical, Aesthetic, and Religious Perspectives
(Stanford Introductory Seminar) Raise ultimate questions about life. Yes, the unexamined life is not worth living, but also the unlived life is not worth examining. Students and professor examine their own lives in the light of questions that the readings and lectures bring up: 1. The big picture: Is there such a thing as ""the"" meaning of life? 2. What is entailed in making personal-existential sense of one's own life? 3. What constitutes the good life, lived in society? 4. How can a university education bear upon the search for a meaningful life? 5. What ""methods"" for or approches to life can one learn from studies in the humanities? After introductory lectures, the seminar studies a series of artworks, poems, diverse texts, and a film, all of which bear on the questions mentioned above -- works such: 1. Plato's Allegory of the Cave, from ""The Republic"" 2. Manet's ""A bar at the Folies Bergere"" 3. A comparison/contrast of Monet's early (1862) ""Still Life"" and van Gogh's late (18
3 units, Aut (Sheehan, T)

RELIGST 15N. Travels through the Afterlife
(Stanford Introductory Seminar) (Same as JEWISHST 15N) Since the beginning of civilization, humans have refused to believe that physical death is the end of life and have sought in various ways to travel into the afterlife. We cannot know what lies beyond death, but there are other kinds of insights to be learned from these otherworldly journeys. The first part of the course will explore the origins and history of the afterlife, going back in time to ancient Egypt, Mesopotamia, Israel, Greece, and medieval Europe to survey these cultures' view of death and what lies beyond it. The second part of the course will investigate what has happened to belief in the afterlife in modern American culture. Our ultimate goal is to confront one of the most difficult aspects of life--our fear of death and oblivion--and also to explore the power of thought and imagination to move beyond the confines of mortality. GER:DB-Hum
4 units, Aut (Weitzman, S)

STS 101Q. Technology in Contemporary Society
(Stanford Introductory Seminar) Preference to sophomores. Introduction to the STS field. The natures of science and technology and their relationship, what is most distinctive about these forces today, and how they have transformed and been affected by contemporary society. Social, cultural, and ethical issues raised by recent scientific and technological developments. Case studies from areas such as information technology and biotechnology, with emphasis on the contemporary U.S. Unexpected influences of science and technology on contemporary society and how social forces shape scientific and technological enterprises and their products. Enrollment limited to 12. GER:DB-SocSci
4 units, Aut (McGinn, R)

STS 103Q. Reading and Writing Poetry about Science
(Stanford Introductory Seminar) (Same as ENGLISH 103Q) Preference to sophomores. Students will study recent poetry inspired by the phenomena and history of the sciences in order to write such poems themselves. These poems bring sensuous human experience to bear on biology, ecology, neuroscience, physics, astronomy, and geology, as well as on technological advances and missteps. Poets such as Mark Doty, Jody Gladding, Albert Goldbarth, Jorie Graham, Sarah Lindsay, Adrienne Rich, W.S. Merwin, and C. K. Williams. Grounding in poetics, research in individually chosen areas of science, weekly analytical and creative writing. Enrollment limited to 12.
4 units, Win (Roberts, E; Rusk, L)

SOC 15N. The Transformation of Socialist Societies
(Stanford Introductory Seminar) Preference to freshmen. The impact of societal organization on the lives of ordinary people in socialist societies and in the new societies arising through the processes of political, economic, and social transformation. Do the concepts of democratization and marketization suffice to character-

ize ongoing changes? Enrollment limited to 16. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Tuma, N)

SOC 16N. African Americans and Social Movements

(Stanford Introductory Seminar) Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women¿s right, LGBT rights, environmental movement, and contemporary political conservativism.

3 units, Spr (Fields, C)

SOC 22N. The Roots of Social Protest

(Stanford Introductory Seminar) Preference to freshmen. The conditions under which social protest occurs and the emergence, success, and viability of contemporary social movements. Examples include women's civil rights, ecology, and antiwar and anti-globilization movements in the U.S. and elsewhere. Sociological theories to explain the timing, location, and causes of mobilization; how researchers evaluate these theories. Comparison of tactics, trajectories, and outcomes. GER:DB-SocSci, EC-GlobalCom

3 units, Win (Olzak, S)

SOC 45Q. Understanding Race and Ethnicity in American Society

(Stanford Introductory Seminar) Preference to sophomores. Historical overview of race in America, race and violence, race and socioeconomic well-being, and the future of race relations in America. Enrollment limited to 16. GER:DB-SocSci

5 units, Aut (Snipp, C)

SPECLANG 198Q. Modern Greece in Film and Literature

(Stanford Introductory Seminar) Preference to sophomores. Cultural and literary highlights. Filmmakers include Kakoyannis, Dassen, Boulmetis, Angelopoulos, and Scorsese; readings from Eugenides, Gage, Kavafis, Kazantzakis, Samarakis, Seferis, and Elytis. GER:DB-Hum, DB-Hum, EC-GlobalCom

3-5 units, Aut (Prionas, E)

STATS 42Q. Undergraduate Admissions to Selective Universities: A Statistical Perspective

(Stanford Introductory Seminar) The goal is the building of a statistical model, based on applicant data, for predicting admission to selective universities. The model will consider factors such as gender, ethnicity, legacy status, public-private schooling, test scores, effects of early action, and athletics. Common misconceptions and statistical pitfalls are investigated. The applicant data are not those associated with any specific university.

2 units, Aut (Switzer, P)

SURG 68Q. Current Concepts in Transplantation

(Stanford Introductory Seminar) Preference to sophomores. Biological aspects of cell and organ transplantation, including issues that arise in the media. Diseases for which transplantation is a treatment, the state of the art in human transplantation, transplantation of animal tissue into humans (xenotransplantation), development of new tissue and organs in the laboratory (tissue engineering and cloning), and development of drugs and biological strategies to promote long-term survival of the tissue or organ (tolerance). How to write a scientific abstract, critique scientific literature, and research and present topics in contemporary transplantation.

3 units, Spr (Martinez, O; Krams, S)

SURG 70Q. Surgical Anatomy of the Hand: From Rodin to Reconstruction

(Stanford Introductory Seminar) The surgical anatomy of the hand is extremely complex in terms of structure and function. Exploration of the anatomy of the hand in different contexts: its representation in art forms, the historical development of the study of hand anatomy, current operative techniques for reconstruction, advances in tissue engineering, and the future of hand transplantation.

2 units, Win (Chang, J)

STATISTICS (STATS) COURSES

UNDERGRADUATE COURSES IN STATISTICS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

STATS 42Q. Undergraduate Admissions to Selective Universities: A Statistical Perspective

(Stanford Introductory Seminar) The goal is the building of a statistical model, based on applicant data, for predicting admission to selective universities. The model will consider factors such as gender, ethnicity, legacy status, public-private schooling, test scores, effects of early action, and athletics. Common misconceptions and statistical pitfalls are investigated. The applicant data are not those associated with any specific university.

2 units, Aut (Switzer, P)

STATS 50. Mathematics of Sports

(Same as MCS 100) The use of mathematics, statistics, and probability in the analysis of sports performance, sports records, and strategy. Topics include mathematical analysis of the physics of sports and the determinations of optimal strategies. New diagnostic statistics and strategies for each sport. Corequisite: STATS 116. GER:DB-Math

3 units, not given this year

STATS 60. Introduction to Statistical Methods: Precalculus

(Same as PSYCH 10, STATS 160) Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages. GER:DB-Math

5 units, Aut (Walther, G), Win (Thomas, E), Spr (Taylor, J), Sum (Richards, W)

STATS 110. Statistical Methods in Engineering and the Physical Sciences

Introduction to statistics for engineers and physical scientists. Topics: descriptive statistics, probability, interval estimation, tests of hypotheses, nonparametric methods, linear regression, analysis of variance, elementary experimental design. Prerequisite: one year of calculus. GER:DB-Math

4-5 units, Aut (Needell, D), Sum (Khalessi, S)

STATS 116. Theory of Probability

Probability spaces as models for phenomena with statistical regularity. Discrete spaces (binomial, hypergeometric, Poisson). Continuous spaces (normal, exponential) and densities. Random variables, expectation, independence, conditional probability. Introduction to the laws of large numbers and central limit theorem. Prerequisites: MATH 52 and familiarity with infinite series, or equivalent. GER:DB-Math

3-5 units, Aut (Siegmund, D), Spr (Donoho, D), Sum (D'Aristotile, A)

STATS 141. Biostatistics

(Same as BIO 141) Introductory statistical methods for biological data: describing data (numerical and graphical summaries); introduction to probability; and statistical inference (hypothesis tests and confidence intervals). Intermediate statistical methods: comparing groups (analysis of variance); analyzing associations (linear and logistic regression); and methods for categorical data (contingency tables and odds ratio). Course content integrated with statistical computing in R. GER:DB-Math

4-5 units, Aut (De la Cruz Cabrera, O), Win (Feldman, M)

STATS 166. Computational Biology
(Same as BIOMEDIN 366, STATS 366) Course is designed to introduce students from the mathematical, physical and engineering sciences to selected current issues in computational biology and bioinformatics. Topics: principles of gene expression measurement by microarrays and sequencing, methods to measure locations of protein-DNA interaction, the application of these techniques in the study of gene regulation, approaches to the mapping of genes by association studies. Emphasis is on the statistical and computational issues in these studies. Assignments: weekly reading of papers and a final project.
2-3 units, Spr (Wong, W)

STATS 167. Probability: Ten Great Ideas About Chance
(Same as PHIL 166, PHIL 266, STATS 267) Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116. GER:DB-Math
4 units, not given this year

STATS 191. Introduction to Applied Statistics
Statistical tools for modern data analysis. Topics include regression and prediction, elements of the analysis of variance, bootstrap, and cross-validation. Emphasis is on conceptual rather than theoretical understanding. Applications to social/biological sciences. Student assignments/projects require use of the software package R. Recommended: 60, 110, or 141. GER:DB-Math
3-4 units, Win (Taylor, J)

STATS 199. Independent Study
For undergraduates.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN STATISTICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

STATS 160. Introduction to Statistical Methods: Precalculus
(Same as PSYCH 10, STATS 60) Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages.
5 units, Aut (Walther, G), Win (Thomas, E), Spr (Taylor, J), Sum (Richards, W)

STATS 200. Introduction to Statistical Inference
Modern statistical concepts and procedures derived from a mathematical framework. Statistical inference, decision theory; point and interval estimation, tests of hypotheses; Neyman-Pearson theory. Bayesian analysis; maximum likelihood, large sample theory. Prerequisite: 116.
3 units, Win (Romano, J), Sum (Labo, P)

STATS 202. Data Mining and Analysis
Data mining is used to discover patterns and relationships in data. Emphasis is on large complex data sets such as those in very large databases or through web mining. Topics: decision trees, association rules, clustering, case based methods, and data visualization.
3 units, Aut (Holmes, S), Sum (Patel, R)

STATS 203. Introduction to Regression Models and Analysis of Variance
Modeling and interpretation of observational and experimental data using linear and nonlinear regression methods. Model building and selection methods. Multivariable analysis. Fixed and random effects models. Experimental design. Pre- or corequisite: 200.
3 units, Win (Staff)

STATS 205. Introduction to Nonparametric Statistics
Nonparametric analogs of the one- and two-sample t-tests and analysis of variance; the sign test, median test, Wilcoxon's tests, and the Kruskal-Wallis and Friedman tests, tests of independence. Nonparametric regression and nonparametric density estimation, modern nonparametric techniques, nonparametric confidence interval estimates.
3 units, not given this year

STATS 206. Applied Multivariate Analysis
Introduction to the statistical analysis of several quantitative measurements on each observational unit. Emphasis is on concepts, computer-intensive methods. Examples from economics, education, geology, psychology. Topics: multiple regression, multivariate analysis of variance, principal components, factor analysis, canonical correlations, multidimensional scaling, clustering. Pre- or corequisite: 200.
3 units, not given this year

STATS 207. Introduction to Time Series Analysis
Time series models used in economics and engineering. Trend fitting, autoregressive and moving average models and spectral analysis, Kalman filtering, and state-space models. Seasonality, transformations, and introduction to financial time series. Prerequisite: basic course in Statistics at the level of 200.
3 units, Spr (Donoho, D)

STATS 208. Introduction to the Bootstrap
The bootstrap is a computer-based method for assigning measures of accuracy to statistical estimates. By substituting computation in place of mathematical formulas, it permits the statistical analysis of complicated estimators. Topics: nonparametric assessment of standard errors, biases, and confidence intervals; related resampling methods including the jackknife, cross-validation, and permutation tests. Theory and applications. Prerequisite: course in statistics or probability.
3 units, Win (Efron, B)

STATS 209. Understanding Statistical Models and their Social Science Applications
(Same as EDUC 260X, HRP 239) Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods
3 units, Win (Rogosa, D)

STATS 211. Research Methods for Meta-Analysis
(Same as HRP 206) Meta-analysis as a quantitative method for combining the results of independent studies enabling researchers to evaluate available evidence. Examples of meta-analysis in medicine, education, and social and behavioral sciences. Statistical methods include nonparametric methods, contingency tables, regression and analysis of variance, and Bayesian methods. Project involving an existing published meta-analysis. Prerequisite: basic sequence in statistics.
3 units, Win (Olkin, I)

STATS 212. Applied Statistics with SAS
Data analysis and implementation of statistical tools in SAS. Topics: reading in and describing data, categorical data, dates and longitudinal data, correlation and regression, nonparametric comparisons, ANOVA, multiple regression, multivariate data analysis, using arrays and macros in SAS. Prerequisite: statistical techniques at the level of STATS 191 or 203; knowledge of SAS not required.
3 units, Sum (Walker, M)

STATS 215. Statistical Models in Biology
Poisson and renewal processes, Markov chains in discrete and continuous time, branching processes, diffusion. Applications to models of nucleotide evolution, recombination, the Wright-Fisher process, coalescence, genetic mapping, sequence analysis. Theoretical material approximately the same as in STATS 217, but emphasis is on examples drawn from applications in biology, especially genetics. Prerequisite: 116 or equivalent.
3 units, Aut (Zhang, N)

STATS 217. Introduction to Stochastic Processes
Discrete and continuous time Markov chains, poisson processes, random walks, branching processes, first passage times, recurrence

and transience, stationary distributions. Non-Statistics masters students may want to consider taking STATS 215 instead. Prerequisite: STATS 116 or consent of instructor.

3 units, Win (Rajaratnam, B), Sum (D'Aristotile, A)

STATS 218. Introduction to Stochastic Processes

Renewal theory, Brownian motion, Gaussian processes, second order processes, martingales.

3 units, Spr (Needell, D)

STATS 219. Stochastic Processes

(Same as MATH 136) Introduction to measure theory, Lp spaces and Hilbert spaces. Random variables, expectation, conditional expectation, conditional distribution. Uniform integrability, almost sure and Lp convergence. Stochastic processes: definition, stationarity, sample path continuity. Examples: random walk, Markov chains, Gaussian processes, Poisson processes, Martingales. Construction and basic properties of Brownian motion. Prerequisite: STATS 116 or MATH 151 or equivalent. Recommended: MATH 115 or equivalent.

3 units, Aut (Zuniga, J)

STATS 221. Introduction to Mathematical Finance

Interest rate and discounted value. Financial derivatives, hedging, and risk management. Stochastic models of financial markets, introduction to Ito calculus and stochastic differential equations. Black-Scholes pricing of European options. Optimal stopping and American options. Prerequisites: MATH 53, STATS 116, or equivalents.

3-4 units, Sum (Staff)

STATS 237. Time Series Modeling and Forecasting

Box-Jenkins and Bayesian approaches. State-space and change-point models. Application to revenue prediction, forecasting product demand, and other real world problems. Development and assessment of models and forecasts in practical applications. Hands-on experience with real data.

3 units, Sum (Staff)

STATS 239A. Workshop in Quantitative Finance

Topics of current interest.

1 unit, not given this year

STATS 239B. Workshop in Quantitative Finance

Topics of current interest. May be repeated for credit.

1 unit, not given this year

STATS 240. Statistical Methods in Finance

(SCPD students register for 240P.) Regression analysis and applications to investment models. Principal components and multivariate analysis. Likelihood inference and Bayesian methods. Financial time series. Estimation and modeling of volatilities. Statistical methods for portfolio management. Prerequisite: STATS 200 or equivalent.

3-4 units, Aut (Lai, T)

STATS 240P. Statistical Methods in Finance

For SCPD students; see 240.

3 units, Aut (Lai, T)

STATS 241. Financial Modeling Methodology and Applications

(SCPD students register for 241P.) Substantive and empirical modeling approaches. Statistical trading strategies and their evaluation. Nonparametric regression. Advanced time series modeling and forecasting. Options and interest rate markets. Credit markets and default risk modeling. Prerequisite: 240 or equivalent.

3-4 units, Win (Lai, T)

STATS 241P. Financial Modeling Methodology and Applications

For SCPD students; see 241.

3 units, Win (Lai, T)

STATS 242. Algorithmic Trading and Quantitative Strategies

An introduction to financial trading strategies based on methods of statistical arbitrage that can be automated. Methodologies related to high frequency data and stylized facts on asset returns; models of order book dynamics and order placement, dynamic trade planning with feedback; momentum strategies, pairs trading. Emphasis on developing and implementing models that reflect the market and behavioral patterns. Prerequisite: STATS 240 or equivalent.

3 units, Sum (Velu, R)

STATS 243. Statistical Models and Methods for Risk Management and Surveillance

(SCPD students register for 243P.) Banking and bank regulation. Market risk and credit risk, asset and liability management. Logistic regression, generalized linear models and generalized mixed models. Censored data and survival analysis, loan prepayment and default as competing risks. Back testing, stress testing and Monte Carlo methods. Risk surveillance, early warning and adaptive risk control methodologies. Prerequisite: STATS 240 or equivalent.

3-4 units, not given this year

STATS 243P. Statistical Models and Methods for Risk Management and Surveillance

For SCPD students; see 243.

3 units, not given this year

STATS 250. Mathematical Finance

(Same as MATH 238) Stochastic models of financial markets. Forward and futures contracts. European options and equivalent martingale measures. Hedging strategies and management of risk. Term structure models and interest rate derivatives. Optimal stopping and American options. Corequisites: MATH 236 and 227 or equivalent.

3 units, Win (Papanicolaou, G)

STATS 253. Spatial Statistics

(Same as STATS 352) Statistical descriptions of spatial variability, spatial random functions, grid models, spatial partitions, spatial sampling, linear and nonlinear interpolation and smoothing with error estimation, Bayes methods and pattern simulation from posterior distributions, multivariate spatial statistics, spatial classification, nonstationary spatial statistics, space-time statistics and estimation of time trends from monitoring data, spatial point patterns, models of attraction and repulsion. Applications to earth and environmental sciences, meteorology, astronomy, remote-sensing, ecology, materials.

3 units, not given this year

STATS 260A. Workshop in Biostatistics

(Same as HRP 260A) Applications of statistical techniques to current problems in medical science.

1-2 units, Aut (Olshen, R)

STATS 260B. Workshop in Biostatistics

(Same as HRP 260B) Applications of statistical techniques to current problems in medical science.

1-2 units, Win (Olshen, R)

STATS 260C. Workshop in Biostatistics

(Same as HRP 260C) Applications of statistical techniques to current problems in medical science.

1-2 units, Spr (Sabatti, C; Olshen, R)

STATS 261. Intermediate Biostatistics: Analysis of Discrete Data

(Same as BIOMEDIN 233, HRP 261) Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference.

3 units, Win (Sainani, K)

STATS 262. Intermediate Biostatistics: Regression, Prediction, Survival Analysis

(Same as HRP 262) Methods for analyzing longitudinal data. Topics include Kaplan-Meier methods, Cox regression, hazard ratios, time-dependent variables, longitudinal data structures, profile plots, missing data, modeling change, MANOVA, repeated-measures ANOVA, GEE, and mixed models. Emphasis is on practical applications. Prerequisites: basic ANOVA and linear regression.

3 units, Spr (Sainani, K)

STATS 267. Probability: Ten Great Ideas About Chance
(Same as PHIL 166, PHIL 266, STATS 167) Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.
4 units, not given this year

STATS 270. A Course in Bayesian Statistics
(Same as STATS 370) Advanced-level Bayesian statistics. Topics: Discussion of the mathematical and theoretical foundation for Bayesian inferential procedures. Examination of the construction of priors and the asymptotic properties of likelihoods and posterior densities. Discussion including but not limited to the case of finite dimensional parameter space. Prerequisite: familiarity with standard probability and multivariate distribution theory.
3 units, not given this year

STATS 290. Paradigms for Computing with Data
For Statistics graduate students and others whose research involves data analysis and development of associated computational software. Programming and computing techniques to support projects in data analysis and related research. Prerequisites: CS 106, and STATS 110 or 141, or equivalent background.
3 units, Win (Narasimhan, B; Chambers, J)

STATS 297. Practical Training
For students in the M.S. program in Financial Mathematics only. Students obtain employment in a relevant industrial or research activity to enhance their professional experience. May be repeated for credit once. Prerequisite: consent of adviser.
1-3 units, Aut (Lai, T), Win (Lai, T), Spr (Lai, T), Sum (Lai, T)

STATS 298. Industrial Research for Statisticians
Masters-level research as in 299, but must be conducted for an off-campus employer. Final report required. Prerequisite: enrollment in Statistics M.S. or Ph.D. program, prior to candidacy.
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STATS 299. Independent Study
For Statistics M.S. students only. Reading or research program under the supervision of a Statistics faculty member. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STATS 300. Advanced Topics in Statistics
May be repeated for credit.
3 units, Sum (Meulman, J)

STATS 300A. Theory of Statistics
Elementary decision theory; loss and risk functions, Bayes estimation; UMVU estimator, minimax estimators, shrinkage estimators. Hypothesis testing and confidence intervals: Neyman-Pearson theory; UMP tests and uniformly most accurate confidence intervals; use of unbiasedness and invariance to eliminate nuisance parameters. Large sample theory: basic convergence concepts; robustness; efficiency; contiguity, locally asymptotically normal experiments; convolution theorem; asymptotically UMP and maximin tests. Asymptotic theory of likelihood ratio and score tests. Rank permutation and randomization tests; jackknife, bootstrap, subsampling and other resampling methods. Further topics: sequential analysis, optimal experimental design, empirical processes with applications to statistics, Edgeworth expansions, density estimation, time series.
2-4 units, Aut (Walther, G)

STATS 300B. Theory of Statistics
Elementary decision theory; loss and risk functions, Bayes estimation; UMVU estimator, minimax estimators, shrinkage estimators. Hypothesis testing and confidence intervals: Neyman-Pearson theory; UMP tests and uniformly most accurate confidence intervals; use of unbiasedness and invariance to eliminate nuisance parameters. Large sample theory: basic convergence concepts; robustness; efficiency; contiguity, locally asymptotically normal experiments; convolution theorem; asymptotically UMP and maximin tests. Asymptotic theory of likelihood ratio and score tests. Rank permutation and randomization tests; jackknife, bootstrap, subsampling and other resampling methods. Further topics: sequential analysis, optimal experimental design, empirical processes with applications to statistics, Edgeworth expansions, density estimation, time series.
2-4 units, Win (Romano, J)

STATS 300C. Theory of Statistics
Decision theory formulation of statistical problems. Minimax, admissible procedures. Complete class theorems (""all"" minimax or admissible procedures are ""Bayes""), Bayes procedures, conjugate priors, hierarchical models. Bayesian non parametrics: di-aichlet, tail free, polya trees, bayesian sieves. Inconsistency of bayes rules.
2-4 units, Spr (Candes, E)

STATS 305. Introduction to Statistical Modeling
Review of univariate regression. Multiple regression. Geometry, subspaces, orthogonality, projections, normal equations, rank deficiency, estimable functions and Gauss-Markov theorem. Computation via QR decomposition, Gramm-Schmidt orthogonalization and the SVD. Interpreting coefficients, collinearity, graphical displays. Fits and the Hat matrix, leverage & influence, diagnostics, weighted least squares and resistance. Model selection, Cp/Aic and crossvalidation, stepwise, lasso. Basis expansions, splines. Multivariate normal distribution theory. ANOVA: Sources of measurements, fixed and random effects, randomization. Emphasis on problem sets involving substantive computations with data sets. Prerequisites: consent of instructor, 116, 200, applied statistics course, CS 106A, MATH 114.
2-4 units, Aut (Hastie, T)

STATS 306A. Methods for Applied Statistics
Regression modeling extended to categorical data. Logistic regression. Loglinear models. Generalized linear models. Discriminant analysis. Categorical data models from information retrieval and Internet modeling. Prerequisite: 305 or equivalent.
2-4 units, Win (Owen, A)

STATS 306B. Methods for Applied Statistics
Unsupervised learning techniques in statistics, machine learning, and data mining.
2-4 units, Spr (Tibshirani, R)

STATS 310A. Theory of Probability
(Same as MATH 230A) Mathematical tools: asymptotics, metric spaces; measure and integration; Lp spaces; some Hilbert spaces theory. Probability: independence, Borel-Cantelli lemmas, almost sure and Lp convergence, weak and strong laws of large numbers. Weak convergence and characteristic functions; central limit theorems; local limit theorems; Poisson convergence. Prerequisites: 116, MATH 171.
2-4 units, Aut (Montanari, A)

STATS 310B. Theory of Probability
(Same as MATH 230B) Stopping times, 0-1 laws, Kolmogorov consistency theorem. Uniform integrability. Radon-Nikodym theorem, branching processes, conditional expectation, discrete time martingales. Exchangeability. Large deviations. Laws of the iterated logarithm. Birkhoff's and Kingman's ergodic theorems. Recurrence, entropy. Prerequisite: 310A or MATH 230A.
2-4 units, Win (Diaconis, P)

STATS 310C. Theory of Probability
(Same as MATH 230C) Continuous time stochastic processes: martingales, Brownian motion, stationary independent increments, Markov jump processes and Gaussian processes. Invariance principle, random walks, LIL and functional CLT. Markov and strong Markov property. Infinitely divisible laws. Some ergodic theory. Prerequisite: 310B or MATH 230B.
2-4 units, Spr (Dembo, A)

STATS 314. Advanced Statistical Methods
Topic this year is multiple hypothesis testing. The demand for new methodology for the simultaneous testing of many hypotheses as driven by modern applications in genomics, imaging, astronomy, and finance. High dimensionality: how tests of many hypotheses may be considered simultaneously. Classical techniques, and recent developments. Stepwise methods, generalized error rates such as the false discovery rate, and the role of resampling. May be repeated for credit.
2-3 units, not given this year

STATS 315A. Modern Applied Statistics: Learning
Overview of supervised learning. Linear regression and related methods. Model selection, least angle regression and the lasso, stepwise methods. Classification. Linear discriminant analysis,

logistic regression, and support vector machines (SVMs). Basis expansions, splines and regularization. Kernel methods. Generalized additive models. Kernel smoothing. Gaussian mixtures and the EM algorithm. Model assessment and selection: crossvalidation and the bootstrap. Pathwise coordinate descent. Sparse graphical models. Prerequisites: STATS 305, 306A,B or consent of instructor.

2-3 units, Win (Hastie, T)

STATS 315B. Modern Applied Statistics: Data Mining
Two-part sequence. New techniques for predictive and descriptive learning using ideas that bridge gaps among statistics, computer science, and artificial intelligence. Emphasis is on statistical aspects of their application and integration with more standard statistical methodology. Predictive learning refers to estimating models from data with the goal of predicting future outcomes, in particular, regression and classification models. Descriptive learning is used to discover general patterns and relationships in data without a predictive goal, viewed from a statistical perspective as computer automated exploratory analysis of large complex data sets.

2-3 units, Spr (Friedman, J)

STATS 316. Stochastic Processes on Graphs
Local weak convergence, Gibbs measures on trees, cavity method, and replica symmetry breaking. Examples include random k-satisfiability, the assignment problem, spin glasses, and neural networks. Prerequisite: 310A or equivalent.

1-3 units, not given this year

STATS 317. Stochastic Processes
Semimartingales, stochastic integration, Ito's formula, Girsanov's theorem. Gaussian and related processes. Stationary/isotropic processes. Integral geometry and geometric probability. Maxima of random fields and applications to spatial statistics and imaging.

2-3 units, not given this year

STATS 318. Modern Markov Chains
Tools for understanding Markov chains as they arise in applications. Random walk on graphs, reversible Markov chains, Metropolis algorithm, Gibbs sampler, hybrid Monte Carlo, auxiliary variables, hit and run, Swedson-Wong algorithms, geometric theory, Poincare-Nash-Cheger-Log-Sobolov inequalities. Comparison techniques, coupling, stationary times, Harris recurrence, central limit theorems, and large deviations.

2-3 units, Aut (Diaconis, P)

STATS 319. Literature of Statistics
Literature study of topics in statistics and probability culminating in oral and written reports. May be repeated for credit.

1-3 units, Aut (Romano, J), Win (Owen, A), Spr (Walther, G)

STATS 320. Heterogeneous Data with Kernels
Mathematical and computational methods necessary to understanding analysis of heterogeneous data using generalized inner products and Kernels. For areas that need to integrate data from various sources, biology, environmental and chemical engineering, molecular biology, bioinformatics. Topics: Distances, inner products and duality. Multivariate projections. Complex heterogeneous data structures (networks, trees, categorical as well as multivariate continuous data). Canonical correlation analysis, canonical correspondence analysis. Kernel methods in Statistics. Representer theorem. Kernels on graphs. Kernel versions of standard statistical procedures. Data cubes and tensor methods.

3 units, Spr (Holmes, S)

STATS 322. Function Estimation in White Noise
Gaussian white noise model sequence space form. Hyperrectangles, quadratic convexity, and Pinsker's theorem. Minimax estimation on Lp balls and Besov spaces. Role of wavelets and unconditional bases. Linear and threshold estimators. Oracle inequalities. Optimal recovery and universal thresholding. Stein's unbiased risk estimator and threshold choice. Complexity penalized model selection. Connecting fast wavelet algorithms and theory. Beyond orthogonal bases.

2-3 units, Aut (Johnstone, I)

STATS 324. Multivariate Analysis
Classic multivariate statistics: properties of the multivariate normal distribution, determinants, volumes, projections, matrix square roots, the singular value decomposition; Wishart distributions, Hotelling's T-square; principal components, canonical correlations, Fisher's discriminant, the Cauchy projection formula.

2-3 units, not given this year

STATS 329. Large-Scale Simultaneous Inference
Estimation, testing, and prediction for microarray-like data. Modern scientific technologies, typified by microarrays and imaging devices, produce inference problems with thousands of parallel cases to consider simultaneously. Topics: empirical Bayes techniques, James-Stein estimation, large-scale simultaneous testing, false discovery rates, local fdr, proper choice of null hypothesis (theoretical, permutation, empirical nulls), power, effects of correlation on tests and estimation accuracy, prediction methods, related sets of cases (""enrichment""), effect size estimation. Theory and methods illustrated on a variety of large-scale data sets.

1-3 units, not given this year

STATS 330. An Introduction to Compressed Sensing
(Same as CME 362) Compressed sensing is a new data acquisition theory asserting that one can design nonadaptive sampling techniques that condense the information in a compressible signal into a small amount of data. This revelation may change the way engineers think about signal acquisition. Course covers fundamental theoretical ideas, numerical methods in large-scale convex optimization, hardware implementations, connections with statistical estimation in high dimensions, and extensions such as recovery of data matrices from few entries (famous Netflix Prize).

2-3 units, Spr (Staff)

STATS 338. Topics in Biostatistics
Data monitoring and interim analysis of clinical trials. Design of Phase I, II, III trials. Survival analysis. Longitudinal data analysis.

3 units, not given this year

STATS 345. Computational Algorithms for Statistical Genetics
(Same as GENE 245) Computational algorithms for human genetics research. Topics include: permutation, bootstrap, expectation maximization, hidden Markov model, and Markov chain Monte Carlo. Rationales and techniques illustrated with existing implementations commonly used in population genetics research, disease association studies, and genomics analysis. Prerequisite: GENE 244 or consent of instructor.

2-3 units, alternate years, not given this year

STATS 351A. An Introduction to Random Matrix Theory
(Same as MATH 231A) Patterns in the eigenvalue distribution of typical large matrices, which also show up in physics (energy distribution in scattering experiments), combinatorics (length of longest increasing subsequence), first passage percolation and number theory (zeros of the zeta function). Classical compact ensembles (random orthogonal matrices). The tools of determinental point processes.

3 units, not given this year

STATS 352. Spatial Statistics
(Same as STATS 253) Statistical descriptions of spatial variability, spatial random functions, grid models, spatial partitions, spatial sampling, linear and nonlinear interpolation and smoothing with error estimation, Bayes methods and pattern simulation from posterior distributions, multivariate spatial statistics, spatial classification, nonstationary spatial statistics, space-time statistics and estimation of time trends from monitoring data, spatial point patterns, models of attraction and repulsion. Applications to earth and environmental sciences, meteorology, astronomy, remote-sensing, ecology, materials.

3 units, not given this year

STATS 362. Monte Carlo
Random numbers and vectors: inversion, acceptance-rejection, copulas. Variance reduction: antithetics, stratification, control variates, importance sampling. MCMC: Markov chains, detailed balance, Metropolis-Hastings, random walk Metropolis, independence sampler, Gibbs sampling, slice sampler, hybrids of Gibbs and Metropolis, tempering. Sequential Monte Carlo. Quasi-Monte Carlo. Randomized quasi-Monte Carlo. Examples, problems and motivation from Bayesian statistics, machine learning, computational finance and graphics.

2-3 units, Aut (Owen, A)

STATS 366. Computational Biology
(Same as BIOMEDIN 366, STATS 166) Course is designed to introduce students from the mathematical, physical and engineering sciences to selected current issues in computational biology and bioinformatics. Topics: principles of gene expression measurement by microarrays and sequencing, methods to measure locations of protein-DNA interaction, the application of these tech-

niques in the study of gene regulation, approaches to the mapping of genes by association studies. Emphasis is on the statistical and computational issues in these studies. Assignments: weekly reading of papers and a final project.

2-3 units, Spr (Wong, W)

STATS 367. Statistical Models in Genetics

Statistical problems in association and linkage analysis of qualitative and quantitative traits in human and experimental populations; sequence alignment and analysis; population genetics/evolution (Wright-Fisher model, Kingman coalescent, models of nucleotide substitution); related computational algorithms. Prerequisites: knowledge of probability through elementary stochastic processes and statistics through likelihood theory.

2-3 units, Win (Siegmund, D)

STATS 370. A Course in Bayesian Statistics

(Same as STATS 270) Advanced-level Bayesian statistics. Topics: Discussion of the mathematical and theoretical foundation for Bayesian inferential procedures. Examination of the construction of priors and the asymptotic properties of likelihoods and posterior densities. Discussion including but not limited to the case of finite dimensional parameter space. Prerequisite: familiarity with standard probability and multivariate distribution theory.

3 units, not given this year

STATS 374. Large Deviations

(Same as MATH 234) Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramer's and Sanov's theorems and their Markov extensions. Applications in statistics, information theory, and statistical mechanics. Prerequisite: MATH 230A or STATS 310.

3 units, not given this year

STATS 375. Inference in Graphical Models

Graphical models as a unifying framework for describing the statistical relationships between large sets of variables; computing the marginal distribution of one or a few such variables. Focus is on sparse graphical structures, low-complexity algorithms, and their analysis. Topics include: variational inference; message passing algorithms; belief propagation; generalized belief propagation; survey propagation. Analysis techniques: correlation decay; distributional recursions. Applications from engineering, computer science, and statistics. Prerequisite: EE 278, STATS 116, or CS 228. Recommended: EE 376A or STATS 217.

3 units, Win (Montanari, A)

STATS 376A. Information Theory

(Same as EE 376A) The fundamental ideas of information theory. Entropy and intrinsic randomness. Data compression to the entropy limit. Huffman coding. Arithmetic coding. Channel capacity, the communication limit. Gaussian channels. Kolmogorov complexity. Asymptotic equipartition property. Information theory and Kelly gambling. Applications to communication and data compression. Prerequisite: EE178 or EE278 or STATS 116, or equivalent.

3 units, Win (Cover, T)

STATS 376B. Information Theory

(Same as EE 376B) Rate distortion theory and Kolmogorov complexity. Information theory and statistics. Method of types. Stein's lemma. AEP. Information capacity of networks. Slepian-Wolf theorem. Optimal investment and information theory. Universal portfolios and universal data compression. Maximum entropy and Burg's theorem. Prerequisite: EE376A.

3 units, Spr (Cover, T)

STATS 390. Consulting Workshop

Skills required of practicing statistical consultants, including exposure to statistical applications. Students participate as consultants in the department's drop-in consulting service, analyze client data, and prepare formal written reports. Seminar provides supervised experience in short term consulting. May be repeated for credit. Prerequisites: course work in applied statistics or data analysis, and consent of instructor.

1-3 units, Aut (Owen, A), Win (Taylor, J), Spr (Olshen, R), Sum (Staff)

STATS 398. Industrial Research for Statisticians

Doctoral research as in 298, but must be conducted for an off-campus employer. Final report required. May be repeated for credit. Prerequisite: Statistics Ph.D. candidate.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STATS 399. Research

Research work as distinguished from independent study of nonresearch character listed in 199. May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STATS 801. TGR Project

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STATS 802. TGR Dissertation

0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STRUCTURAL BIOLOGY (SBIO) COURSES

UNDERGRADUATE COURSES IN STRUCTURAL BIOLOGY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SBIO 199. Undergraduate Research

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN STRUCTURAL BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SBIO 228. Computational Structural Biology

(Same as BIOPHYS 228) Interatomic forces and interactions such as electrostatics and hydrophobicity, and protein structure in terms of amino acid properties, local chain conformation, secondary structure, domains, and families of folds. How protein motion can be simulated. Bioinformatics introduced in terms of methods that compare proteins via their amino acid sequences and their three-dimensional structures. Structure prediction via simple comparative modeling. How to detect and model remote homologues. Predicting the structure of a protein from knowledge of its amino acid sequence. Via Internet.

3 units, not given this year

SBIO 241. Biological Macromolecules

(Same as BIOC 241, BIOPHYS 241) The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 40. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only.

3-5 units, Aut (Herschlag, D; Ferrell, J; Block, S; Weis, W; Garcia, K; Puglisi, J)

SBIO 242. Methods in Molecular Biophysics

(Same as BIOPHYS 242) Experimental methods in molecular biophysics from theoretical and practical standpoints. Emphasis is on X-ray diffraction, nuclear magnetic resonance, and fluorescence spectcroscopy. Prerequisite: physical chemistry or consent of instructor.

3 units, Win (Staff)

SBIO 274. Topics in Nucleic Acid Structure and Function

Principles of nucleic acid structure and function. Methods for investigating nucleic acid structure. Limited to graduate students and postdoctoral fellows in structural biology. Prerequisite: consent of instructor.

2 units, not given this year

SBIO 299. Directed Reading in Structural Biology

Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SBIO 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.
4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SBIO 399. Graduate Research
Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SBIO 801. TGR Project
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SBIO 802. TGR Dissertation
0 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

STRUCTURED LIBERAL EDUCATION (SLE) COURSES

UNDERGRADUATE COURSES IN STRUCTURED LIBERAL EDUCATION

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SLE 91. Structured Liberal Education
Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. The cultural foundations of western civilization in ancient Greece, Rome, and the Middle East, with attention to Buddhist and Hindu counterparts and the questions these traditions address in common. Texts and authors include Homer, Plato, Aristotle, Greek tragedy, Sappho, the Hebrew Bible, the New Testament, Saint Augustine, and texts from Hindu and Buddhist traditions. GER:DB-Hum, IHUM-1
9 units, Aut (Lougee Chappell, C; Watkins, G)

SLE 92. Structured Liberal Education
Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. The foundations of the modern world, from late antiquity through the Middle Ages, the Renaissance, the Enlightenment, and the Scientific Revolution. Authors include Dante, Descartes, Shakespeare, and texts from Chinese and Islamic traditions. GER:DB-Hum, IHUM-2
9 units, Win (Lougee Chappell, C; Watkins, G)

SLE 93. Structured Liberal Education
Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. Modernity as a period in intellectual history and a problem in the human sciences. Authors include Marx, Nietzsche, Freud, Kafka, Woolf, Eliot, and Sartre. GER:DB-Hum, IHUM-3
10 units, Spr (Lougee Chappell, C; Watkins, G)

SLE 199. Teaching SLE
1 unit, Aut (Watkins, G), Win (Watkins, G; Lougee Chappell, C), Spr (Watkins, G; Lougee Chappell, C)

SURGERY (SURG) COURSES

UNDERGRADUATE COURSES IN SURGERY

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SURG 68Q. Current Concepts in Transplantation
(Stanford Introductory Seminar) Preference to sophomores. Biological aspects of cell and organ transplantation, including issues that arise in the media. Diseases for which transplantation is a treatment, the state of the art in human transplantation, transplantation of animal tissue into humans (xenotransplantation), development of new tissue and organs in the laboratory (tissue engineering and cloning), and development of drugs and biological strategies to promote long-term survival of the tissue or organ (tolerance). How to write a scientific abstract, critique scientific literature, and research and present topics in contemporary transplantation.
3 units, Spr (Martinez, O; Krams, S)

SURG 70Q. Surgical Anatomy of the Hand: From Rodin to Reconstruction
(Stanford Introductory Seminar) The surgical anatomy of the hand is extremely complex in terms of structure and function. Exploration of the anatomy of the hand in different contexts: its representation in art forms, the historical development of the study of hand anatomy, current operative techniques for reconstruction, advances in tissue engineering, and the future of hand transplantation.
2 units, Win (Chang, J)

SURG 101. Regional Study of Human Structure
Preference to seniors. Lectures in regional anatomy and dissection of the human cadaver; the anatomy of the trunk and limbs through the dissection process, excluding the head and neck.
5 units, Win (Gosling, J; Whitmore, I)

SURG 111A. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 211A) (Graduate students register for 211A.) Basics of life support outside the hospital setting; readiness training for emergencies on- or off-campus. Topics include emergency patient assessments, and cardiac, respiratory, and neurological emergencies. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Prerequisites: CPR certification; application (see http://surg211.stanford.edu), and consent of instructor.
3 units, Aut (Gilbert, G; D'Souza, P)

SURG 111B. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 211B) (Graduate students register for 211B.) Continuation of 111A/211A. Approach to traumatic injuries. Topics include head, neck, and trunk injuries, bleeding and shock, burn emergencies, and environmental emergencies. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Prerequisite: 111A/211A and consent of instructor.
3 units, Win (Gilbert, G; D'Souza, P)

SURG 111C. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 211C) (Graduate students register for 211C.) Continuation of 111B/211B. Special topics in EMS; topics include pediatric, obstetric, and gynecologic emergencies, EMS operations, mass casualty incidents, and assault. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT certification exam. Prerequisite: 111B/211B, CPR-PR certification, and consent of instructor.
3 units, Spr (Gilbert, G; D'Souza, P)

SURG 112A. Advanced Reading and Teaching for the EMT-1
(Same as SURG 212A) Advanced Topics in EMS and training in teaching BLS skills (Graduate students register for 212A.) Topics include advanced airway and stroke management, abdominal emergencies, and prehospital pharmacology. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.
2-3 units, Aut (Gilbert, G; D'Souza, P)

SURG 112B. Advanced Reading and Teaching for the EMT-1
(Same as SURG 212B) Advanced Topics in EMS and training in teaching BLS skills. (Graduate students register for 212B.) Topics include advanced assessment and treatment of the undifferentiated trauma patient (including advanced airway management, monitoring, and evaluation) and prehospital care in nontraditional locations. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.
2-3 units, Win (Gilbert, G; D'Souza, P; Espinoza, N)

SURG 112C. Advanced Reading and Teaching for the EMT-1
(Same as SURG 212C) Advanced Topics in EMS and training in teaching BLS skills. (Graduate students register for 212C.) Topics include advanced assessment and treatment of patients in difficult and advanced situations - mass casualty incidents, assaults, pediatrics; and advanced emergency skills - ultrasound, suturing. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.

2-3 units, Spr (Gilbert, G; D'Souza, P)

SURG 150. Principles and Practice of International Medical Humanitarianism in Surgery
(Same as SURG 250) Open to undergraduate, graduate, and medical students. Focus is on understanding ethical theory behind humanitarianism (utilitarianism, global health equity, and basic human rights), the growing role of surgery in international health, and social innovation and business in the health care sector. Summer internship opportunities for international health service with subsidized travel for top students. Guest speakers include world-renowned physicians, CEOs, and social-medical entrepreneurs.

4 units, Aut (Samagh, S; Samagh, S; Laub, D; Chang, J)

SURG 199. Undergraduate Research
Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SURGERY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SURG 201. Basic Cardiac Life Support
All medical students must be certified in Basic Cardiac Life Support before the end of the first (autumn) quarter. Students who provide documentation of certification received within six months prior to the date of matriculation will be exempted from the requirement. The course teaches one- and two-rescuer CPR, management of an obstructed airway, and CPR for infants and children. Upon completion of the course, students receive an American Heart Association certificate in BLS.

1 unit, Aut (Smith-Coggins, R)

SURG 203A. Human Anatomy
Introduction to human structure and function presented from a medical perspective. Introduction to the physical examination and frequently-used medical imaging techniques. Students are required to attend lectures, actively participate in seminar groups, and engage in dissection of the human body in the anatomy laboratory. Surgery 203A presents structure of the thorax, abdomen, pelvis and limbs.

11 units, Aut (Gosling, J; Whitmore, I)

SURG 203B. Human Anatomy
Continues the introduction to human structure and function from a medical perspective, the physical examination, and frequently-used medical imaging techniques. Students are required to attend lectures, actively participate in seminar groups, and engage in dissection of the human body in the anatomy laboratory. Surgery 203B presents structure of the head, neck and back.

4 units, Win (Gosling, J; Whitmore, I)

SURG 204. Introduction to Surgery and Surgical Techniques
Innovative introduction to the various aspects of surgery directed at pre-clinical MD students. Students participate in interactive clinical surgical scenarios animated by attending physicians. Covers the spectrum of surgical specialties. Includes scrubbing techniques, basic instrument handling, and the opportunity to scrub in on operations at Stanford Hospital.

1 unit, Aut (Greco, R; Wasterlain, A)

SURG 205. Advanced Suturing Techniques
Builds upon skills taught in the Surgical Interest Group's introductory suturing workshops. Techniques such as suturing in a hole, suturing different tissues, and hand, instrument and laparoscopic knot tying.

1 unit, Aut (Wehner, M; Visser, B)

SURG 208. Plastic Surgery Tutorial
Diagnosis, theory, and practice of plastic and reconstructive surgery. Limited to two students per faculty member.

2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SURG 209. Plastic Surgery
Students participate in plastic and reconstructive surgery as functioning members of the clinical team. Students are exposed to operative surgery, emergency and trauma care, evaluation of operative candidates in the outpatient setting, and also attend teaching conferences. Limited to four students. Prerequisite: completion of first year or clinical experience.

1-18 units, Aut (Chang, J; Schendel, S; Lorenz, H; Longaker, M; Gurtner, G; Girod, S; Hentz, V; Lee, G), Win (Chang, J; Schendel, S; Lorenz, H; Longaker, M; Gurtner, G; Girod, S; Hentz, V; Lee, G), Spr (Chang, J; Girod, S; Gurtner, G; Hentz, V; Lee, G;

SURG 211A. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 111A) (Graduate students register for 211A.) Basics of life support outside the hospital setting; readiness training for emergencies on- or off-campus. Topics include emergency patient assessments, and cardiac, respiratory, and neurological emergencies. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Prerequisites: CPR certification; application (see http://surg211.stanford.edu), and consent of instructor.

3 units, Aut (Gilbert, G; D'Souza, P)

SURG 211B. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 111B) (Graduate students register for 211B.) Continuation of 111A/211A. Approach to traumatic injuries. Topics include head, neck, and trunk injuries, bleeding and shock, burn emergencies, and environmental emergencies. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Prerequisite: 111A/211A and consent of instructor.

3 units, Win (Gilbert, G; D'Souza, P)

SURG 211C. Emergency Medical Technician (EMT-1): Training and Application
(Same as SURG 111C) (Graduate students register for 211C.) Continuation of 111B/211B. Special topics in EMS; topics include pediatric, obstetric, and gynecologic emergencies, EMS operations, mass casualty incidents, and assault. Lectures, practicals, and applications. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT certification exam. Prerequisite: 111B/211B, CPR-PR certification, and consent of instructor.

3 units, Spr (Gilbert, G; D'Souza, P)

SURG 212A. Advanced Reading and Teaching for the EMT-1
(Same as SURG 112A) Advanced Topics in EMS and training in teaching BLS skills (Graduate students register for 212A.) Topics include advanced airway and stroke management, abdominal emergencies, and prehospital pharmacology. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.

2-3 units, Aut (Gilbert, G; D'Souza, P)

SURG 212B. Advanced Reading and Teaching for the EMT-1
(Same as SURG 112B) Advanced Topics in EMS and training in teaching BLS skills. (Graduate students register for 212B.) Topics include advanced assessment and treatment of the undifferentiated trauma patient (including advanced airway management, monitoring, and evaluation) and prehospital care in nontraditional locations. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.

2-3 units, Win (Gilbert, G; D'Souza, P; Espinoza, N)

SURG 212C. Advanced Reading and Teaching for the EMT-1
(Same as SURG 112C) Advanced Topics in EMS and training in teaching BLS skills. (Graduate students register for 212C.) Topics include advanced assessment and treatment of patients in difficult and advanced situations - mass casualty incidents, assaults, pediatrics; and advanced emergency skills - ultrasound, suturing. Prerequisites: SURG 111/211 A-C (or equivalent EMT-Basic certification), CPR for the Professional Rescuer certification, and consent of instructor. May be repeated for credit.

2-3 units, Spr (Gilbert, G; D'Souza, P)

SURG 220. Emergency Medicine: Introduction
The specialty of emergency medicine and initial care of emergency patients, both in the pre-hospital phase and in the emergency department. Lectures and/or practical sessions cover: patient assessment; the initial management of the multiple trauma patient; and common medical emergencies, such as poisoning, asthma, and chest pain. Students taking the course for 1 unit must have 50% class attendance and pass the final exam; 2 units constitutes 70% class attendance and passing the final exam; 3 units includes participation in emergency department observation shifts; 4 units requires 90% attendance and includes both observation and EMS ride-alongs.

1-4 units, Aut (Mahadevan, S; Ma, J; Chiao, A)

SURG 223. Wilderness Medicine
Open to all students. Wilderness-related illnesses and injuries; a framework for evaluation and treatment of emergencies in the backcountry. Hands-on clinical skills. Topics include high altitude medicine, hypothermia, envenomations, search and rescue, improvisation, and survival medicine. Includes opportunity for certification in Wilderness First Aid (WFA).

4 units, Spr (Lipman, G; Weiss, E)

SURG 225. Transplantation Science
Offers medical students a more in-depth understanding of the field of transplantation. Develops an understanding of transplant immunology, tissue typing, immunopharmacology, and transplant pathology. Includes such topics as heart and heart/lung transplantation, kidney/pancreas transplantation, liver transplantation, bone marrow transplantation, and donor issues. Focus is on the field of transplantation as it relates to preoperative care and management of patients prior to transplantation as well as the long term care and follow-up of patients. Guest speakers. Prerequisites: SURG 218 (Anatomy); BIOC 200 (may be taken concurrently).

1 unit, alternate years, not given this year

SURG 228. Introduction to Vascular Disease and Treatment
Develops basic interventional skills using hands-on endovascular simulation in multiple vascular beds. Designed for students interested in careers in vascular surgery, interventional cardiology, interventional radiology, and vascular medicine. Topics: peripheral vascular disease, angiography, SFA interventions, aortoiliac disease; visceral vascular disease and renal interventions, cerebrovascular disease and carotid intervention lab; frontiers in vascular disease. Prerequisite: completion of first year of medical school.

1 unit, Aut (Lee, J; Lilo, E), Win (Lee, J; Lilo, E)

SURG 229. Advanced Vascular Disease and Treatment
Designed for students interested in careers in vascular surgery and vascular medicine. Expands upon the basic physiology, pathology, and skills learned in SURG 228. Topics: renal disease, cerebrovascular disease and carotid interventions, AAA disease and intervention, DVT disease, the future of vascular surgery. Centered on simulation based learning, student presentations, and discussion. Prerequisite: SURG 228

1 unit, Spr (Lee, J; Lilo, E)

SURG 230. Obesity in America
Prevalence and effects of the obesity epidemic in America and the growing prevalence of associated comorbidities such as diabetes, hypertension, hyperlipidemia, sleep apnea, and joint problems. Risk factors, multi-disciplinary treatment options, the role of food in society, patients' perspectives, and current research in the field. Includes fieldtrips to grocery stores and restaurants.

1 unit, Win (Morton, J; Ahmed, S)

SURG 231. Healthcare in Developing Countries: Haiti and Beyond
Lunchtime lecture series open to all students. Aims to answer the deceptively simple question: How can we improve health in the devoping world? Topics range from water sanitation to supply-side incentivization, from family planning to war zone surgery. Students gain useful skills for experience in international medicine. MD students are eligible to apply for a sub-internship in surgery at Hopital Albert Schweitzer in Dechapelle, Haiti.

1 unit, Spr (Greco, R; Leroux, E)

SURG 250. Principles and Practice of International Medical Humanitarianism in Surgery
(Same as SURG 150) Open to undergraduate, graduate, and medical students. Focus is on understanding ethical theory behind humanitarianism (utilitarianism, global health equity, and basic human rights), the growing role of surgery in international health, and social innovation and business in the health care sector. Summer internship opportunities for international health service with subsidized travel for top students. Guest speakers include world-renowned physicians, CEOs, and social-medical entrepreneurs.

4 units, Aut (Samagh, S; Samagh, S; Laub, D; Chang, J)

SURG 254. Operative Anatomy and Techniques
For preclinical students; provides a background in and integrates knowledge of surgical anatomy and therapy. Surgical or operative anatomy differs from gross anatomy in that the area exposed during surgery may be limited, the dissection may require exposing other seemingly unrelated anatomic structures with unique landmarks, and the procedure may require unusual technical facility. The course provides an opportunity for students to understand the goals of representative surgical procedures (translating pathophysiology to surgical decision making to actual incision). Students learn surgical skills and perform the dissection of a number of commonly performed operations in the cadaver laboratory. The course emphasizes hands-on participation in surgical procedures in the laboratory and is taught by attending physicians in general, cardiothoracic, vascular, plastic, head and neck, urologic, and orthopedic surgery.

1 unit, Win (Fann, J; Johannet, P; Srivastava, S)

SURG 280. Early Clinical Experience in Surgery
Provides an observational experience in a surgery specialty. Prerequisite: consent of instructor.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SURG 296. Individual Work: Human Anatomy
Carried out under the supervision of one or more members of the staff. Prerequisite: consent of instructor.

1-18 units, Aut (Whitmore, I; Gosling, J), Win (Whitmore, I; Gosling, J), Spr (Whitmore, I; Gosling, J), Sum (Whitmore, I; Gosling, J)

SURG 299. Directed Reading in Surgery
Consists of studies in progress, including cardiovascular and circulatory problems; gastric physiology; hemostatic disorders; homotransplantation; liver disorders; orthopedic pathology; bone growth; radiation injury; immunology, bacteriology, pathology, and physiology of the eye; physiological optics; comparative ophthalmology; neurophysiology of hearing; spatial orientation and disorientation; nasal function; and psychophysics of sensation. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SURG 370. Medical Scholars Research
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

4-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SURG 399. Graduate Research
Students undertake investigations sponsored by individual faculty members.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SYMBOLIC SYSTEMS (SYMSYS) COURSES

UNDERGRADUATE COURSES IN SYMBOLIC SYSTEMS

Primarily for undergraduates; graduate students may enroll with consent of adviser.

SYMSYS 100. Introduction to Cognitive and Information Sciences
(Same as LINGUIST 144, PHIL 190, PSYCH 132) The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major. GER:DB-SocSci

4 units, Spr (McClelland, J; van Benthem, J)

SYMSYS 145. Cognition in Interaction Design
Interactive systems from the standpoint of human cognition. Topics include skill acquisition, complex learning, reasoning, language, perception, methods in usability testing, special computational techniques such as intelligent and adaptive interfaces, and design for people with cognitive disabilities. Students conduct analyses of real world problems of their own choosing and redesign/analyze a project of an interactive system. GER:DB-SocSci
3 units, Win (Shrager, J)

SYMSYS 170. Decision Behavior: Theory and Evidence
(Same as SYMSYS 270) Introduction to the study of judgment and decision making, relating theory and evidence from disciplines such as psychology, economics, statistics, neuroscience, and philosophy. The development and critique of Homo economicus as a model of human behavior, and more recent theories based on empirical findings. Recommended: background in formal reasoning.
3-4 units, not given this year

SYMSYS 190. Senior Honors Tutorial
Under the supervision of their faculty honors adviser, students work on their senior honors project. May be repeated for credit.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SYMSYS 191. Senior Honors Seminar
Recommended for seniors doing an honors project. Under the leadership of the Symbolic Systems program coordinator, students discuss, and present their honors project.
1 unit, Aut (Davies, T)

SYMSYS 196. Independent Study
Independent work under the supervision of a faculty member. Can be repeated for credit.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SYMBOLIC SYSTEMS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SYMSYS 200. Symbolic Systems in Practice
Applying a Symbolic Systems education at Stanford and outside. The basics of research and practice. Students develop and present a project, and investigate different career paths, including academic, industrial, professional, and public service, through interviews with alumni.
2-3 units, Aut (Davies, T), Spr (Davies, T)

SYMSYS 201. ICT, Society, and Democracy
The impact of information and communication technologies on social and political life. Interdisciplinary. Classic and contemporary readings focusing on topics such as social networks, virtual versus face-to-face communication, the public sphere, voting technology, and collaborative production.
3 units, not given this year

SYMSYS 206. Topics in the Philosophy of Neuroscience
Preference to Undergraduates. Focus is literature in philosophy and neuroscience whose topics include perception, memory, neurophenomenology, sensorimotor accounts of consciousness, computational models, and eliminativism, among others. Prerequisites: Familiarity with philosophy (Phil 80) or neuroscience.
3 units, Win (Skokowski, P)

SYMSYS 209. Battles Over Bits
The changing nature of information in the Internet age and its relationship to human behavior. Philosophical assumptions underlying practices such as open source software development, file sharing, common carriage, and community wireless networks, contrasted with arguments for protecting private and commercial interests such as software patents, copy protection, copyright infringement lawsuits, and regulatory barriers. Theory and evidence from disciplines including psychology, economics, computer science, law, and political science. Prerequisite: PSYCH 40, 55, 70, or SYMBSYS 202.
3 units, not given this year

SYMSYS 210. Learning Facial Emotions: Art and Psychology
Artistic and psychological learning approaches to emotion recognition from facial expressions. The advantages of learning by drawing from live models when there are cognitive deficits due to aging, autism, or Aspergers. Comparative analysis uses brain studies, learning theory, and human-computer interaction. Psychological and artistic training methods for emotion recognition. Studio component conveys the art drawing approach. Prerequisites: PSYCH 1 or consent of instructor.
3 units, not given this year

SYMSYS 211. Learning Facial Emotions: Art, Psychology, Human-Computer Interaction
Learning to recognize facial emotions by drawing a live model versus the psychology method of using classified images of subtle and micro expressions. Dimensions of analysis include cognitive modeling and neuroscience. The design of human-computer interaction systems for people with cognitive deficits such as autism and Aspergers, which integrate the art and psychology approaches using methods such as robot heads, avatars, and facial recognition software. Prerequisites: PSYCH 1 or consent of instructor.
3 units, not given this year

SYMSYS 270. Decision Behavior: Theory and Evidence
(Same as SYMSYS 170) Introduction to the study of judgment and decision making, relating theory and evidence from disciplines such as psychology, economics, statistics, neuroscience, and philosophy. The development and critique of Homo economicus as a model of human behavior, and more recent theories based on empirical findings. Recommended: background in formal reasoning.
3-4 units, not given this year

SYMSYS 280. Symbolic Systems Research Seminar
A mixture of public lectures of interest to Symbolic Systems students (the Symbolic Systems Forum) and student-led meetings to discuss research in Symbolic Systems. Can be repeated for credit. Required for master's students in Symbolic Systems during each quarter of enrollment, but encouraged for undergraduate majors also.
1 unit, Aut (Davies, T), Win (Davies, T), Spr (Davies, T)

SYMSYS 290. Master's Degree Project
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SYMSYS 291. Master's Program Seminar
Enrollment limited to students in the Symbolic Systems M.S. degree program. May be repeated for credit.
1 unit, Aut (Davies, T), Win (Davies, T), Spr (Davies, T)

TIBETAN LANGUAGE (TIBETLNG) COURSES

UNDERGRADUATE COURSES IN TIBETAN LANGUAGE

Primarily for undergraduates; graduate students may enroll with consent of adviser.

TIBETLNG 1. First-Year Tibetan, First Quarter
Grammar, reading, and composition. Tibetan culture and the Tibetan view of reality.
3 units, Aut (Clark, R)

TIBETLNG 2. First Year Tibetan, Second Quarter
Continuation of 1.
3 units, Win (Clark, R)

TIBETLNG 3. First Year Tibetan, Third Quarter
Continuation of 2.
3 units, Spr (Clark, R)

TIBETLNG 199. Individual Work
May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN TIBETAN LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

TIBETLNG 395. Graduate Studies in Tibetan
May be repeated for credit. Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

URBAN STUDIES (URBANST) COURSES

UNDERGRADUATE COURSES IN URBAN STUDIES

Primarily for undergraduates; graduate students may enroll with consent of adviser.

URBANST 110. Introduction to Urban Studies
The study of cities and urban civilization. History of urbanization and current issues such as suburbanization, racial discrimination, globalization, terrorism, and the environment. Public policies designed to address these issues. GER:DB-SocSci, EC-AmerCul
4 units, Aut (Stout, F), Win (Stout, F), Spr (Kahan, M)

URBANST 111. Urban Politics
(Same as POLISCI 121, PUBLPOL 133) The major actors, institutions, processes, and policies of sub-state government in the U.S., emphasizing city general-purpose governments through a comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite: POLISCI 2 or consent of instructor. GER:DB-SocSci
5 units, Aut (Gale, D)

URBANST 112. The Urban Underclass
(Same as SOC 149, SOC 249) (Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor. GER:DB-SocSci, EC-AmerCul
5 units, Win (Rosenfeld, M)

URBANST 113. Introduction to Urban Design: Contemporary Urban Design in Theory and Practice
Comparative studies in neighborhood conservation, inner city regeneration, and growth policies for metropolitan regions. Lect-disc and research focusing on case studies from North America and abroad, team urban design projects. Two class workshops in San Francisco Sat Jan 15 and Jan 29. Terms: Win | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP) Instructors: Gast, G. GER:DB-SocSci
5 units, Win (Gast, G)

URBANST 114. Cities in Comparative Perspective
(Same as ANTHRO 126) Core course for Urban Studies majors. The city as interdisciplinary object. Discourses about cities such as the projects, practices, plans, representations, and sensibilities that combine to create what people know about urban spaces. Local, national, and transnational spatial scales. Conversations across regional boundaries; geographies of difference. Case studies. GER:DB-SocSci
5 units, Aut (Ebron, P; Roque, A)

URBANST 115. Urban Sustainability: Long-Term Archaeological Perspectives
(Same as CLASSGEN 123, CLASSGEN 223) Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas.
3-5 units, Spr (Shanks, M)

URBANST 123. Approaching Research and the Community
Comparative perspective on research with communities and basic overview of research methodologies, with an emphasis on the principles and practices of doing community-based research as a collaborative enterprise between academic researchers and community members. How academic scholarship can be made useful to communities. How service experiences and interests can be used to develop research questions in collaboration with communities and serve as a starting point for developing senior theses or other independent research projects.
2 units, Aut (Visconti, V), Spr (Visconti, V)

URBANST 126. Spirituality and Nonviolent Urban and Social Transformation
(Same as RELIGST 162) A life of engagement in social transformation is often built on a foundation of spiritual and religious commitments. Case studies of nonviolent social change agents including Rosa Parks in the civil rights movement, César Chávez in the labor movement, and WIlliam Sloane Coffin in the peace movement; the religious and spiritual underpinnings of their commitments. Theory and principles of nonviolence. Films and readings. Service learning component includes placements in organizations engaged in social transformation. Service Learning Course (certified by Haas Center). GER:DB-Hum
5 units, not given this year

URBANST 127. Community Planning Workshop
Students work in teams to conduct research, analyze and evaluate alternatives, and make recommendations for possible solutions to local community development issues. Students work with community partners to blend theory and practice to accomplish a community based project.
4-5 units, not given next year

URBANST 127. COMMUNITY PLANNING WORKSHOP
4-5 units, not given this year

URBANST 128. Community Mapping Practicum
Students will use mapping techniques to explore community planning and policy issues in Redwood City. Focusing on building other skills including teamwork, writing, and oral communication. GIS is not a prerequisite.
4 units, not given this year

URBANST 131. Social Innovation and the Social Entrepreneur
Invited lecture series. Perspectives and endeavors of thought leaders and entrepreneurs who address social needs in the U.S. and internationally through private for-profit and nonprofit organizations, nongovernmental organizations, or public institutions.
1 unit, Aut (Edwards, M)

URBANST 132. Concepts and Analytic Skills for the Social Sector
How to create and grow innovative, non-profit and for-profit ventures which have the primary goal of solving social and environmental problems. Topics include organizational mission, strategy, marketing, financing and evaluation. Opportunities and limits of methods from the for-profit sector to meet social goals. Perspectives from the field of social entrepreneurship. Focus is on integrating theory with practical applications. Enrollment limited to 20. Prerequisite:consent of instructor. GER:DB-SocSci
4 units, Win (Litvak, L)

URBANST 133. Social Entrepreneurship Collaboratory
Interdisciplinary student teams create and develop U.S. and international social entrepreneurship initiatives. Proposed initiatives may be new entities, or innovative projects, partnerships, and/or strategies impacting existing organizations and social issues in the U.S. and internationally. Focus is on each team¿s research and on planning documents to further project development. Project development varies with the quarter and the skill set of each team, but should include: issue and needs identification; market research; design and development of an innovative and feasible solution; and drafting of planning documents. In advanced cases, solicitation of funding and implementation of a pilot project. Enrollment limited to 30. May be repeated for credit. Prerequisites: 131 and 132, or consent of instructor.
4 units, Aut (Edwards, M), Spr (Scher, L)

URBANST 137. Innovations in Microcredit and Development Finance
The role of innovative financial institutions in supporting economic development, the alleviation of rural and urban poverty, and gender equity. Analysis of the strengths and limits of commercial banks, public development banks, credit unions, and microcredit organizations both in the U.S. and internationally. Readings include academic journal articles, formal case studies, evaluations, and annual reports. Priority to students who have taken any portion of the social innovation series: URBANST 131, 132, or 133. Recommended: ECON 1A or 1B.
4 units, Spr (Kieschnick, M)

URBANST 161. U.S. Urban History since 1920
The end of European immigration and its impact on cities; the Depression and cities; WW II and the martial metropolis; de-

industrialization; suburbanization; African American migration; urban renewal; riots, race, and the narrative of urban crisis; the impact of immigration from Asia, Latin America, and Africa; homelessness; the rise of the Sunbelt cities; gentrification; globalization and cities. Final project is history of a San Francisco neighborhood, based on primary sources and site visit. GER:DB-SocSci, EC-AmerCul

5 units, not given this year

URBANST 162. Managing Local Governments

In-the-trenches approach. Issues in leading and managing local governments in an era of accelerating and discontinuous change. Focus is on practical strategies related to financing, public services impacted by increasing demand and revenue constraints, the politics of urban planning, private-public partnerships, public sector marketing, entrepreneurial problem solving, promoting a learning and risk-taking organizational culture, and developing careers in local government. Enrollment limited to 25; preference to Urban Studies majors. GER:DB-SocSci

4 units, Win (Staff)

URBANST 163. Land Use Control

Methods of land use control related to the pattern and scale of development and the protection of land and water resources. Emphasis is on the relationship between the desired land use goal and geographical landscape, physical externalities, land use law, and regulatory agencies. Topics include the historical roots of modern land use controls; urban reforms of the 19th century; private ownership of land; zoning; local, state, and federal land use regulation; and land trusts preservation. Smart growth, environmental impact consideration, private property rights, and special purpose agencies are related to current issues. GER:DB-SocSci

4 units, Spr (Hall, R)

URBANST 164. Sustainable Cities

Focus is on the prospects for urban sustainability, including social, economic and environmental dimensions. Course examines the main problems facing urban areas, how they are assessed, and the policies and programs that try to address them. Topics include sustainability indicators, demographic trends and migration, income distribution, green building, urban sprawl, ecological footprint, air and water quality, climate change, and sustainable energy and transportation policies.

4-5 units, Spr (Boudet, H)

URBANST 165. Sustainable Urban and Regional Transportation Planning

Environmental, economic, and equity aspects of urban transportation in 21st-century U.S. Expanded choices in urban and regional mobility that do not diminish resources for future generations. Implications for the global environment and the livability of communities. GER:DB-SocSci

4-5 units, not given this year

URBANST 171. Urban Design Studio

The practical application of urban design theory. Projects focus on designing neighborhood and downtown regions to balance livability, revitalization, population growth, and historic preservation.

5 units, not given this year

URBANST 190. Urban Professions Seminar

Workshop. Contemporary practice of urban design and planning, community development, urban education, public service law, and related fields. Topics depend partly on student interests. Bay Area professionals lecture and respond to questions concerning their day-to-day work, impressions of their field, and the academic background recommended for their work.

1 unit, Win (Kahan, M)

URBANST 194. Internship in Urban Studies

For Urban Studies majors only. Students organize an internship in an office of a government agency, a community organization, or a private firm directly relevant to the major. Reading supplements internship. Paper summarizes internship experience and related readings.

2-4 units, Aut (Staff), Win (Staff), Spr (Staff)

URBANST 195. Special Projects in Urban Studies

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

URBANST 197. Directed Reading

1-5 units, Aut (Kahan, M), Win (Kahan, M), Spr (Kahan, M)

URBANST 198. Senior Research in Public Service

Limited to seniors approved by their departments for honors thesis and admitted to the year-round Public Service Scholars Program sponsored by the Haas Center for Public Service. What standards in addition to those expected by the academy apply to research conducted as a form of public service? How can communities benefit from research? Theory and practice of research as a form of public service readings, thesis workshops, and public presentation of completed research. May be repeated for credit. Corequisite: 199.

1-3 units, Aut (Visconti, V), Win (Visconti, V), Spr (Visconti, V)

URBANST 199. Senior Honors Thesis

1-10 units, Aut (Staff), Win (Staff), Spr (Staff)

URBANST 201. Preparation for Senior Project

(Same as SOC 201) First part of capstone experience for Urban Studies majors pursuing an internship-based research project or honors thesis. Assignments culminate in a research proposal, which may be submitted for funding. Students also identify and prepare for a related internship, normally to begin in Spring Quarter in URBANST 201B or in Summer. Research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Service Learning Course (certified by Haas Center).

5 units, Win (Kahan, M)

URBANST 201A. Capstone Internship in Urban Studies

Restricted to Urban Studies majors. Students work at least 80 hours with a supervisor, establish learning goals, and create products demonstrating progress. Reflection on service and integration of internship with senior research plans. Must be completed by start of Winter Quarter senior year. May continue for additional quarter as 194. Service Learning Course (certified by Haas Center). Corequisite: URBANST 201 or consent of instructor.

3 units, Aut (Kahan, M), Win (Kahan, M), Spr (Kahan, M)

URBANST 201B. Capstone Internship Seminar

Students carry out an internship of at least 80 hours with a community organization or government agency. Class meets weekly to discuss related issues, including ethics of service, combining service and research, navigating organizational dynamics, and setting and accomplishing internship goals. Students submit internship agreement and internship-related deliverables, and give in-class presentations.

3-4 units, Spr (Kahan, M)

URBANST 202. Preparation for Honors Thesis

(Same as SOC 202) Primarily for juniors in Sociology; sophomores who plan to be off-campus Winter Quarter of their junior year may register with consent of instructor. Students write a research prospectus and grant proposal, which may be submitted for funding. Research proposal in final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research.

5 units, Win (McAdam, D)

URBANST 203. Senior Seminar

Conclusion of capstone sequence. Students write a substantial paper based on the research project developed in 201 or 202. Students in the honors program may incorporate paper into their thesis. Guest scholar chosen by students. WIM

5 units, Aut (Kahan, M)

WRITING AND RHETORIC, PROGRAM IN (PWR) COURSES

UNDERGRADUATE COURSES IN WRITING AND RHETORIC, PROGRAM IN

Primarily for undergraduates; graduate students may enroll with consent of adviser.

PWR 1AH. Writing & Rhetoric 1: The Rhetoric of American Multicultural Experience

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of multicultural experience and cultural as-

similation, focusing on the theme of social acceptance. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Heredia, A)

PWR 1AO. Writing & Rhetoric 1: Visual Rhetoric Across the Globe: Capturing Culture in Images
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of styles of leadership across the globe and communication strategies used to bring about change. Exploration of how global leaders learn cross-cultural rhetoric skills to adapt to dynamic and unfamiliar situations. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (O'Brien, A), Spr (O'Brien, A)

PWR 1CA. Writing & Rhetoric 1: The Rhetoric of Gaming
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include how gameplay in a variety of genres operates as argument about cultural values and how games function as sites of community building, social networking, and learning. Students produce research-based arguments on these issues and merge practice and production in storyboarding rhetorically persuasive games. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Alfano, C), Spr (Alfano, C)

PWR 1CR. Writing & Rhetoric 1: Writing Nature: Discourses in Ecology, Culture, and Technology
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Inquiry into human relationships with nature and how these influence ethical choices and social justice. Service Learning Course (certified by Haas Center). See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Ross, C)

PWR 1D. Writing Well: An Introduction to College Writing
Offered only to participants in the Summer College for High School Students. Writing 1D develops critical reading, writing, and research skills applicable to any area of study. Emphases include close reading, analysis of varied texts, development of strong theses, revision strategies, and introduction to research-based argument. Classes are small, encouraging extensive interaction between students and instructors. Classes feature discussions of readings, peer work, and individual conferences with instructors. Each section of Writing 1D will have a thematic emphasis developed by the instructor; students choose sections based on their individual interests. (Writing 1D does not meet the Stanford first-year writing requirement.)
3 units, Sum (Brawn, S)

PWR 1DC. Writing & Rhetoric 1: Is This What a Feminist Looks Like? Race/Gender in the Obama Age
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the coverage of and activism in a post-racial U.S., including evaluation of the debate over the intersections of racial activism and feminist activism in U.S. politics. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1DCA. Writing & Rhetoric 1: Tell Me a Story: Rhetoric of Narrative & Knowledge from fMRIs to Fiction
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Inquiry into the nature of storytelling and its uses in the work of biologists, lawyers, philosophers, and historians. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Carluccio, D), Spr (Carluccio, D)

PWR 1DH. Writing & Rhetoric 1: The Virtue of Vice and the Vice of Virtue: The Rhetoric of Criminality
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students investigate language and images that construct criminals, analyzing how these representations shape personal and cultural beliefs. Analysis of the costs and benefits of retributive, restorative, and transformative justice systems. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Hunter, D)

PWR 1DW. Writing & Rhetoric 1: Gangsters, Glamor Girls, Golddiggers: Dialectic of U.S. Culture and Hollywood
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of American film and its conversation with American culture. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Walter, D), Win (Walter, D), Spr (Walter, D)

PWR 1GAC. Writing & Rhetoric 1: Protest Art!: The Rhetoric of Art as Social Activism
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of art in drawing our attention to social issues such as racism, poverty, sexism, and homophobia and in moving us to social action. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GAF. Writing & Rhetoric 1: Little Boxes: The Rhetoric of the American Suburb
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the suburbs as a site of cultural debate through investigation of the ways that authors and artists imagine the physical landscape of the suburb and the inner lives of suburbanites. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GAJ. Writing & Rhetoric 1: The Rhetoric of Adrienne Johnson
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Johnson, A), Spr (Johnson, A)

PWR 1GAT. Writing & Rhetoric 2: The Rhetoric of Amir Tevel
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Tevel, A), Spr (Tevel, A)

PWR 1GAW. Writing & Rhetoric 1: Global Exchange: Rhetoric in a World Context
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. The American cultural apparatus, its limitations, and development of other world views. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Watters, A), Spr (Watters, A)

PWR 1GAZ. Writing & Rhetoric 1: From Cradle to Grave: The Rhetoric of Age and Aging
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the history of aging in America; developments in reproductive science; the proverbial mid-life crisis; and how people cope with the ultimate horizon of death. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 1GBJ. Writing & Rhetoric 1: Rhetoric of Brian Johnsrud
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with in-

structor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Johnsrud, B), Spr (Johnsrud, B)

PWR 1GBW. Writing & Rhetoric 1: The Rhetoric of Benjamin Wiebracht
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Wiebracht, B), Spr (Wiebracht, B)

PWR 1GCJ. Writing & Rhetoric 1: El Otro Lado / The Other Side: The rhetoric of real and imagined borders
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. The physical border between the United States and Mexico is the focus of the examination of the artistic, scholarly, and political rhetoric of real and imagined borders. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GCX. Writing & Rhetoric 1: "I Do": The Rhetoric of Consent
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the idea of consent and the underlying principles of free will and autonomy in the fields of law, intellectual property, marriage contracts, political philosophy, medical ethics, and sex. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GCZ. Writing & Rhetoric 1: The Rhetoric of Connie Zhu
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Zhu, X), Spr (Zhu, X)

PWR 1GDM. Writing & Rhetoric 1: Whose Streets? Our Streets!: The Rhetoric of Protest
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. History of protest and analysis of protest as a rhetorical device meant to draw attention to injustice. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GER. Writing & Rhetoric 1: The Rhetoric of Social Media
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the multifaceted and hypertextual rhetoric of social media, the intersection between rhetoric and social media, and how new types of online media have heightened participation, openness, and a sense of community. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GGH. Writing & Rhetoric 1: Understanding American Political Speeches of the 20th and 21st Centuries
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Rhetorical analyses of speeches by a range of 20th-century American political figures and the political rhetoric of the present day. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GHJ. Writing & Rhetoric 1: The Rhetoric of The Economist
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the strategies that produce The Economist magazine¿s rhetorically effective yet anonymous voice. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Janiszewska, H)

PWR 1GIF. Writing & Rhetoric 1: Dark Humor: A Rhetoric of Social Taboos
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of dark humor as it deals with the most delicate subject matter, topics we designate as sacred and beyond criticism: violence and bodily damage, illness, aging and death, race and ethnicity, and gender and sexuality. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Fernandez, I)

PWR 1GJE. Writing & Rhetoric 1: Gay Ghettoes, Queer Hoods: The Rhetoric of Race and Urban Sexual Subcultures
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the rhetoric of urban sexual subcultures, and how the rhetoric in medical science, journalism, and popular entertainment defines queers of color in intellectual thought and pop culture. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GJM. Writing & Rhetoric 1: The Rhetoric of Joshua Mann
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Mann, J), Spr (Mann, J)

PWR 1GJS. Writing & Rhetoric 1: The Rhetoric of Jonathan Sensenbaugh
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Sensenbaugh, J), Spr (Sensenbaugh, J)

PWR 1GJW. Writing & Rhetoric 1: Rhetoric of Jessica Weare
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Weare, J), Spr (Weare, J)

PWR 1GLA. Writing & Rhetoric 1: The Rhetoric of Lucy
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Alford, L), Spr (Alford, L)

PWR 1GLD. Writing & Rhetoric 1: The Cyborg Body: The Rhetoric of Disability
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of ¿disability,¿ using the analogy of the cyborg, in an era when the human body has become plastic, digitized and surgically manipulated. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GLL. Writing & Rhetoric 1: Wow, that's so postcard: The Rhetoric of Tourism
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of tourism as a way of seeing and representing the rest of the world and oneself, touching on some of the most pressing political, economic, and cultural questions facing an in-

creasingly globalized world. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GM. Writing & Rhetoric 1: Anywhere That Is Wild: The Making and Unmaking of Rhetoric
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the tension between reverence and science, language and feeling, natural and unnatural in the interrelationship of rhetoric and nature. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Moyer, G)

PWR 1GMR. Writing & Rhetoric 1: Fearful Symmetry: The Rhetoric of the Double
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the fictions of the double and the philosophies of personal identity, and how both anticipate and condition contemporary responses to the twin issues of human cloning and intellectual property. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Reid, M), Win (Reid, M), Spr (Reid, M)

PWR 1GMV. Writing & Rhetoric 1: Don't Take it Personally!: The Rhetoric of The Insult
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of how insults function rhetorically in specific situations and how they have catalyzed prolonged confrontations around race, education, politics, sexual orientation, and national standing. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GMW. Writing & Rhetoric 1: The Rhetoric of Meredith Wallis
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Wallis, M), Spr (Wallis, M)

PWR 1GMX. Writing & Rhetoric 1: "Too Much Information?": The Rhetoric of Social Networking & Online Privacy
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Critical analysis of the ways in which online life intersects with real life around issues including privacy, authorship, and morality. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Vega, M), Win (Vega, M), Spr (Vega, M)

PWR 1GNL. Writing & Rhetoric 1: The Rhetoric of Nathaniel Landry
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Landry, N), Spr (Landry, N)

PWR 1GRA. Writing & Rhetoric 1: Millions Like Us: The Rhetoric of Crowds
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include symbolic meaning of rock, sports, and political events; virtual crowds online; and use of crowds to shape ideology. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 1GRH. Writing & Rhetoric 1: 2012 & the Rhetoric of Apocalypse
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of apocalypse as a cultural phenomenon. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GRL. Writing & Rhetoric 1: The Rhetoric of Rhiannon Lewis
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Lewis, R), Spr (Lewis, R)

PWR 1GRN. Writing & Rhetoric 1: Lasting Only One Day: The Rhetoric of Ephemera and Other Discarded Things
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of ephemera and how they argue for their meaning as they collect and preserve the past while reflecting humantransience. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GRY. Writing & Rhetoric 1: Rhetoric of Ryan Haas
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Haas, R), Spr (Haas, R)

PWR 1GSA. Writing & Rhetoric 1: The Rhetoric of Sami
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Amad, Y), Spr (Amad, Y)

PWR 1GSD. Writing & Rhetoric 1: Masters of Style - The Rhetoric of Sophistication
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of how style is mastered and deployed in a range of genres. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Dippold, S)

PWR 1GTM. Writing & Rhetoric 1: The Rhetoric of Taste
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the rhetoric of taste as the luxurious product of a sophisticated society and as tedious, stultifying, snobby, or outright offensive. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GTX. Writing & Rhetoric 1: 'Making My Way Downtown': The Rhetoric of the City
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Through historic, literary, journalistic, and film portrayals of city life, we will analyze the idea of 'the city' as constructed through media and in the imaginations of its residents, and the way life in cities is really lived. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1GVC. Writing & Rhetoric 1: The Rhetoric of Vanessa
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Chang, V), Spr (Chang, V)

PWR 1HR. Writing & Rhetoric 1: Fake News and the Rhetoric of "Truthiness"
Development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Critical analysis of the fake news phenomenon, considering its impact on the political process and how we discuss important issues of the day. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Rytkonen, H)

PWR 1JB. Writing & Rhetoric 1: From Mad Cow to Mad Corn: The Rhetoric of Food Science and Politics
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include how activists, nutritionists, food scientists, chemical companies, and legislative bodies articulate their concerns and argue their positions and how agribusiness and government respond to consumer concerns about food produced with the aid of chemicals. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Bleakney, J), Spr (Bleakney, J)

PWR 1JH. Writing & Rhetoric 1: Lies and the Lying Liars Who Tell Them: Rhetoric and Deception
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of untruth, misrepresentation, and deception in journalistic and scientific rhetoric. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1JL. Writing & Rhetoric 1: Rhetoric and Humanitarian Intervention
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of how media representations of world crises are crafted to persuade us to action, appealing to our senses of justice, pragmatism, outrage, and compassion. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Lee, J)

PWR 1JP. Writing & Rhetoric 1: The Rhetoric of Consumer Culture
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students explore what consumerism says about the larger culture and the segmented groups within it, analyzing popular and scholarly texts as well as current trends in pop culture, to research how the activities of consumerism shape culture. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Peterson, J), Win (Peterson, J)

PWR 1JT. PWR 1: RHETORIC HEALTH CARE
4 units, not given this year

PWR 1KB. Writing & Rhetoric 1: Authentic Experience: The Rhetoric of Tourism
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Staff), Win (Staff), Spr (Staff)

PWR 1KD. Writing & Rhetoric 1: Writing About Crisis: Feature Article Essays
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. How various feature article writers argue the issues of soaring energy and food prices, serious market volatility, climate change, an ongoing war in the Middle East, and how terms like ¿crisis¿ or ¿change¿ impact the discussion. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (DiPirro, K)

PWR 1KE. Writing & Rhetoric 1: The Science of Sports
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include sports at the level of cells and psychology, the science of sports equipment and sports spaces, the ethics of performance enhancement, and sports-related research projects on the Stanford campus. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Spr (Myers, K)

PWR 1KM. Writing & Rhetoric 1: If These Walls Could Talk: The Rhetoric of Places and Spaces
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Explores the ¿language¿ of man-made environments such as universities, theme parks, monuments, shopping malls, museums, and public buildings. Students analyze space through physical exploration and critical inquiry and discover the applications of rhetoric not only to traditional texts but to physical structures and spaces as well. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Spr (Moekle, K)

PWR 1KMA. Writing & Rhetoric 1: Metaphor and Motion: The Rhetoric of Sacred Space
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 1KS. Writing & Rhetoric 1: Imagining Others: 21st Century Cosmopolitanism
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of cosmopolitanism, questions related to globalization, nationalism, citizenship, cultural values, aesthetics, and identity. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Savelson, K)

PWR 1LK. Writing & Rhetoric 1: The Rhetoric and Politics of Satire
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Explores the ways that satirists use irony, exaggeration, and humor--among other rhetorical techniques--to make serious statements about the world. Juxtaposes historical and recent satirical writing to illuminate intellectual problems that are thousands of years old and sharply contemporary. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 1LKA. Writing & Rhetoric 1: Rhetoric, Social Media, and Virtual Worlds
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the effects of social media and how we shape our identities and develop new habits of mind when we enter virtual worlds. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Konstantinou, L), Win (Konstantinou, L), Spr (Konstantinou, L)

PWR 1MF. Writing & Rhetoric 1: The Rhetoric of Urban Life
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Feldman, M)

PWR 1MJ. Writing & Rhetoric 1: Rock 'n' Rhetoric
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include rhetorical strategies and meaning of the lyrics of songs with multiple interpretations and how rock musicians construct arguments in their songs. Analysis of how sur-

rounding cultural and historical contexts influence the significance and meaning of rock songs. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, Aut (Ford, M), Win (Ford, M)

PWR 1PB. Writing & Rhetoric 1: Supreme Court Rhetoric

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of Supreme Court opinions, ¿amicus curiae¿ briefs, editorials about Court opinions, and pertinent lower court decisions. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Win (Bator, P)

PWR 1PH. Writing & Rhetoric 1: He Said, She Said: The Rhetoric of Gender Politics

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the ways in which news articles, movie clips, magazine advertisements, television commercials, and other texts present gender roles, and how the roles and bodies of both sexes are presented as objects open to scrutiny, critique, exploitation, abuse, and awe. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, Win (Hanlon-Baker, P)

PWR 1RT. Writing & Rhetoric 1: The War Between Wars: the "isms" of modernism

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of modernism in art, literature, and thought between the two world wars. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Aut (Taylor, R)

PWR 1SB. Writing & Rhetoric 1: Machine Dreams: The Rhetoric of Technology

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the arguments we make about technology, the arguments various technologies produce about us, and the ways in which rhetoric itself might be productively viewed as a technology for producing arguments. Students explore the social, economic, political, and psychological consequences of rapidly developing technologies. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, Spr (Brawn, S)

PWR 1SH. Writing & Rhetoric 1: Strange Art, Stranger Politics: Absurdism and the Rhetoric of Social Action

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the benefits and drawbacks of deploying strange art as artistic and political protest, how breaking the aesthetic rules sometimes serves to argue for social change, and how absurdist protests succeed or fail to gain social traction. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, not given this year

PWR 1SL. Writing & Rhetoric 1: New Media Rhetoric and Web 2.0

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students define new media and debate the ideas of web 2.0; the virtue of Web 2.0 in digital game modifications and the potential subversive effects of web 2.0 on advertising restrictions; and look into the possibilities and limitations of democracy 2.0. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, not given this year

PWR 1SLA. Writing & Rhetoric 1: "Advertising R Us": The Rhetoric of Advertising

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Aut (Lee, S)

PWR 1SM. Writing & Rhetoric 1: The Elephant, the Tiger, and the Cellphone: Rhetoric of India and Indian Film

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the rhetoric of the India of the new millennium, including issues of gender, caste, class, religion, sexuality, nationalism, diaspora, outsourcing, and globalization. Service Learning Course (certified by Haas Center). See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Spr (Mediratta, S)

PWR 1SMA. Writing & Rhetoric 1: Humans and Things: The Rhetoric of Commodities and Commodification

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, not given this year

PWR 1SMB. Writing & Rhetoric 1: The Jewel in the Crown: The Rhetoric of (Post)Colonialism

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, not given this year

PWR 1SS. Writing & Rhetoric 1: Soap Operas and Soapboxes: The Rhetoric of Performance

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students explore identity as a social, political, and cultural performance; how different situations call for particular styles of rhetorical performance; and how people evaluate and analyze different types of performances, including artistic and political performances, as well as the performances of everyday life. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, not given this year

PWR 1SSA. Writing & Rhetoric 1: Real and Imagined Lives: Narrative, Rhetoric, and Identity

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of identity as constructed in a range of narrative forms including fiction, memoirs, political campaigns, and social media. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Aut (Schuyler, S)

PWR 1SU. Writing & Rhetoric 1: The World According to Bollywood: Indian Cinema and its Representations

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of representations of India¿s culture through Indian film and how such representations have coincided with India¿s economic success overthe last two decades of the twentieth century, giving rise to a new trend in global popular culture. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, not given this year

PWR 1SUA. Writing & Rhetoric 1: Such a Long Journey: South Asian Diaspora in the World

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

4 units, Win (Chakravarty, S)

PWR 1SW. Writing & Rhetoric 1: Scandals, Private Lives, and Public Faces: The Rhetoric of Stanford
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the early history and rhetoric of the ¿public face¿ of Stanford University, from the post-Gold Rush and Big Four railroad era to the building of the University See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Wyle, S)

PWR 1WG. Writing & Rhetoric 1: Reading Minds: The Rhetoric of Consciousness
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of states of mind ranging from the radical self-possession cultivated through practice to altered states induced through drugs and trauma, illness, and religion. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Goldberg, W), Spr (Goldberg, W)

PWR 2AH. Writing & Rhetoric 2: Ethnic Narratives and the Rhetoric of American Identity
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how race and ethnicity in America have become subjects of personal negotiations and public perception. Addresses various topics such as biracial and bicultural identity, acculturation, and stereotyping. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Heredia, A), Spr (Heredia, A)

PWR 2AO. Writing & Rhetoric 2: Rhetoric and Global Leadership
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of styles of leadership across the globe and communication strategies used to bring about change. Exploration of how global leaders learn cross-cultural rhetoric skills to adapt to dynamic and unfamiliar situations. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (O'Brien, A), Win (O'Brien, A), Spr (O'Brien, A)

PWR 2CA. Writing & Rhetoric 2: Networked Rhetoric: Social Networks, Participatory Media and the Future of Wr
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the issues surrounding participatory media and social networking in contemporary digital culture from the perspective of both theory and practice. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Staff)

PWR 2CR. Writing & Rhetoric 2: Revolutions in Environmental Rhetoric
Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of the motivations and appeals of environmental arguments, considering underlying assumptions and contexts of time, culture, audience, purpose, and mode of delivery. Participation in Community Writing Project, working with local nonprofit environmental organizations to produce real-world writing, multimedia, and/or speaking projects on these organizations' behalf. Work in the community will form the basis of the major research project. Service Learning Course (certified by Haas Center). Prerequisite: PWR 1. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Win (Ross, C), Spr (Ross, C)

PWR 2CRA. Writing & Rhetoric 2: The State of California: Rhetoric of a Dream
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Service Learning Course (certified by Haas Center). See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2DC. Writing & Rhetoric 2: The Popular Science of Sex
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the intersection between social debate and scientific research about sex and gender; how social debates draw on, represent, respond to, and influence scientific studies; and how the process shapes our knowledge and beliefs about sex and gender. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 2DCA. Writing & Rhetoric 2: Race/Gender in the "Obama Age"
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of perceptions of race and gender seen through the political lens of the 2008 presidential campaign. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units

PWR 2DH. Writing & Rhetoric 2: Me and My iPod: The Rhetoric of Identity
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the message, performance, and construction of identity, electronic renditions of the self, and the constant or changing nature of identity. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Hunter, D)

PWR 2DHA. Writing & Rhetoric 2: Scholar Activists Fix the World? The Rhetoric of Scholarship and Activism
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Hunter, D)

PWR 2GAW. Writing & Rhetoric 2: Rhetoric in a World Context
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. ¿ See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Staff)

PWR 2GM. Writing & Rhetoric 2: Unpredictable Dialogue: Art of the Essay, Art of the Interview
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the rhetorical craft of the interview, exploring structure, language, timing, and development in a range of forums, including documentaries, radio, transcription, campus conversations, and television. Research of a Stanford professor¿s work, including interview. Presentation of findings from research and interview to the class. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Moyer, G), Spr (Moyer, G)

PWR 2HR. Writing & Rhetoric 2: What's So Funny? Humor, Race, Class and Gender
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of cartoons and jokes about and by feminists, LGBTs, ethnic minorities, and rednecks. Discussion of how jokes reflect important moral values about race, sex, gender, and religion. Exploration of how satire works as social criticism. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Win (Rytkonen, H), Spr (Rytkonen, H)

PWR 2JB. Writing & Rhetoric 2: Rhetoric of Ethics in Research and Technology
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the rhetoric of ethical discourse, including the ethical standards guiding research at Stanford and examples of ethical misconduct. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Bleakney, J)

PWR 2JH. Writing & Rhetoric 2: Cred: Rhetoric and Credibility in Research, Politics, and Everyday Life
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Work on making students more effective researchers and communicators in their areas of interest, with a focus on gaining and projecting credibility. Exploration of how speakers and writers gain and lose credibility, how people evaluate the credibility of others, and how the rules of credibility are different in politics, in scholarship, and in popular culture. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 2JL. Writing & Rhetoric 2: Doomsday Rhetoric
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Investigation of how the doomsday epic expresses real concerns emerging from fields like technology, environmental studies, pathobiology, and politics. Consideration of apocalypticism as a mode of argument. Examination of how belief in the imminent destruction of the present world order influences our political decisions and personal behavior. Topics in religious eschatology and apocalypticism illuminate the genre¿s origins. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, not given this year

PWR 2JLA. Writing & Rhetoric 2: Speaking About Art: Narrating the Collections of the Cantor Art Center
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration and theory of successful strategies of oral communication, considering how words and images (in this case works of art) work together to create meaning, culminating in creation of an audio guide for the Cantor Arts Center. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2JLB. Writing & Rhetoric 2: Rhetoric and Education Reform
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of social, ideological, and pedagogical perspectives on education reform. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Lee, J), Win (Lee, J)

PWR 2JP. Writing & Rhetoric 2: Marketing Imagination: The Rhetoric of Creativity and Commerce
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of unspoken rules regarding the separation of creativity and commerce and arguments about how consumer culture influences the work of the artist. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Peterson, J)

PWR 2JT. PWR 2: RHETORIC OF MEDICINE
4 units, Spr (Staff)

PWR 2KD. Writing & Rhetoric 2: Performing Writing: Drama and the New Media
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the application of performance techniques makes academic or professional presentations more compelling. Scripting and delivering of group research projects. Research in new forms of media, analysis of how the conventions of a particular medium affect the content of the message. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (DiPirro, K), Win (DiPirro, K)

PWR 2KE. Writing & Rhetoric 2: Olympic Rhetoric: Studying the Spirit of the Games
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of Olympic media, looking specifically at race and gender in Olympic coverage; technological innovation and ethics in the Games; and Olympic history. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2KEA. Writing & Rhetoric 2:Competitive Women: Opportunity, Exposure, and Resistance in the World of Sports
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of women in sports, looking specifically at issues of opportunity, exposure, and resistance; arguments made by, for, and against women playing sports; and the fight for equality in sports. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Myers, K)

PWR 2KEB. Writing & Rhetoric 2: Sports Appeal: Packaging and Promoting Stanford Athletics
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Myers, K)

PWR 2KM. Writing & Rhetoric 2: A Planet on Edge: The Rhetoric of Sustainable Energy
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Focus on the rhetoric and ethics of ¿sustainable energy,¿ investigating both the alarmism and optimism which fuel this debate. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Moekle, K), Win (Moekle, K)

PWR 2KMA. Writing & Rhetoric 2: Natural Enemies: The Rhetoric of Invasion Biology
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the use of metaphors and argument in the context of invasion biology and species conservation, especially the effects those metaphors and claims have on practice and policy outcomes. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html
4 units, not given this year

PWR 2KS. Writing & Rhetoric 2: Happy Now? The Anatomy of Happiness
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. How the emerging field of happiness studies involves psychologists, economists and policy-makers in defining what happiness is and determining how society might create the conditions in which it can flourish. Exploration of how happiness studies can uncover happiness at the heart of arguments about democracy, religion, and personal lifestyles, exploring what makes people happy across cultural, social, and national contexts. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Savelson, K), Spr (Savelson, K)

PWR 2LK. Writing & Rhetoric 2: Rhetoric in Crisis!
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Konstantinou, L)

PWR 2MF. Writing & Rhetoric 2: Speaking About Art: Narrating the Cantor's Collections
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of strategies for developing museum audio guides, including analysis of existing guides and behind-the-scenes work in the Cantor Arts Center. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Feldman, M)

PWR 2MFA. Writing & Rhetoric 2: Searching for San Jose: Urban Studies Audio Walking Tours
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Feldman, M)

PWR 2MR. Writing & Rhetoric 2: Sex Appeals: the Rhetoric of Lust
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. . See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Spr (Reid, M)

PWR 2PB. Writing & Rhetoric 2: The Power of Political Photography
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Topics include the role of photographers and photo-journalists in helping viewers see the world differently and the political implications of fashion photography, environmental photography, music photography, and fashion photography. Traditional readings as well as archival and field research. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Bator, P), Spr (Bator, P)

PWR 2PH. Writing & Rhetoric 2: Equal Treatment: The Rhetoric of Public Health
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of how public health discourses influence policymaking, practitioners, and community members, how the public understands the rhetoric of public health, and how that understanding affects public and government support of health-related research. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2PHA. Writing & Rhetoric 2: You Go Girl: The Rhetoric of Gender Equality
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Hanlon-Baker, P)

PWR 2RT. Writing & Rhetoric 2: Stepping Out of the Shadows: Music, Bass Guitar, and the Rhetoric of Revoluti
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of how the emergence of the electric bass in the fifties helped usher in a revolution that challenged commonplace assumptions concerning nationality, race, gender, and sexuality. Exploration of the history of the electric bass as a case study of musical revolutions, focusing on how music revolutions reflect emerging ideologies in any given culture. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Spr (Taylor, R)

PWR 2RTA. Writing & Rhetoric 2: Postmodernism and the Rhetoric of Uncertainty
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Inquiry into major theories of the postmodern and analysis of postmodernism's effect on culture. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Taylor, R)

PWR 2SB. Writing & Rhetoric 2: Writing the Future: The Rhetoric of Popular Science and Science Fiction
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of science fiction and popular writing about science and technology as arguments about where we are headed, where we are, who we are, and what we value. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Aut (Brawn, S), Win (Brawn, S), Spr (Brawn, S)

PWR 2SH. Writing & Rhetoric 2: The Ugly American: Tourism and the Rhetoric of Power
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of the Ugly American in aesthetics and culture, in films and novels, tourist locations and business conferences, to illuminate America¿s complex role in the world. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2SL. Writing & Rhetoric 2: Got Ads: Visual Design in Print Advertising
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Introduction to the rhetorical interplay of visuals, text, and design layout in print advertising, and narrative, classificatory, and dynamic patterns in print advertisement campaigns. Culminates in design and presentation of an original ad campaign. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Lee, S), Spr (Lee, S)

PWR 2SM. Writing & Rhetoric 2: Dirty, Pretty Things: The Rhetoric of Objects and Objectification
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of objects and objectification, from the relationships shared by cultures, objects, and people to how human beings have been objectified through colonialism, enslavement, sex-trafficking, and organ trade. Material objects discussed in terms of staging, collecting, design, location, inheritance, and cultural meaning. Service Learning Course (certified by Haas Center). See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Win (Mediratta, S)

PWR 2SMA. Writing & Rhetoric 2: Love and Longing in Bombay: Romance and Rebellion in Indian Film
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2SS. Writing & Rhetoric 2: The Rhetoric of Mass Audiences
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the ability to reproduce a work for increasingly large audiences has fundamentally changed the nature of art and its effect on culture. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, Win (Schuyler, S), Spr (Schuyler, S)

PWR 2SSA. Writing & Rhetoric 2: Rhetoric of Reality Culture
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. ¿. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
4 units, not given this year

PWR 2SU. Writing & Rhetoric 2: Hollywood Bollywood: Rhetoric of India in Global Cinema
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the rhetoric of India is constructed for an international audience through films and how such representations have coincided with India¿s recent economic success to give rise to a new trend in global popular culture. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
4 units, Aut (Chakravarty, S), Spr (Chakravarty, S)

PWR 2SW. Writing & Rhetoric 2: The Rhetoric of World War II: Strategies of Persuasion in War Time
Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Through work with the Hoover Archives, exploration of how written, visual, and film sources were used by a variety of countries to influence their citizens during WWII. Topics include the rhetoric of eugenics, politi-

cal speeches, war posters, and how advertising during WWII pursued clear agendas to support government goals. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, Aut (Wyle, S), Win (Wyle, S)

PWR 2WG. Writing & Rhetoric 2: All That Jazz: The Rhetoric of American Musical Theater

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the conventions and strategies that define the genre of American musical theater. Analysis of how contemporary musicals mirror, revise, and even subvert traditional rules while addressing a range of current issues. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.

4 units, Aut (Goldberg, W), Win (Goldberg, W), Spr (Goldberg, W)

PWR 4. Directed Writing

Further work on developing writing. Analysis and research-based argument, writing for a range of audiences and in varied disciplinary contexts. Workshops and individual conferences. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

3-4 units, not given this year

PWR 5. Independent Writing

Individual writing project under the guidance of a PWR instructor. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

1-5 units, Aut (Diogenes, M), Win (Diogenes, M), Spr (Diogenes, M), Sum (Staff)

PWR 6. Writing Workshop

1-2 units, Aut (Diogenes, M), Win (Staff), Spr (Staff)

PWR 91. Intermediate Writing

For students who have completed the first two levels of the writing requirement and want further work in developing writing abilities, especially within discipline-specific contexts and nonfiction genres. Individual conferences with instructor and peer workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

3 units, Spr (Staff)

PWR 191. Advanced Writing

Open to undergraduates and graduate students. Crafting nonfiction prose in a range of genres. Focus is on the relationship of genre and form; attention to developing stylistic versatility. Individual conferences with instructor. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

3 units, not given this year

PWR 192. Projects in Research, Writing, and Rhetoric

Advanced work on research projects, early drafts of theses, proposals. Shared work, discussions, and examination of methods, rhetorics, and styles in all disciplines. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

1-5 units, not given this year

PWR 193. Writing the Honors Thesis

For students from all majors in the process of writing an honors thesis. Review of key elements of thesis process, including literature reviews, structure, argumentation, style, and documentation. Group and individual workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

1-5 units, not given this year

PWR 194. Topics in Writing and Rhetoric: Law and the Rhetorical Tradition

(Same as LAW 304.) Interdisciplinary seminar. The rhetorical underpinnings of legal argument. Goal is understanding rhetoric as readers and interpreters of legal texts and to develop skills as writers and speakers. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

4 units, Win (Staff)

PWR 195. Writing Center Peer Tutor Seminar

(Same as ENGLISH 195W) For students selected to serve as peer writing tutors in the Stanford Writing Center and/or at other campus sites. Readings on and reflection about writing processes, the dynamics of writing and tutoring situations, tutoring techniques, learning styles, diversity, and ethics. Observation of tutoring sessions, written responses to readings, and other written work.

3 units, Spr (Lunsford, A)

CENTERS, LABORATORIES, AND INSTITUTES

Independent research laboratories, centers, and institutes perform multidisciplinary research that extends beyond the scope of any one of the University's organized schools. Consult the links below for full information on these units.

Information on academic programs for undergraduates is provided by following the links on the right.

OFFICE OF VICE PROVOST AND DEAN OF RESEARCH

Vice Provost and Dean of Research and Dean of the Independent Laboratories, Centers, and Institutes: Ann M. Arvin
Offices: 450 Serra Mall, Main Quadrangle, Building 60
Mail Code: 94305-2064
Office Phone: 650-723-8789
Office Fax: 650-723-0662
Web Site: http://stanford.edu/dept/DoR

The following independent Laboratories, Centers, and Institutes report to the Vice Provost and Dean of Research:

BIOLOGICAL AND LIFE SCIENCES

- Bio-X, the interdisciplinary program related to bioengineering, biomedicine, and biosciences, http://biox.stanford.edu
- Spectrum (formerly the Stanford Center for Clinical and Translational Education and Research), http://spectrum.stanford.edu

ENVIRONMENTAL SCIENCES

- Precourt Institute for Energy, http://pie.stanford.edu/
  - Precourt Energy Efficiency Center, http://peec.stanford.edu
  - Global Climate and Energy Project (G-CEP), http://gcep.stanford.edu
- Woods Institute for the Environment, http://woods.stanford.edu

HUMANITIES AND SOCIAL SCIENCES

- Center for Advanced Study in the Behavioral Sciences (CASBS), http://www.casbs.org
- Center for the Study of Language And Information (CSLI), http://www-csli.stanford.edu
- Freeman Spogli Institute for International Studies (FSI), http://fsi.stanford.edu
  - Center on Democracy, Development, and the Rule of Law (CDDRL), http://cddrl.stanford.edu
  - Stanford Health Policy (Center for Health Policy/Center for Primary Care and Outcomes Research), http://healthpolicy.stanford.edu
  - Center for International Security and Cooperation (CISAC) http://cisac.stanford.edu
  - Walter H. Shorenstein Asia-Pacific Research Center (Shorenstein APARC), http://aparc.stanford.edu
  - The Europe Center, http://fce.stanford.edu
  - Program on Food Security and the Environment, http://fse.stanford.edu
  - Inter-University Center for Japanese Language Studies (IUC), http://www.stanford.edu/dept/IUC
  - Program on Energy and Sustainable Development (PESD), http://pesd.stanford.edu
  - Stanford Program on International and Cross-Cultural Education (SPICE), http://spice.stanford.edu
- Human-Sciences and Technologies Advance Research Institute (H-STAR), http://hstar.stanford.edu
  - Media-X, http://mediax.stanford.edu
  - Stanford Center for Innovations in Learning (SCIL), http://scil.stanford.edu
- Stanford Center on Longevity (SCL), http://longevity.stanford.edu
- Stanford Humanities Center, http://shc.stanford.edu
- Stanford Institute for Economic Policy Research (SIEPR), http://siepr.stanford.edu

PHYSICAL SCIENCES

- Edward L. Ginzton Laboratory, http://stanford.edu/group/ginzton
- Geballe Laboratory for Advanced Materials (GLAM), http://stanford.edu/group/glam
- Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), http://www-group.slac.stanford.edu/kipac, operated jointly with SLAC National Accelerator Laboratory
- Photon Ultrafast Laser Science and Engineering (PULSE), http://pulse.slac.stanford.edu, operated jointly with SLAC National Accelerator Laboratory
- Stanford Institute for Materials and Energy Sciences (SIMES), http://simes.slac.stanford.edu, operated jointly with SLAC National Accelerator Laboratory
- W. W. Hansen Experimental Physics Laboratory (HEPL), http://hepl.stanford.edu http://hepl.stanford.edu

CENTERS REPORTING TO THE DEAN OF HUMANITIES AND SCIENCES

- Center for Space Science and Astrophysics, http://www.stanford.edu/group/CSSA
- Institute for Research in the Social Sciences (IRiSS), http://iriss.stanford.edu
  - Stanford Center for Population Research (SCPR) (web site in development)
  - Stanford Center for the Study of Poverty and Inequality (CPI), http://iriss.stanford.edu/CPI
  - Stanford Center for American Democracy (SCAD) (web site in development)
  - Stanford Center on Philanthropy and Civil Society (PACS), http://pacscenter.stanford.edu
  - Social Science History Program (SSHP), http://iriss.stanford.edu/sshp
- Michelle R. Clayman Institute for Gender Research, http://gender.stanford.edu
- Morrison Institute for Population and Resource Studies, http://www.stanford.edu/group/morrinst

OTHER ACADEMIC PROGRAMS AND CENTERS, AND INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

- Hoover Institution on War, Revolution and Peace, http://www.hoover.org
- SLAC National Accelerator Laboratory (SLAC), http://www.slac.stanford.edu
- Stanford Synchrotron Radiation Laboratory (SSRL), http://ssrl.slac.stanford.edu

CENTER FOR SPACE SCIENCE AND ASTROPHYSICS

Emeriti: (Professors) Robert Cannon, I-Dee Chang, Daniel B. DeBra, W.Gary Ernst, Von R. Eshleman, Robert A. Helliwell, Bruce B. Lusignan, Ronald J. P. Lyon, Laurence A. Manning, Bradford W. Parkinson, J. David Powell, Peter A. Sturrock, G. Leonard Tyler, Robert V. Wagoner; *(Professors, Research)* Donald L. Carpenter, Aldo V. daRosa, Antony Fraser-Smith

Director: Roger W. Romani

Associate Directors: Umran S. Inan, Philip H. Scherrer

Professors: Roger Blandford (Physics, SLAC), Elliot Bloom (SLAC), Lambertus Hesselink (Electrical Engineering), Umran S. Inan (Electrical Engineering), Steven Kahn (Physics, SLAC), Tune Kame (SLAC), Peter F. Michelson (Physics), Vahé Petrosian (Physics), Roger W. Romani (Physics), Norman H. Sleep (Geophysics), Howard Zebker (Electrical Engineering, Geophysics)

Associate Professors: Tom Abel (Physics, SLAC), Steve Allen (Physics, SLAC), Sarah Church (Physics), Guenther Walther (Statistics)

Assistant Professors: Stefan Funk (Physics, SLAC), Chao-Lin Kuo (Physics, SLAC), Risa Wechler (Physics, SLAC)

Professors (Research): C-W. Francis Everitt (HEPL), Philip H. Scherrer (Physics)

Consulting Professor: Martin Walt (Electrical Engineering)

SLAC Staff Physicist: Grzegorz Madejski

Center Offices: Varian, Room 316

Mail Code: 94305-4060

Phone: (650) 723-1439

Email: danav@stanford.edu

Web Site: http://www.stanford.edu/group/CSSA

The Center for Space Science and Astrophysics is an interdepartmental organization coordinating research in space science and astrophysics. Its members are drawn from the Department of Geological and Environmental Sciences in the School of Earth Sciences; the departments of Aeronautics and Astronautics, Electrical Engineering, and Mechanical Engineering in the School of Engineering; the departments of Applied Physics, Physics, and Statistics in the School of Humanities and Sciences; the W. W. Hansen Experimental Physics Laboratory; and the SLAC National Accelerator Laboratory. Its membership also includes all faculty and appropriate staff at the Kavli Institute for Particle Astrophysics and Cosmology, located at SLAC and the Physics department.

The facilities of the center are available to any interested and qualified student, who must be admitted by and registered in a department. The departments of Aeronautics and Astronautics, Applied Physics, Electrical Engineering, Mechanical Engineering, and Physics offer opportunities leading to an M.S. or Ph.D. degree for work in space science or astrophysics. The center also offers opportunities to undergraduates who may, for instance, participate in research projects in their junior or senior years, on a part-time basis during the school year or on a full-time basis during the summer. The Astronomy Course Program operates a small student observatory where students may gain practical experience in astronomical observing.

FREEMAN SPOGLI INSTITUTE FOR INTERNATIONAL STUDIES (FSI)

The Freeman Spogli Institute for International Studies (FSI) provides opportunities for undergraduate research through the CISAC Interschool Honors Program in International Security Studies and the CDDRL Undergraduate Honors Program. For information on the institute that manages student fellowship programs, see http://fsi.stanford.edu/fellowships/.

INTERSCHOOL HONORS PROGRAM IN INTERNATIONAL SECURITY STUDIES

Co-Directors: Martha Crenshaw, Coit D. Blacker

The Center for International Security and Cooperation (CISAC) coordinates a University-wide Interschool Honors Program in International Security Studies. Students chosen for the honors program intern with a security-related organization, attend the program's honors college in Washington, D.C., in September, attend a year-long core seminar on international security research, and produce an honors thesis with policy implications. Upon fulfilling individual department course requirements and completing the honors program, students graduate in their major with a certificate in Honors in International Security Studies. To be considered for the program, students must demonstrate sufficient depth and breadth of international security course work. Successful applicants to the program are expected to have taken: POLISCI 114S, International Security in a Changing World; MS&E 193, Technology in National Security; and at least one related course such as ECON 150/PUBLPOL 104, Economic Policy Analysis; STS 110/MS&E 197/PUBLPOL 103B, Ethics and Public Policy; SOC 160, Formal Organizations; PUBLPOL 102/SOC 166, Organizations and Public Policy; POLISCI 110B, Strategy, War, and Politics; POLISCI 110D, War and Peace in American Foreign Policy; POLISCI 123/PUBLPOL 101, Politics and Public Policy; or POLISCI 114T, Major Issues in International Conflict Management.

Students in the program enroll in IIS 199, Interschool Honors Program in International Security Studies, in Autumn, Winter, and Spring quarters.

Information about and applications to this program may be obtained from the Center for International Security and Cooperation, C206-8 Encina Hall Central, telephone (650) 724-8055 or http://cisac.stanford.edu.

CENTER ON DEMOCRACY, DEVELOPMENT, AND THE RULE OF LAW (CDDRL) HONORS PROGRAM

The Center on Democracy, Development, and the Rule of Law (CDDRL) Honors Program provides students majoring in any Stanford academic department the opportunity to conduct an independent research project focused on issues of democracy, development, and the rule of law under CDDRL faculty guidance. Students interested in the program consult with their prospective honors advisers in their junior year and must submit their honors thesis proposal in the Spring Quarter of that year. Honors students present a formal defense of their theses in mid-May of the senior year. Prerequisites for the program are a 3.5 grade-point average, a strong overall academic record, and demonstrated skills in writing and conducting independent research.

Required course work includes INTNLREL 199, an honors research seminar that focuses on democracy, development, and the rule of law in developing countries, as well as INTNLREL/POLISCI 114D, CDDRL's flagship undergraduate lecture course taught every Autumn Quarter. Honors students meet weekly with faculty and their peers to present project theses and receive feedback during Autumn and Winter quarters of their senior year. Students must attend honors college in Washington D.C. with the program in September before Autumn Quarter classes begin.

For more information, contact the Center on Democracy, Development, and the Rule of Law, Encina Hall C100, phone (650) 724-7197; or see http://cddrl.stanford.edu.

WOODS INSTITUTE FOR THE ENVIRONMENT: GOLDMAN INTERSCHOOL HONORS PROGRAM IN ENVIRONMENTAL SCIENCE, TECHNOLOGY, AND POLICY

The Woods Institute for the Environment coordinates a University-wide interschool honors program in environmental science, technology, and policy. Undergraduates planning to participate in the honors program are required to pursue studies in environmental sciences, technology, and policy, with a concentration in a single discipline. After completion of the prerequisite units, students join small group honors seminars to work with faculty members in the environmental field on an honors thesis that incorporates both scientific principles and policy aspects of environmental issues.

Courses in environmental studies appear under the course listings of the schools of Earth Sciences, Engineering, and Humanities and Sciences. Information about and applications to this program may be obtained by phoning (650) 723-5697 and at http://woods.stanford.edu/education/goldman.

The Woods Institute provides support for student group projects focusing on the environment and sustainability. For details, see http://woods.stanford.edu/students/projects.html.

The Woods Institute also sponsors a weekly series of talks on a broad range of energy topics under the rubric of CEE/ENERGY 301, Energy Seminar. For more information, see http://woods.stanford.edu/cgi-bin/energyseminar.php.

LIBRARIES AND COMPUTING RESOURCES

STANFORD UNIVERSITY LIBRARIES AND ACADEMIC INFORMATION RESOURCES

University Librarian and Director of Academic Information Resources: Michael A. Keller
Web Site: http://library.stanford.edu

Stanford University Libraries and Academic Information Resources (SULAIR) includes more than 30 libraries and programs supporting research, teaching, and learning at Stanford University. SULAIR acquires and delivers library collections in all formats, establishes policies and standards to guide the use of academic information resources, develops training and support programs for academic uses of computers, and maintains a broad array of electronic information resources, including the online library catalog and several hundred article and indexing databases and electronic journal subscriptions.

In each library unit, knowledgeable professional staff provide assistance in locating and using print and online information resources. Subject specialists and reference librarians are available for individual consultation, group classes, demonstrations, and special workshops by request.

Libraries throughout campus provide group and individual study spaces, public computers, personal laptop connections, photocopy machines, and digital scanners for use by Stanford faculty, staff, and students.

For information about library hours, see http://libraryhours.stanford.edu.

In support of the University's academic mission, Academic Computing Services provides technology expertise, resources and services to students and faculty. Academic Computing Services supports the use of technology in teaching, learning, research, and community; operates and manages technology-enabled teaching and learning environments including classrooms and public study spaces, the Multimedia Studio in Meyer Library, the Digital Language Lab, and computer clusters in Green Library, Tresidder Union, and the student residences; provides technology education, consulting support, and multimedia services at Meyer and in the residences; provides faculty-specific computing resources through the Academic Technology Specialist Program and Academic Technology Lab; and provides technology support to Stanford University Libraries' services.

Information about the library collections, facilities, services, and policies is available at http://library.stanford.edu.

Further information about library services and resources is available from the Information Center staff in Cecil H. Green Library at http://infocenter.stanford.edu, and from reference staff in all University libraries.

CENTRAL CAMPUS LIBRARIES

The Cecil H. Green Library (East and Bing Wings) maintains research collections in the humanities, social sciences, area studies, and interdisciplinary areas. These collections number approximately 2.8 million volumes. Major services in Green Library include: the Information Center, the Media Microtext Center, the Jonsson Reading Room, the Lane Reading Room, the Bender Room, Loan Desk and Privileges, Interlibrary Services, course reserves, the Department of Special Collections, and the University Archives.

The J. Henry Meyer Memorial Library houses the East Asia Library as well as the Academic Computing Services group of SULAIR and provides study, multimedia, consulting, and instructional support services. In addition, Meyer Library houses the University's Digital Language Lab, technology enabled study spaces and classrooms, the Academic Technology Lab, and the central offices of Student Computing and Academic Computing Services.

BRANCH LIBRARIES

Humanities and Social Sciences Branch Libraries include the Art and Architecture Library, Cubberley Education Library, East Asia Library, Music Library, and Archive of Recorded Sound.

Science Branch Libraries include the Branner Earth Sciences Library, Engineering Library, Falconer Biology Library, Mathematical and Computer Sciences Library, Harold A. Miller Library at the Hopkins Marine Station, Physics Library, and Swain Library of Chemistry and Chemical Engineering.

For a complete list of campus libraries, see: http://libraries.stanford.edu.

COORDINATE LIBRARIES

J. Hugh Jackson Library, Graduate School of Business
Director: Kathy Long
Lane Medical Library
Director: Debra Ketchell
Crown Law Library
Director: Paul Lomio
SLAC National Accelerator Laboratory Library
Director of Technical Information Services: Patricia Kreitz

HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE

Director: John Raisian
Web Site: http://www.hoover.org

Since its founding by Herbert Hoover in 1919 as a special collection dealing with the causes and consequences of World War I, the Hoover Institution has become an international center for documentation, research, and publication on political, economic, social, and educational change in the 20th and 21st centuries.

The Hoover Library and Archives include one of the largest private archives in the world and contain outstanding area collections on Africa, East Asia, Eastern Europe, Russia and the former Soviet Union, Latin America, the Middle East, North America, and Western Europe.

Holdings include government documents, files of newspapers and serials, manuscripts, memoirs, diaries, and personal papers of men and women who have played significant roles in the events of these centuries, the publications of societies and of resistance and underground movements, the publications and records of national and international bodies, both official and unofficial, and books and pamphlets, many of them rare and irreplaceable. The materials are open to all Stanford students, faculty, and staff, to scholars from outside the University, and to the public at large.

INFORMATION TECHNOLOGY SERVICES (IT SERVICES)

Web Site: http://it-services.stanford.edu

IT Services manages the University's central information technology infrastructure and provides hundreds of services and applications for use in academic and business activities. Support is provided in four layers:

- Participation and client-focused leadership in institutional IT planning, including strategies for data center expansion, centrally managed storage and backup, and business continuity and disaster recovery.
- Applications and services for departments and end-users including email, calendaring, wireless connectivity, web authentication, and Windows and Linux server hosting. These services are supported by a help desk, contract-support consultants, online self-help, and training.
- Applications and services that support other campus service providers, including the help desk, change management, and network registration systems.
- A communications and collaboration infrastructure robust enough to support advanced network, voice, and web-based services.

To learn about the variety of information technology resources available at Stanford, see http://computing.stanford.edu. For assistance with technology services at Stanford, contact the Stanford IT Help Desk at (650) 725-HELP (5-4357) or submit a request through http://helpsu.stanford.edu.

THE CONTINUING STUDIES PROGRAM

Dean and Associate Provost: Charles Junkerman
Associate Dean and Director: Dan Colman
Program Offices: 482 Galvez Mall
Mail Code: 94305-6079
Phone: (650) 725-2650; Fax: (650) 725-4248
Email: continuingstudies@stanford.edu
Web Site: http://continuingstudies.stanford.edu

The Continuing Studies Program provides adults from Stanford and surrounding communities the opportunity to take classes on a part-time basis for intellectual enrichment, both personal and professional. Courses and events are offered in all four academic quarters, with over 350 courses planned throughout the year.

The faculty are primarily drawn from the ranks of the University's professoriate. The program presents a wide variety of courses, with a central concentration in the liberal arts, including literature, history, art and architecture, and music.

Tuition discounts are available to University employees, Stanford students and faculty, Stanford Alumni Association members, educators, and those over age 65.

For a course catalogue, contact the Continuing Studies Program by mail, phone, or email as above.

The Continuing Studies Program also administers the Master of Liberal Arts Program and Summer Session.

MASTER OF LIBERAL ARTS PROGRAM

Associate Dean and Director: Linda Paulson
Participating Faculty: Russell Berman (Comparative Literature, German Studies), Marc Bertrand (French and Italian, emeritus), Jay Bhattacharya (Medicine), Eamonn Callan (Education), Gerry Dorfman (Hoover Institution, Political Science), Michele Elam (English), Martin Evans (English), Paula Findlen (History), Larry Friedlander (English), Kenneth Fields (English), Hester Gelber (Religious Studies), Albert Gelpi (English, emeritus), Barbara Gelpi (English, emerita), Robert Gregg (Religious Studies, emeritus), Tom Grey (Music), Hans Ulrich Gumbrecht (French and Italian), Van Harvey (Religious Studies, emeritus), Gavin Jones (English), Charles Junkerman (Continuing Studies Program), Nancy Kollmann (History), Marsh McCall (Classics, emeritus), Mark Mancall (History, emeritus), Scotty McLennan (Religious Life), David Palumbo-Liu (Comparative Literature), Linda Paulson (English), Denis Phillips (Education, emeritus), Ronald Rebholz (English, emeritus), Rush Rehm (Drama, Classics), John Rick (Anthropology), John Rickford (Linguistics), Paul Robinson (History, emeritus), Ramón Saldívar (English), Paul Seaver (History, emeritus), Thomas Sheehan (Religious Studies), Robert Siegel (Microbiology and Immunology), Peter Stansky (History, emeritus), Stephen Stedman (Freeman Spogli Institute for International Studies), Thomas Wasow (Linguistics), Ernlé Young (Medicine, emeritus), Steven Zipperstein (Jewish Culture and History)
Program Offices: 482 Galvez Mall
Mail Code: 94305-6079
Phone: (650) 725-0061
Email: mlaprogram@stanford.edu
Web Site: http://mla.stanford.edu

Courses offered by the Master of Liberal Arts Program are listed under the subject code MLA on the *Stanford Bulletin's* ExploreCourses web site.

Program Description—The Master of Liberal Arts (MLA) program aims to provide a flexible, interdisciplinary program for returning adult students who seek a broad education in the liberal arts. The underlying premise of the MLA program is that knowledge gained through an interdisciplinary course of study leads to intellectual independence and satisfaction not always found in discipline-based programs of study. The goals of the MLA program are to develop advanced critical thinking, to foster intellectual range and flexibility, and to cultivate an individual's ability to find the connections among different areas of human thought: art, history, literature, music, philosophy, political science, science, and theology.

The program is designed with part-time students in mind: seminars meet in the evening, and students complete the degree in 4-5 years. All master's seminars are taught by members of the Stanford faculty. Seminar size is limited to 20 students.

Degree Requirements—Candidates for the MLA degree must complete a minimum of 50 units of course work with at least a grade point average of 3.3 (B+). These units must include a three-quarter foundation course (equal to 12 units total), one 4-unit core introductory seminar for second-year students, at least seven 4-unit MLA seminars, and a 6-unit master's thesis. Students must also fulfill distribution requirements in each of the following areas: humanities; social science or social policy; and science, engineering, or medicine.

Foundation Course—During the Autumn, Winter, and Spring following admission to the program, a three-quarter foundation course is required of all students. The purpose of this course is to lay the groundwork for the interdisciplinary, intercultural studies the student will shortly undertake. The foundation course will introduce students to the broad framework of history, literature, philosophy, political science, and art.

Core Seminar—During the first quarter of the second year, students take the core introductory seminar, MLA 102, An Introduction to Interdisciplinary Graduate Study. This seminar prepares students for interdisciplinary graduate work at Stanford. Students concentrate on writing a critical graduate paper, conducting library research, presenting the results of their research, and productively participating in a collaborative seminar.

MLA Seminars—Students are required to take at least seven MLA seminars of four units each. Each year, at least nine seminars are offered in the MLA program. Each MLA course requires a substantial seminar paper. Students are encouraged to use these papers as a way to investigate new fields of interest, as well as a way to develop different perspectives on issues in which they have an ongoing interest.

Master's Thesis—The MLA program culminates in the master's thesis. Students approaching the end of the program write a thesis, approximately 75-100 pages in length, that evolves out of work they have pursued during their MLA studies. The thesis is undertaken with the prior approval of the MLA program, and under the supervision of a Stanford faculty member. During the process of writing the thesis, students are members of a work-in-progress group, which meets regularly to provide peer critiques, motivation, and advice. Each student presents the penultimate draft of the thesis to a colloquium of MLA faculty and students, in preparation for revising and submitting the final draft to the adviser and to the MLA program.

Enrollment Requirements—MLA students must enroll for each academic year from the time of original matriculation until conferral of the degree. To remain active, students must either: (a) complete a minimum of two courses (eight units) in one academic year, defined as from the beginning of Autumn Quarter through the end of the following Summer Quarter; or (b) be actively working on their thesis and regularly attend a minimum of three quarters of the work-in-progress meetings from the time the student enrolls in work-in-progress through graduation.

Timeline for Completion—All requirements for the Master of Liberal Arts degree must be completed within five years after the student's first term of enrollment in the program. If extraordinary circumstances prevent completion within five years, a student may

submit a written petition for a maximum one-year extension to the Associate Dean and Director. This petition is reviewed by a committee which makes a recommendation to the Director; the final decision is at the discretion of the Director. To be considered, the petition must be submitted on or before May 1 of the student's fifth year in the program.

Registration—Master of Liberal Arts students enroll in courses through Stanford's Axess system.

SUMMER SESSION

Associate Dean: Patricia Brandt
Assistant Dean of Summer College: Jim Sirianni
Program Offices: 482 Galvez Mall
Mail Code: 94305-6079
Phone: (650) 723-3109; Fax: (650) 725-6080
Email: summersession@stanford.edu
Web Site: http://summer.stanford.edu

Students attending Stanford Summer Session are enrolled in either a regular degree program, the Summer Visitor Program, or the Summer College program for High School Students.

The regular degree program is for students who are candidates for a Stanford degree and who are continuing their academic work in Summer Quarter. Degree-seeking Stanford students should indicate on Axess during Spring Quarter that they intend to register for Summer Quarter. Separate application is not required.

The Summer Visitor Program is for students who are not presently candidates for a Stanford degree. It is open to students who are currently enrolled in or have graduated from another college or university. Qualified high school students who have completed at least their sophomore year may apply to the Summer College program.

Students in Summer Session, in general, enjoy the privileges of students in the regular degree programs except that work completed cannot be applied toward a Stanford degree or credential until the student has been admitted to regular standing. Admission as a summer visitor does not imply later admission to matriculated status. However, should the visitor matriculate at a later date through normal admission procedures, the summer work may be applied toward the requirements for a Stanford degree or credential at the discretion of the University or academic department.

Students in the Summer Program are not matriculated Stanford University students, and not all University student policies apply to Summer Program students. The University reserves the right, at its discretion, to withhold registration from, or require withdrawal from the program of, any student or applicant.

Consistent with its obligations under the law, Stanford prohibits discrimination against applicants or students on the basis of sex, race, age, color, disability, religion, sexual orientation, gender identity, national and ethnic origin, and any other characteristic protected by applicable law in the administration of its educational policies, admissions policies, and other University-administration.

For more information, contact Summer Session by email, mail, phone, or fax using the listings above. Information is updated annually in January and may also be found online at http://summer.stanford.edu.

STUDENT AFFAIRS

Vice Provost for Student Affairs: Greg Boardman
Associate Vice Provost and Dean of Student Life: Chris Griffith
Associate Vice Provost and Dean of Educational Resources: Sally Dickson
Associate Vice Provost and Director of Vaden Health Center: Ira Friedman
Associate Vice Provost and University Registrar: Thomas C. Black
Associate Vice Provost and Dean of Residential Education: Deborah Golder
Web Site: http://studentaffairs.stanford.edu/

Student Affairs provides services and programs to undergraduates and graduate students in support of the University's academic mission.

The division encompasses programs and services for undergraduates and graduate students which include the Office of Residential Education, University Registrar, Vaden Health Center, Career Development Center, Office of Accessible Education, Graduate Life Office, Haas Center for Public Service, Judicial Affairs, Bechtel International Center, Asian American Activities Center, Black Community Services Center, El Centro Chicano, LGBT Community Resources Center, Native American Cultural Center, Women's Community Center, and Office of Student Activities.

The Vice Provost for Student Affairs reports directly to the Provost and is responsible for providing leadership, policy direction, administrative support for budget, personnel, facilities, and development, as well as oversight of the efficiency and effectiveness of each of the division's units. The Vice Provost interacts with the President, the Provost, the University Cabinet, faculty, schools, department representatives, students, and parents. The Vice Provost also serves as an ex officio member of the Senate of the Academic Council.

STUDENT SERVICES CENTER

Office: Tresidder Memorial Union, 2nd floor
Contact via HelpSU: https://remedyweb.stanford.edu/helpsu/helpsu?pcat=StuAcct&dtag=10772
Phone: (650) 723-7772 or (866) 993-7772 (toll-free)
Web Site: http://studentservicescenter.stanford.edu
The AskJane Online Answers Resource: http://askjane.stanford.edu

The Student Services Center (SSC) is committed to providing a single point of friendly, professional service for answers to questions concerning administrative and financial issues. The center strives to resolve 90% of students' issues upon first contact. The SSC represents Student Financial Services, the Office of the University Registrar, the University Cashier's Office, the Financial Aid Office, and Stanford ID Card Services, and is able to assist students with questions including those related to University billing, financial aid disbursements, refunds, payroll deductions, payment plan, enrollment, Stanford degree policies and procedures, Stanford ID card, and forms pickup and submission.

DEAN OF STUDENT LIFE

Dean of Student Life: Chris Griffith
Office: Old Union
Phone: (650) 723-2733
Web Site: http://stanford.edu/dept/vpsa

The Dean of Student Life has responsibility for overseeing the development, implementation, and monitoring of comprehensive student life programs. The unit consists of the Graduate Life Office, Office of Student Activities, Judicial Affairs, Organizational Conduct Board, Old Union and 5-SURE. The Dean reports to the Vice Provost for Student Affairs and is a member of his executive group.

DEAN OF EDUCATIONAL RESOURCES

Dean of Educational Resources: Sally Dickson
Office: Old Union
Phone: (650) 721-4037
Web Site: http://stanford.edu/dept/vpsa

The Dean of Educational Resources is responsible for overseeing the development, implementation, and monitoring of comprehensive programs relating to ethnic, gender, career, and learning needs and interests of student groups. The unit is comprised of the Asian American Activities Center, Black Community Services Center, El Centro Chicano, LGBT Community Resources Center, Native American Cultural Center, Women's Community Center, Bechtel International Center, Career Development Center, and the Office of Accessible Education. The Dean also has oversight responsibility for the Haas Center for Public Service, as well as responsibility for the Acts of Intolerance Protocol. The Dean reports to the Vice Provost for Student Affairs and serves as a member of his executive group.

OFFICE OF ACCESSIBLE EDUCATION (OAE)

Offices: 563 Salvatierra Walk
Phone: (650) 723-1066; TDD (650) 723-1067
Web Site: http://studentaffairs.stanford.edu/oae

The Office of Accessible Education (OAE) is the campus office designated to work with students, faculty, and staff to put in place appropriate accommodations for all Stanford students with disabilities, at both the undergraduate and graduate levels (including the professional schools). The OAE provides a wide array of support services, accommodations, and programs to remove barriers to full participation in the life of the University.

In reaching its determinations about appropriate accommodations, the OAE considers factors such as the documentation from professionals specializing in the area of the student's diagnosed disability, the student's functional limitations, and the student's input and accommodation history in regard to particular needs and limitations. The OAE then works with the student and relevant faculty and staff through an interactive process designed to achieve an accommodation that meets the needs of all parties.

CAREER DEVELOPMENT CENTER

Center Office: 563 Salvatierra Walk
Web Site: http://cardinalcareers.stanford.edu

Counseling Services—Monday through Friday, 9 a.m. to 12 noon, 1 p.m. to 5 p.m.; (650) 725-1789.

Employment Services—Monday through Friday, 8:15 a.m. to 4:30 p.m.; (650) 723-9014.

Reference File Services—Monday through Friday, 10 a.m. to 12 noon, 1 p.m. to 4 p.m.; (650) 723-1548.

The Career Development Center (CDC) offers services such as counseling, workshops, presentations, on-campus recruiting, job/internship databases, reference file services, library resources, and alumni networking, to help students make informed decisions and to plan for life after Stanford.

Services are available to undergraduate and graduate students, and all students are encouraged to visit in person or via the web. Programs and services are free to students; limited services are available to alumni and student spouses/domestic partners.

The following suggestions may assist students in getting the most out of the CDC:

- Visit early in a Stanford career.
- Register with the CDC's Cardinal Career online system to access internships, part-time and full-time.
- Gather general career information through the career resource library, jobs and internship database, handouts, and alumni network.
- Inquire about individual counseling for all stages of career planning and development.
- Participate in workshops and other programs to clarify career goals.
- Use the Reference File Service to ease the management of applications for graduate school or employment.

COMMUNITY CENTERS

There are six ethnic and community centers that support students who seek services associated with a particular group or community. Each center has its own site and professional staff who advise and counsel students. In addition, the centers sponsor programs throughout the year that foster intellectual, personal, and cultural growth. Detailed information is available on the following web sites:

- Asian American Activities Center: http://stanford.edu/group/a3c
- Black Community Services Center: http://stanford.edu/dept/BCSC
- El Centro Chicano: http://stanford.edu/dept/elcentro
- LGBT Community Resources Center: http://lgbt.stanford.edu
- Native American Cultural Center: http://stanford.edu/dept/nacc
- Women's Community Center: http://womenscntr.stanford.edu

GRADUATE LIFE OFFICE

Graduate Life Office: Escondido Village Office, 859 Comstock Circle
Graduate Life Office, Graduate Community Center: 750 Escondido Road
Phone: (650) 736-7078
Email: graduatelife@stanford.edu
Web Site: http://glo.stanford.edu

The Graduate Life Office (GLO) works with students on and off campus and with student groups, including Community Associates (student residence staff), the Graduate Student Programming Board, and the Graduate Student Council, to create an inclusive environment through programs in the residences and campus-wide. The Graduate Community Center (GCC) serves as a focal point for meetings and activities in the graduate community.

The GLO staff also works with individual students who need information and support or who may be experiencing personal difficulties. Staff members are knowledgeable about and have access to support and resources available throughout the University. Staff work closely with student services administrators in academic departments to provide consultation and services to students in need.

GRADUATE STUDENT RESIDENCE PROGRAM

The University's philosophy of graduate student housing is based on the premise that supporting high quality graduate scholarship and research is central to the mission of the University. By providing affordable housing in proximity to academic resources, the University creates an environment conducive to research and intellectual dialogue among students, their peers, and faculty members. The Community Associate (CA) program in the residences serves as a supportive resource for residents and to connect student neighbors through social events and activities to build a sense of community in the residences.

HAAS CENTER FOR PUBLIC SERVICE

Center Offices: 562 Salvatierra Walk
Mail Code: 8620
Phone: (650) 723-0992
Web Site: http://haas.stanford.edu

The Haas Center for Public Service connects academic study with public service to strengthen communities and develop effective public leaders. The center aspires to develop aware, engaged, and thoughtful citizens who contribute to the realization of a more just and humane world.

To accomplish these objectives, the center collaborates with associated units at Stanford to implement programs in the following areas of work.

- Through the center's fellowship programs, undergraduates perform summer internships in nonprofit organizations, foundations, and government agencies locally, nationally, and internationally. Postgraduate fellowships allow graduating seniors to work with a mentor in a nonprofit or public agency for a year.
- The Public Service Leadership Fellows Program provides an opportunity for students who want to be intentional about their leadership development. Center staff also provides leadership development through training, advising, and resources to Stanford in Government, Alternative Spring Break, and other student groups engaged in service.
- With support from the center, Stanford faculty members have created service-learning courses that involve Stanford students in providing direct service and community-based research efforts in collaboration with local schools and other partner agencies. The center's Public Service Scholars Program supports seniors writing honors theses that combine academic research with service to communities.
- Faculty from Stanford's School of Education collaborate with center staff to provide curriculum guidance and training for tutors and mentors at nearby schools. Another program trains Stanford students to bring results of scientific research to neighborhood programs. The federally supported Community Service Work-Study program, administered in conjunction with the University's Financial Aid Office, allows students to satisfy work-study obligations year-round by working in community organizations and public agencies.
- The postgraduate and alumni programs help students, particularly graduating seniors, identify opportunities to assist in launching their public service careers in nonprofit and government agencies, and in the private sector in service-related positions. The Haas Center houses the Center on Philanthropy and Civil Society, a program of the Institute for Research in the Social Sciences (IRiSS).

Students interested in public service fellowships, service-learning courses, community-based research, public and community service internships for youth and education, or service organization leadership development should contact the center.

BECHTEL INTERNATIONAL CENTER

Web Site: http://icenter.stanford.edu

The Bechtel International Center (I-Center) is a meeting place for students and senior research scholars at Stanford from throughout the world and for internationally oriented U.S. students, faculty, and short-term visitors on the campus. Through a variety of social, cultural, and educational programs, I-Center facilities are utilized to acquaint students and scholars with the life of the University and the community, and to bring them together in activities of mutual interest.

The Center believes that international educational exchange nurtures a lifelong global perspective, and plays a key role in supporting Stanford's standing as a truly international university in the following ways:

- Provides information about and assistance with obtaining and maintaining legal status in the U.S. to foreign students, scholars, and Stanford departments.
- Advises U.S. students who are pursuing scholarships for study and research abroad.
- Enables foreign students, scholars, and their family members at Stanford to receive maximum academic, cultural, and personal benefit from their stays in the U.S.
- Contributes to international activities at Stanford by helping to create a welcoming and supportive environment that is responsive to the needs of the international community.
- Facilitates professional meetings between visiting international delegations and their Stanford counterparts.
- Provides opportunities for Stanford students, faculty, staff, and members of the local community to broaden their horizons by interacting with people from different cultures through programs to increase international awareness and understanding.

JUDICIAL AFFAIRS AND STUDENT CONDUCT

Office: Tresidder Memorial Union, 2nd floor
Mailing Address: 459 Lagunita Drive, Suite 9
Mail Code: 94305-3010
Phone: (650) 725-2485
Fax: (650) 736-0247
Web Site: http://judicialaffairs.stanford.edu
Email: judicial.affairs@stanford.edu

The primary codes of conduct for students are the Fundamental Standard and Honor Code. The Student Judicial Charter of 1997 was approved by the Associated Students of Stanford University, the Senate of the Academic Council, and the President of the University during Spring Quarter 1996-97 and Autumn Quarter 1997-98, replacing the earlier charter and becoming effective in January 1998. Cases of alleged violations of the University's Honor Code, Fundamental Standard, and other student conduct policies now proceed through an established student judicial process based upon the Student Judicial Charter of 1997, which can be found in its entirety at the University's Office of Judicial Affairs web site at http://judicialaffairs.stanford.edu. The web site also contains the policies, rules, and interpretations, as well as the University's Student Conduct Penalty Code, applicable to those students found responsible for violating the Honor Code, the Fundamental Standard, or other University policy or rule.

When a violation of the Fundamental Standard, Honor Code, or other University policy or rule governing student conduct is alleged, or whenever a member of the University community believes such a violation has occurred, he or she should contact the Office of Judicial Affairs.

THE FUNDAMENTAL STANDARD

Students at Stanford are expected to know, understand, and abide by the Fundamental Standard, which is the University's basic statement on behavioral expectations articulated in 1896 by Stanford's first President, David Starr Jordan, as follows:

"Students are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University."

Actions that have been found to be in violation of the Fundamental Standard include:

- Physical assault
- Property damage
- Forgery
- Theft
- Sexual harassment or other sexual misconduct
- Misrepresentation in seeking financial aid, University housing, University meals, or other University benefits
- Driving on campus while under the influence of alcohol
- Misuse of computer equipment or email
- Sending threatening or obscene messages

There is no standard penalty which applies to violations of the Fundamental Standard. Penalties range from a formal warning to expulsion. Each case is fact specific; considerations include the nature and seriousness of the offense, the motivation underlying the offense, and precedent in similar cases.

THE HONOR CODE

The Honor Code is the University's statement on academic integrity. It is essentially the application of the Fundamental Standard to academic matters. Provisions of the Honor Code date from 1921, when the honor system was established by the Academic Council of the University Faculty at the request of the student body and with the approval of the President. The Honor Code reads:

A. The Honor Code is an undertaking of the students, individually and collectively:
   1. that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;
   2. that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

B. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.

C. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.

Examples of conduct that has been found to be in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper
- Unpermitted collaboration
- Plagiarism
- Revising and resubmitting a quiz or exam for regrading without the instructor's knowledge and consent
- Representing as one's own work the work of another
- Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted

For more information, see the Interpretations and Applications of the Honor Code at http://stanford.edu/dept/vpsa/judicialaffairs/guiding/honorcode. The standard penalty for a first offense is a one quarter suspension from the University and 40 hours of community service. In addition, many faculty members issue a 'No Pass' for the course in which the violation occurred.

OLD UNION

Stanford's student union, known as the Old Union, serves as a hub for student activities on campus. The central structure in a three-building complex, the Old Union has administrative offices for ASSU, Office of Student Activities (OSA), Dean of Student Life, and Dean of Educational Resources. It also houses a multi-faith center known as CIRCLE (Center for Inter-Religious Community, Learning, and Experiences), meeting rooms for student use, and the Axe and Palm which offers casual dining. Adjoining the Old Union, the Nitery houses a black-box theater and El Centro Chicano, and the Clubhouse is home to the Asian American Activities Center and the Native American Cultural Center.

OFFICE OF RESIDENTIAL EDUCATION

Web Site: http://www.stanford.edu/dept/resed/

The Office of Residential Education is responsible for developing the policies, programs, and staffing which support the intellectual, educational, and community-building activities in student residences. The conviction behind the Stanford residence program is that formal teaching, informal learning, and personal support in residences play an important role in a Stanford education.

RESIDENTIAL EDUCATION PROGRAM

The Residential Education program provides Stanford undergraduates with a small community experience within a large research university. Residential Education programs extend the classroom into the residences and complement the academic curriculum with activities and experiences that contribute to students' preparation for a life of leadership, intellectual engagement, citizenship, and service. An extensive network of staff, including many who live in the residence halls, supports students during their undergraduate careers.

RESIDENCE DEANS

Residence Deans provide assistance to on- and off-campus undergraduate students. They can advise students about personal matters, occasionally intervene directly in behavioral problems or mental health concerns, and assist with personal emergencies. Advice is also available on issues of academic probation or suspension, leaves of absence, special concerns of students, and administrative matters. Residence Deans work closely with the Dean of Student Life and other University offices. They are assigned to specific residences and to off-campus students. For further information, undergraduates should call Residential Education at (650) 725-2800. For assistance, graduate students can consult Assistant Deans in the Graduate Life Office at (650) 736-7078.

OFFICE OF STUDENT ACTIVITIES

Web Site: http://www.stanford.edu/dept/OSA

The Office of Student Activities, located in Old Union, supports student activities, over 600 student organizations and the ASSU through publications, workshops, one-on-one consultation, advising and major event planning support. The OSA also provides fundraising expertise for student groups and leadership opportunities for students.

VOLUNTARY STUDENT ORGANIZATIONS

There are over 600 different Voluntary Student Organizations (VSOs) at Stanford. VSOs are those organizations: (1) in which membership is not mandatory and is nondiscriminatory, (2) in which membership is both open and limited to current Stanford students registered in a degree-granting program, (3) in which students make all organizational decisions, and (4) whose purposes and procedures are consistent with the goals and standards of the University. In order to use University facilities, the Stanford name, or to receive ASSU funding, all voluntary student organizations must register with the University through the Office of Student Activities, Old Union, room 206.

As a condition of registration, each voluntary student organization must file and have approved each of the following:

1. A statement of purpose and organizational constitution.
2. A statement about membership eligibility.
3. Clear procedures for officer elections.
4. Identification of the authorized representatives of the group, who must be a currently registered student, and at least five active members in the organization who are currently registered students.

Each voluntary student organization must renew its registration with the University annually, early in Autumn Quarter, by submitting new registration materials.

If a voluntary student organization that is registered with the University seeks to use University facilities for meetings open to more than its own members and to specifically invited guests, such meetings shall be subject to the regulations of the Committee on Public Events. All organization events held in University facilities must receive event approval from the Office of Student Activities and Stanford Events.

A voluntary student religious organization may hold open meetings in University facilities only with the approval of the Office of the Dean for Religious Life.

A registered voluntary student organization may advocate publicly a position on a public issue, provided the organization clearly identifies itself, and provided such an organization in any public statement makes clear it does not represent or speak for the University or for the Associated Students.

No student group may use University space or facilities or receive other University support for purposes of supporting candidates for public office. Groups may use public places such as White Plaza for tables, speeches, and similar activities; may have intermittent use of on-campus meeting rooms; and may request to reserve auditoriums and similar space for public events including speeches by political candidates as long as all University guidelines are followed.

TRESIDDER MEMORIAL UNION

Tresidder Memorial Union (TMU) is a center of community activity on the Stanford campus. It houses a variety of restaurants and meeting rooms, a ticket office and campus information center, a convenience store, banking and credit union offices with ATMs, a fitness center, FedEx/Kinkos and a hair salon.

TMU is also the home of several administrative offices: Meeting Services, Judicial Affairs, Residential Education, Student Services Center, Stanford Catering, Stanford Dining (Meal Card program), the LAIR computer center and the Office of the Vice Provost for Student Affairs.

VADEN HEALTH CENTER

Center Office: 866 Campus Drive

Web Site: http://vaden.stanford.edu

The Allene G. Vaden Health Center strictly protects the confidentiality of information obtained in medical care and counseling.

MEDICAL SERVICES

Medical Services (650-498-2336, ext. 1) is the first stop for diagnosis and treatment of illness, injury, and ongoing conditions, as well as preventive counseling and education. Services available without additional charge for students who have paid the Campus Health Service fee include:

- Medical appointments in general medicine and sports medicine.
- Medical advice for routine concerns throughout the day. When Medical Services is closed, advice for urgent conditions is available from the on-call physician.
- Referral to specialists, primarily at Stanford Hospital and Clinics and Menlo Medical Clinic.

Additional services (fees apply):

- Allergy injections, immunizations, travel services, physical exams for employment and scholarships, HIV testing, laboratory, X-rays, drug screening (academic year only).
- Pharmacy (650-498-2336, ext. 3) and physical therapy (650-723-3195) are available on site.

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS)

CAPS (650-723-3785) helps students who experience a wide variety of personal, academic, and relationship concerns. Services available without additional charge for students who have paid the Campus Health Service Fee include:

- Evaluation and brief counseling, including personal, couples and group therapy. Students requesting or requiring longer, ongoing therapy incur fees.
- Workshops and groups that focus on students' social, personal and academic effectiveness.
- Crisis counseling for urgent situations 24 hours a day.
- Consultation and outreach to faculty, staff, and student organizations.

YWCA SEXUAL ASSAULT CENTER AT STANFORD

The YWCA Sexual Assault Center at Stanford assists students, staff, faculty and other Stanford campus affiliates who are victims of sexual assault. Located on the first floor of Vaden Health Center, it is open by appointment or drop-in office hours, Monday through Thursday, 2:00-4:00 PM. The center also can be reached at its 24-hour campus telephone line (650) 725-9955.

HEALTH PROMOTION SERVICES

Health Promotion Services (650-723-0821) educates and supports students to help them make informed, healthy decisions about their lifestyle. Services include:

- Individual preventive counseling and resource referral concerning nutrition, weight management, eating and body image, alcohol, tobacco and other drug use, sexual assault and harassment, relationships, intimacy and gender issues, and sexual health.
- Health education speakers, programs, and events and workshops at student residences, community centers, student organizations, and for new students (such as Real World: Stanford).
- Academic courses and internships.
- Student groups and volunteer opportunities including Peer Health Educators, HIV Peer Anonymous Counseling and Testing (HIV*PACT), Sexual Health Peer Resource Center (SHPRC), and CPR/First Aid classes.

HEALTH INSURANCE

All registered students are required to have health insurance. Call (650) 723-2135 for more information. Cardinal Care, the University-sponsored plan for students, fulfills this requirement. Insured by Aetna Student Health (medical), and ValueOptions (mental health), Cardinal Care features comprehensive, worldwide coverage, services by referral at Stanford University Medical Center and Menlo Medical Clinic, and lowest costs when one initiates care at Vaden Health Center. Stanford does not sponsor a health insurance plan for dependents; for available options, see http://vaden.stanford.edu/insurance/dependent.html. Options for voluntary dental insurance are also offered.

OTHER SERVICES AND PROGRAMS

BOOKSTORE

Web Site: http://stanfordbookstore.com

Organized in 1897, Stanford Bookstore, (650) 329-1217, located at 519 Lasuen Mall (White Plaza), provides a diverse selection of books, course materials, and supplies to the students, faculty, staff, and community in and surrounding Stanford. The bookstore carries over 130,000 titles, including a wide selection of medical books and books written by Stanford authors, making it one of the largest bookstores in the nation. The bookstore also carries medical instruments, Stanford logo apparel, gifts and souvenirs, periodicals, and features a café that provides an enhanced shopping experience. The Computer Store, in the main branch, sells academically priced computer hardware and software. Other services include shipping of purchases, gift cards, book buyback, fax service, postage stamp sales, an ATM, and Enterprise Rent-A-Car hotline. There are four branches in addition to the Stanford Bookstore that also serve the community: the Stanford Athletics Shop (formerly the Track House Sports Shop), (650) 327-8870, underneath the Cobb Track and Angell Field bleachers, is the headquarters for Stanford Athletic Gear; Tresidder Express convenience store, (650) 723-9224 in Tresidder Union; the Stanford Shop, (650) 614-0295, at the Stanford Shopping Center, provides Stanford apparel; and the Bookshop, (650) 725-2775, at the Cantor Center for the Arts, carries books on the arts, fine gifts, apparel, and jewelry.

DIVERSITY AND ACCESS OFFICE

Office: Mariposa House, 585 Capistrano Way
Mail Code: 94305-8230
Phone: (650) 723-0755; TTY: (650) 723-1216
Email: equal.opportunity@stanford.edu, disability.access@stanford.edu
Web Site: http://stanford.edu/dept/diversityaccess

The Diversity and Access Office has two primary missions:

1. To oversee University compliance with nondiscrimination and equal opportunity laws (including but not limited to Title VI, Title VII, and Title IX), as well as the regulations relating to affirmative action. This includes collecting, monitoring, reporting, and analyzing personnel data regarding the hiring, promotion, and retention of women and minorities.
2. To oversee University compliance with federal and state disability-related laws, including (but not limited to) the Americans with Disabilities Act, and Sections 503 and 504 of the Rehabilitation Act. This includes providing certain non-academic services (and accommodations) to students with disabilities, and providing assistance and information to staff and faculty with disabilities needing workplace accommodations. The office also provides auxiliary aids and services to the public visiting Stanford and attending public events. In addition, the office monitors disability access on campus and provides information regarding web accessibility.

STANFORD CONFERENCE SERVICES

Phone: (650) 723-3126
Email: conferenceinquiries@stanford.edu
Web Site: http://conference.stanford.edu

A conference is defined as any student, youth, or adult group that convenes for part of a day (including a luncheon), overnight, or for several days, outside the regular or summer academic sessions for registered students. Policies concerning conferences are the responsibility of the offices of the President and the Provost.

To make arrangements for hosting a new, academically sponsored residential summer conference during the mid-June through late-August time frame, contact Stanford Conference Services by phone or email as listed above. Stanford Conference Services also offers meeting planning services on a year-round basis for academically sponsored conference groups seeking assistance with planning and managing residential and non-residential conferences. In addition, conference organizers seeking to conduct conferences outside of the late August to early June time frame can also contact the non-academic facilities scheduling in the Office of the University Registrar, (650) 723-6755 or reg-events@stanford.edu, or contact Stanford Events, (650) 723-2551 or stanfordevents@stanford.edu.

Academic sponsorship by a Stanford dean or department head is required for first time conferences hosted by University departments or by conferences hosted by external organizations interested in meeting at Stanford. Conferences initiated by University departments or external organizations must demonstrate consistency with the University's academic mission. For summer conferences, the sponsoring department submits its proposal to the Director of Stanford Conference Services for review in terms of available facilities and for the approval of the President's Office. At least half of the participants in any summer conference at Stanford hosted by an external organization must be housed in Stanford's campus residences and participate in daily meal plans provided by Stanford Dining. On-campus residential housing and dining services are normally available from the Sunday following Commencement through late August.

Summer conference groups should contact Stanford Conference Services concerning arrangements for tables, chairs, audio-visual aids, signage, janitorial services, trash pick-up and removal, sprinkler shutoffs, and other conference-related products/services. During the academic year, housing arrangements for University-sponsored visitors can be made through the Stanford Guest House, (650) 926-2800, or at http://guesthouse.stanford.edu.

OMBUDS

Stanford University Ombuds: David Rasch
Ombuds Office: Mariposa House, 585 Capistrano Way, Room 210
Phone: (650) 723-3682
Fax: (650) 725-7288
Mail Code: 94305-8200
Email: rasch@stanford.edu
Web Site: http://stanford.edu/dept/ombuds
School of Medicine Ombuds: http://med.stanford.edu/ombuds

The charge to the Ombuds office at Stanford is: "The Ombudsperson's task is to protect the interests and rights of members of the Stanford community from injustices or abuses of discretion, from gross inefficiency, from unnecessary delay and complication in the administration of University rules and regulations, and from inconsistency, unfairness, unresponsiveness, and prejudice in the individual's experience with University activities. The Ombudsperson's office exists to receive, examine, and channel the complaints and grievances of members of the Stanford community, and to secure expeditious and impartial redress."

Any troublesome matter in the University community may be discussed in confidence with the University Ombuds. Services of the office are available to students, staff, and faculty. Although possessing no decision making authority, the Ombuds has wide powers of inquiry. The Ombuds refers matters to the proper person or office expeditiously and also provides conflict resolution services. For the role of the office of the Ombuds in cases of sexual harassment, see the "Non-Academic Regulations" section of this bulletin.

POLICE SERVICES

Department Office: Corner of Campus Drive and Serra Street
Phone: (650) 723-9633
Web Site: http://police.stanford.edu

The Stanford Department of Public Safety is a full service police department that operates 24 hours a day, 7 days a week. For police, fire, or ambulance response, dial 9-1-1, or 9-9-1-1 from a University phone. Emergency assistance can also be obtained by using one of the nearly 100 Blue Emergency Phone Towers strategically placed around campus.

The department is comprised of the following divisions:

The Field Services Division consists of sworn and non-sworn officers who patrol the campus and respond to calls for service. Sworn officers receive their police powers through the Santa Clara County Sheriff's Office. Sworn officers have the legal authority to stop vehicles, make arrests, and enforce all laws. Non-sworn officers assist the sworn officers with security patrols, evidence collection, crime prevention presentations, and other assigned tasks.

Community Service Division: Community Service Officers (CSOs) enforce the parking rules and regulations on campus, and provide traffic control at special events, construction zones, and accident scenes. CSOs also provide building security during emergency or critical incidents.

The Support Services Division provides logistical, technical, and accounting support to the department. Special events are handled through this division as well. Special Events Personnel (SEPs) provide security at campus events including athletic events, concerts, student-sponsored events, and dignitary visits. SEPs are available for hire by groups needing security at their University events. Contact the special events office at (650) 723-4924, or email event_security@stanford.edu, for more information.

The Administrative Support Division supports the department through training, recruiting, payroll, human resources, and other business functions.

For additional safety information or to view the yearly crime statistics, see the Stanford Safety and Security Almanac, available free from Public Safety, or see http://police.stanford.edu.

OFFICE FOR RELIGIOUS LIFE

Office: Memorial Church
Phone: (650) 723-1762
Web Site: http://religiouslife.stanford.edu

The mission of the Office for Religious Life (ORL) is to guide and enhance spiritual, religious, and ethical life within the Stanford University community. Multifaith exploration and dialogue, central in Stanford's history from its founding, is a vital part of both its ethos and education.

The ORL is committed to welcoming students of all genders and sexual identities, all religious and non-religious traditions, and all cultural backgrounds, striving to ensure that students, faculty, and staff have access to supportive contexts in which to pursue their spiritual journeys on the Stanford campus.

The ORL oversees and provides support for Stanford Associated Religions (SAR), more than thirty religious organizations that offer their spiritual services to the campus, as well as the Center for Inter-Religious Community, Learning, and Experiences (the CIRCLE). Located on the third floor of the remodeled Old Union, the CIRCLE offers an interfaith sanctuary, a seminar room, a common room, a student lounge, a non-lending library, and offices housing many SAR member groups.

STANFORD ALUMNI ASSOCIATION

Web Site: http://stanfordalumni.org
Phone: (800) 786-2586 or (650) 723-2021

The Stanford Alumni Association (SAA) seeks to serve all Stanford alumni and students by offering programs and services such as reunions, regional events, *Stanford Magazine*, online services, volunteer and learning opportunities, and the alumni directory.

The Stanford Alumni Association's alumni and student class outreach department (ASCO) provides undergraduates and graduate students with networking opportunities, celebratory and social events, and programs that enhance their Stanford experience and help connect them to the 200,000 alumni worldwide who make up the Stanford alumni community. ASCO programs bring students and alumni together through Reunion Homecoming Weekend each autumn and Commencement weekend in the spring, along with alumni networking events throughout the year.

For students, SAA sponsors events such as student tailgates, alumni panels, Senior Send-off, Senior Dinner on the Quad, and Class Day. The Alumni Association gives out the J.E. Wallace Sterling Award and the Stanford Award of Excellence annually to honor graduating seniors for exemplary service to the University. For more information on student programs at the Stanford Alumni Association, see http://www.stanfordalumni.org/students/home.html.

STANFORD EVENTS

Stanford Events supports the mission and goals of Stanford University through open engagement of the campus community and the worldwide public. The department has three divisions: Public Events, Stanford Lively Arts, and the Stanford Ticket Office.

Public Events oversees, advises, and produces University events and ceremonies as designated by the President's office such as: Commencement, Baccalaureate, the University President's inaugurations, New Student Orientation Convocation, Community Day/Founders' Celebration, and other high-profile university events. This division also serves in an advisory capacity to the schools, departments, and student groups on campus, and oversees University policy and procedure regarding campus events. The Public Events office has final approval authority of Stanford facility and open space use for non-academic public events on campus. For information about University event planning, policies, procedures, and University facilities,see http://stanfordevents.stanford.edu, or call (650) 723-2551.

Stanford Lively Arts, the University's presenting program, annually brings to campus a full season of music, dance, and theater by world-famous artists and exceptional newcomers. It furthers research and creativity through world premieres, collaborations, and commissions. In addition to on-stage performances, Lively Arts extends and supplements the academic life of the University through master classes, extended residencies, workshops, lectures and demonstrations, and group discussions. Internationally acclaimed artists perform serious work with Stanford students in classrooms as well as in residence halls. Discounts on performances are available for faculty, staff, and students. For tickets and more information, see http://livelyarts.stanford.edu, or call (650) 725-ARTS (2787).

Stanford Ticket Office provides ticketing services for the arts and entertainment events of Stanford University. Tickets for Stanford Lively Arts, Stanford music and drama departments, Stanford Jazz Workshop/Festival, and the ASSU Concert Network are among the event tickets that are available through this office. For more information, see http://tickets.stanford.edu, or call (650) 725-ARTS (2787).

AWARDS AND HONORS

FACULTY AND STAFF AWARDS

KENNETH M. CUTHBERTSON AWARD

The Kenneth M. Cuthbertson Award was established in 1981 to recognize exceptional service to Stanford University. It was established by members of the faculty who wish to remain anonymous. All members of the Stanford community are eligible for the award; the sole criterion is the quality of the contribution that the recipients have made to the University. The award provides a way of honoring members of the staff and faculty for their efforts on behalf of the University.

Ordinarily, one award is made each year. The award was first presented in 1981 to the person for whom it is named. Kenneth M. Cuthbertson was one of the early architects of Stanford's long-term financial planning and fundraising program. His service to Stanford set an enduring standard for those who will come after him. The award is made annually at the University Commencement Ceremony.

LLOYD W. DINKELSPIEL AWARDS

The Lloyd W. Dinkelspiel Awards recognize distinctive and exceptional contributions to undergraduate education at Stanford University. The two principal awards are made to the faculty or staff members adjudged to have made the most distinctive contribution to the development and enrichment of undergraduate education in its broadest sense. Two awards are also made to graduating seniors who combine academic achievement with effective contributions to undergraduate student life. Preference is given to service in the School of Humanities and Sciences in the area of liberal education. The awards are made from an endowment fund established in memory of Lloyd W. Dinkelspiel, a Stanford alumnus and trustee. The awards are made annually at the University Commencement Ceremony.

WALTER J. GORES AWARDS

The Walter J. Gores Faculty Achievement Awards for excellence in teaching were established by bequest of Walter J. Gores, Stanford Alumnus of the Class of 1917 and a professor at the University of Michigan for 30 years. Teaching is understood in its broadest sense and includes, in particular, lecturing, leading discussions, tutoring, and advising at the undergraduate or graduate levels. Any member of the teaching staff of the University is eligible for an award, including all faculty of professorial rank, instructors, lecturers, teaching fellows, and teaching and course assistants. Ordinarily, awards are made to a senior faculty member (associate or full professor) or senior lecturer; a junior faculty member or member of the teaching staff; and a teaching assistant (graduate or undergraduate student). The awards are made annually at the University Commencement Ceremony.

ALLAN COX MEDAL FOR FACULTY EXCELLENCE FOSTERING UNDERGRADUATE RESEARCH

The Allan Cox Medal for Faculty Excellence Fostering Undergraduate Research is awarded annually to a faculty member who has established a record of excellence directing undergraduate research over a number of years. It may also go to a faculty member who has done an especially outstanding job with just one or two undergraduates who have demonstrated superior work. The medal was established in memory of the former professor of Geophysics and Dean of the School of Earth Sciences, a strong supporter of faculty-student research collaboration.

HERBERT HOOVER MEDAL FOR DISTINGUISHED SERVICE

David Starr Jordan's belief that every academic degree should represent work actually done in or under the direction of the institution granting it has meant that, since its founding, Stanford has awarded no honorary degrees. As a means of recognizing extraordinary individuals who deserve special acknowledgment, the Stanford Alumni Association in 1962 voted to establish the Herbert Hoover Medal for Distinguished Service. The name pays tribute to the former President's example of service to his University, to his country, and to the cause of world humanitarianism. Indeed, Mr. Hoover was the first award recipient. The gold medal is presented following selection by an anonymous committee appointed by the Chair of the Board of Directors of the Alumni Association.

STUDENT AWARDS

BOOTHE PRIZE FOR EXCELLENCE IN WRITING

Awarded during the freshman year, the Boothe Prize recognizes excellence in writing. Students are selected for this honor on the basis of essays written for courses fulfilling the Introduction to the Humanities or Writing and Rhetoric requirements. The prize is named for Mr. and Mrs. D. Power Boothe, Jr., whose gifts to the University reflect their interest in the humanities.

PRESIDENT'S AWARD FOR ACADEMIC EXCELLENCE IN THE FRESHMAN YEAR

The President's Award honors students who have exceptionally distinguished academic records that exemplify a strong program of study in the freshman year. Students eligible for the award normally have completed Writing and Rhetoric and Introduction to the Humanities requirements during their first year at Stanford.

DEANS' AWARD FOR ACADEMIC ACHIEVEMENT

The Deans of Earth Sciences, Engineering, and Humanities and Sciences recognize from five to ten undergraduate students each year for their academic endeavors. Honorees are cited for noteworthy accomplishments which represent more than a high grade point average or success in course work. Faculty nominate students who have exceptional tangible achievements in classes or independent research, national academic competitions, a presentation or publication for a regional or national audience, or exceptional performance in the creative arts.

FIRESTONE MEDAL FOR EXCELLENCE IN RESEARCH

The Firestone Medal is awarded to seniors in recognition of excellence in undergraduate research. Departments in the School of Humanities and Sciences nominate students who have completed outstanding honors projects in the social, physical, and natural sciences.

ROBERT M. GOLDEN MEDAL FOR EXCELLENCE IN THE HUMANITIES AND CREATIVE ARTS

The Golden Medal recognizes outstanding achievement in the humanities and the creative arts. Seniors receive these medals upon nomination by their major department.

HOEFER PRIZE FOR EXCELLENCE IN UNDERGRADUATE WRITING

The Hoefer Prize recognizes students and faculty for their work in courses that meet the University Writing Requirement for writ-

ing in the major. Prizes are awarded in each of the five areas of the undergraduate curriculum: humanities, social sciences, natural sciences, engineering, and earth sciences.

FREDERICK EMMONS TERMAN ENGINEERING SCHOLASTIC AWARD

The School of Engineering annually presents the Terman Award to seniors for outstanding academic achievement. The awardees share their award with a high school teacher of their nomination.

PHI BETA KAPPA

Phi Beta Kappa is a nationwide society honoring students for the excellence and breadth of their undergraduate scholarly accomplishments. Membership in the Stanford Chapter (Beta of California) is open to undergraduates of all majors. To be elected to Phi Beta Kappa at Stanford, a student must achieve academic distinction in the major as well as in courses across a broad range of fields.

Approximately a tenth of the members of a graduating class are elected to Phi Beta Kappa. Of this number, about one fifth are chosen in their junior year, the remainder in their senior year.

The chapter's election guidelines define breadth of study as excellence beyond the major field. To be considered for election, a student must have taken at least three courses of 3 units or more at Stanford by the time elections are held early in the Spring Quarter with a letter grade of 'B-' or better in each of the following three major domains of knowledge: humanities; science, engineering, and math; and social sciences. Students who transfer in their junior year must have taken at least two courses at Stanford in two of the major domains and at least one course in the third domain, and must have completed a minimum of 75 units of academic work at Stanford by the end of Winter Quarter. Students who transfer in their sophomore year must have taken at least two courses at Stanford in each of the major domains.

There is no direct correlation between Stanford University General Education Requirements (GERs) and Phi Beta Kappa breadth requirements. The elections committee analyzes the content of individual courses to determine which major domain requirement they may satisfy. IHUM, PWR, and first-year language courses do not satisfy the PBK breadth criterion.

A grade of '+' or 'CR' is not considered a sign of distinction. Minimally satisfying the breadth criterion is not considered a sign of distinction.

The academic records of eligible students are automatically reviewed, so no special action is required for students wishing to be considered for membership. Anonymity in the election process is ensured by removal of the students' names from their academic records before consideration. Students who desire that their records not be made available for consideration by the Stanford chapter of Phi Beta Kappa should inform the Registrar, 630 Serra Street, Suite 120, Stanford, CA 94305-6032.

EXCHANGE PROGRAMS AND CROSS-ENROLLMENT AGREEMENTS

Stanford has exchange programs and cross-enrollment agreements with a number of other colleges and universities. The purpose of these programs and agreements is to offer Stanford students courses and training that are not available in the Stanford curriculum.

EXCHANGE PROGRAMS

UNDERGRADUATE

Stanford has exchange programs with four colleges and universities that allow students to exchange schools for a quarter/semester or for a year, depending on the school. These programs are best suited to students in their junior year, when the major area of study has been determined. Stanford students register for zero units at Stanford during the quarter(s) in which they are attending another college or university and pay the regular Stanford tuition. Courses taken at the other institution are treated as transfer credit back to Stanford. Students should contact the External Credit Evaluation section of the Office of the University Registrar to determine whether the courses taken through an exchange program may qualify for credit toward a Stanford degree. Only the number of units accepted in transfer, not the course titles or the grades received, are recorded on the Stanford transcript.

Exchange programs are currently available at three historically black institutions: Howard University in Washington D.C.; and Morehouse College and Spelman College in Atlanta, Georgia. The exchange program at Dartmouth College in Hanover, New Hampshire, focuses on Native American Studies. Further information is available at the Undergraduate Advising and Research Center.

GRADUATE

The Exchange Scholar Program is open to doctoral students in the fields of humanities, social sciences, and sciences who have completed one full year of study at one of the participating institutions. These students may apply to study at Stanford, and Stanford students may apply to one of these other institutions, for a maximum of one academic year (Autumn, Winter, and Spring quarters) to take advantage of particular educational opportunities not available on the home campus. The participating institutions are Brown University, University of Chicago, Columbia University, Cornell University, Harvard University, Massachusetts Institute of Technology, Princeton University, Stanford University, University of Pennsylvania, and Yale University. Further information on the program may be obtained from the Office of the University Registrar, or the graduate dean's office at participating institutions. Some institutions may place restrictions on specific departments.

Stanford also has separate exchange programs with the University of California, Berkeley, and the University of California, San Francisco. Further information may be obtained at the Office of the University Registrar.

CROSS-ENROLLMENT AGREEMENTS FOR ROTC

Stanford has cross-enrollment agreements for the Reserve Officers' Training Corps (ROTC) with the Navy and Marine Corps ROTC program at the University of California at Berkeley, the Army ROTC program at Santa Clara University, and the Air Force ROTC program at San Jose State University. The purpose of these agreements is to allow Stanford students to engage in military training while working on their degrees from Stanford. Courses taken in ROTC programs are offered by and through UC Berkeley, Santa Clara, and San Jose State. The courses do not qualify to be used towards the 12-unit requirement for full-time registration status or satisfactory academic progress requirements for Stanford undergraduates. Certain ROTC courses may be eligible to be used as transfer credit if they qualify under Stanford's transfer credit practices.

Normally, students who participate in ROTC training complete a four-year course of instruction at the respective institution that consists of two years of basic courses during the freshmen and sophomore years, and an advanced course of instruction during the junior and senior years. Students who accept ROTC scholarships are generally subject to a service obligation, depending on the regulation of the particular service.

Stanford students who are enrolled in ROTC programs under the cross-enrollment agreements are eligible to compete for scholarships to include full tuition and a monthly stipend (Navy and Air

Force), or other varying amounts (Army). Students normally compete for national scholarships as high school seniors, although current Stanford students may be eligible to enroll in ROTC on a non-scholarship basis. Non-scholarship ROTC students are eligible to compete for scholarships, and individual services may offer additional scholarship programs to current qualifying undergraduate and graduate students. Interested students should contact the appropriate military professor at the host institution to obtain information on these programs and to initiate application procedures (see below).

Students who satisfactorily complete an ROTC program and are awarded a Stanford degree qualify for a commission as a Second Lieutenant in the U.S. Army, an Ensign in the U.S. Navy, a Second Lieutenant in the U.S. Marines, or a Second Lieutenant in the U.S. Air Force.

For questions concerning the ROTC programs, Stanford students should consult one of the following: Air Force ROTC, San Jose State University, San Jose, CA 95192-0051, telephone (408) 924-2960; Army ROTC, Department of Military Science, Santa Clara University, Santa Clara, CA 95053, telephone (408) 554-4034; Naval ROTC, 152 Hearst Gym, University of California, Berkeley, CA 94720-3640, telephone (510) 643-6345.

AIR FORCE ROTC

The following are offered by San Jose State University. See also http://info.sjsu.edu/web-dbgen/catalog/departments/AS.html.

AS 001A,B. The Foundation of the United States Air Force
Freshman year. Introduces students to the Air Force and AFROTC. The characteristics, missions, and organization of the Air Force. Officership and professionalism, career opportunities, military customs and courtesies, and communication skills. Required leadership lab.

AS 002A,B. The Evolution of the United States Air And Space Power
Sophomore year. Air and space power through historical study and analysis. The capabilities, function, and doctrinal employment of aerospace forces. Emphasis is on oral and written communication skills. Required leadership lab.

AS 131A,B. Air Force Leadership Studies
Junior year. Leadership, management fundamentals, professional knowledge, Air Force personnel system, ethics, and communication skills. Application-level knowledge of skills required of junior Air Force officer through case studies, practical exercises, and seminar discussion. Required leadership lab. Prerequisites: AS 001A,B, AS 002A,B, or as determined by department chair.

AS 141A. National Security Affairs
Senior year. The national security process, international and regional relations, advanced leadership ethics, and Air Force doctrine with focus on the military as a profession, officership, military justice, civilian control of the military, and current issues affecting military professionalism. Required leadership lab. Pre- or corequisites: AS 131A, or as determined by department chair.

AS 141B. Preparation for Active Duty
Senior year. The role of the Air Force officer in contemporary society emphasizing skills to facilitate a smooth transition from civilian to military life. Required leadership lab. Pre- or corequisites: AS 131A,B, or as determined by department chair.

Leadership Laboratory (LLAB)
Mandatory. Hands-on. Drill and ceremony; Air Force customs and courtesies; leadership and followership skills. Guest speakers.

ARMY ROTC

See also http://scu.edu/rotc.

FRESHMAN YEAR

MILS 11. Leadership and Personal Development
Taught on Stanford campus. Personal challenges and competencies for effective leadership. How life skills such as goal setting, time management, physical fitness, and stress management relate to leadership and officership. Development of a personal fitness program under the guidance of an Army master fitness trainer. Two 60-minute classes per week. Weekly 3-hour leadership labs required. One four-day weekend field exercise away from the University.

MILS 12. Foundations in Leadership I
Taught on Stanford Campus. Leadership fundamentals such as setting direction, problem solving, listening, presenting briefs, providing feedback, and effective writing skills. Leadership dimensions and values. Two 60-minute classes per week. Weekly 3-hour leadership labs required. One evening military formal dinner.

MILS 13. Foundations in Leadership II
Taught on Stanford campus. Leadership framework; practical applications in fundamentals such as problem solving, listening, presenting briefs, and effective writing skills. Values, attributes, skills, and actions in the context of practical and interactive exercises. Two 60-minute classes per week. Weekly 3-hour leadership labs required. One four-day weekend field training exercise away from the University.

SOPHOMORE YEAR

MILS 21. Innovative Leadership
Taught on Stanford campus. Creative and innovative leadership strategies and styles through historical cases and interactive exercises. Personal motivation and team building through team exercises. Focus is on leadership values and attributes through organizational customs and courtesies. Leadership case studies; individual creeds and organizational ethos. Two 60-minute classes per week. Weekly 3-hour labs required. One four-day weekend field training exercise away from the University.

MILS 22. Leadership in Changing Environments
Taught on Stanford campus. The challenges of leading in contemporary operational environments. Crosscultural challenges and applications to leadership tasks and situations. Case studies. Two 60-minute classes per week. Weekly 3-hour labs required. One evening military formal dinner.

MILS 23. Team Leading Procedures
Taught on Stanford campus. Plans and orders that enable small units to complete assigned tasks and the decision making process. Planning techniques to develop orders, briefing plans, and decisions. Two 60-minute classes per week. Five 3-hour labs per quarter. One four-day weekend field training exercise away from the University.

JUNIOR YEAR

MILS 131. Adaptive Team Leadership
Taught at Santa Clara University. Adaptive leadership skills and the demands of the ROTC Leader Development Assessment Course (LDAC). Scenarios related to small-unit tactical operations to develop self awareness and thinking skills. Feedback on student leadership abilities. Two 90-minute classes per week. Weekly 3-hour labs required. One mandatory four-day field training exercise away from the University. Prerequisites: MILS 11, 12, 13, 21, 22, and 23, or consent of department chair.

MILS 132.Situational Leadership I
Taught at Santa Clara University. Skills in leading small units, including decision making, persuading, and motivating team members when under fire. Two 90 minute classes per week. Weekly 3-hour labs required. One evening military formal dinner. Prerequisite: MILS 131, or consent of department chair.

MILS 133. Situational Leadership II
Taught at Santa Clara University. Applications of situational leadership challenges in decision making, persuading, and motivating team members when under fire. Preparation for ROTC Leader Development Assessment Course (LDAC). Two 90-minute classes per week. Weekly 3-hour labs required. One mandatory four-day field training exercise away from the University. Prerequisite: MILS 132, or consent of department chair.

SENIOR YEAR

MILS 141. Developing Adaptive Leaders
Taught at Santa Clara University. Planning, executing, and assessing complex operations, functioning as a member of staff , and providing leadership performance feedback to subordinates. Situational opportunities to assess risk, make ethical decisions, and provide coaching to fellow ROTC students. Responsibilities of key staff. Two 90-minute seminars per week. Weekly 3-hour labs required. One mandatory four-day weekend field training exercise

away from the University. Prerequisite: MILS 133, or consent of department chair.

MILS 142. Leadership in a Complex World I
Taught at Santa Clara University. Differences in customs and courtesies, military law, principles of war, and rules of engagement in the face of international terrorism. Interacting with nongovernmental organizations, civilians on the battlefield, and host nation support. Two 90-minute seminars per week. Weekly 3-hour labs required. One evening military formal dinner. Prerequisite: MILS 141.

MILS 143. Leadership in a Complex World II
Taught at Santa Clara University. Preparation for first unit of assignment and transition to Lieutenant. Case studies, scenarios, and exercises to prepare for complex ethical and practical demands as commissioned officers in the U.S. Army. Two 90-minute seminars per week. Weekly 3-hour labs required. One mandatory four-day weekend field training exercise away from the University. Prerequisite: MILS 142.

MILITARY HISTORY

MILS 199. Dynamics of Leadership in Military History
Taught at Santa Clara University. Dynamics that drive decisions made by history's military leaders and followers. Wars and battles from 1861 to present. Techniques and innovations in military training, weapon systems, political timing, and their effect they have on strategies. Combined arms experiences.

NAVAL ROTC

The Department of Naval Science at UC Berkeley offers programs of instruction for men and women leading to active duty commissions in the U.S. Navy or U.S. Marine Corps.

COURSES

Navy option students enrolled in one of the four-year programs normally complete the following courses during the first two years. Students should consult http://navyrotc.berkeley.edu for more information and changes to course offerings. Click on the Courses link to access course descriptions.

FRESHMAN YEAR

NS 1. Introduction to Naval Science
NS 2. Sea Power

SOPHOMORE YEAR

NS 3. Leadership and Management
NS 10. Naval Ship Systems I: Engineering

Navy option students enrolled in either the four- or two-year program normally complete the following courses during their junior and senior years.

JUNIOR YEAR

NS 12A. Navigation and Naval Operations I
NS 12B. Navigation and Naval Operations II

SENIOR YEAR

NS 401. Naval Ship Systems
NS 412. Leadership and Ethics

In addition to the above courses, Navy option ROTC students are required to participate in weekly professional development laboratories (drill) at UC Berkeley and complete a number of other courses at Stanford including one year of calculus, physics, and English, and one quarter of world cultural studies, and military history or national security policy.

In lieu of NS 401, NS 10, NS 12A and NS 12B, Marine option students participate in Marine Seminars and complete MA 154, History of Littoral Warfare, and MA 20, Evolution of Warfare, or a designated equivalent course. Marine option students also participate in the weekly professional development laboratories.

NONACADEMIC REGULATIONS

NONDISCRIMINATION POLICY

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, it prohibits discrimination, including harassment, against students or applicants for admission, or employees or applicants for employment on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of its educational policies, admissions policies, scholarships and loan programs, and athletic and other University-administered programs. The following person has been designated to handle inquiries regarding this policy: the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

ADA (AMERICANS WITH DISABILITIES ACT)/SECTION 504 GRIEVANCE PROCEDURE (STUDENT)

For information concerning policies and procedures for students with disabilities, see http://www.stanford.edu/dept/diversityaccess/access/student_grievance.html, or the ADA/Section 504 Compliance Officer, Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford CA, 94305-8230, (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email); see also the Office for Accessible Education (OAE) at http://studentaffairs.stanford.edu/oae and the OAE's Grievance Procedure web site at http://studentaffairs.stanford.edu/oae/grievance.

POLICY

The following is quoted from the policy:

I. *Policy*

Stanford University, in compliance with state and federal laws and regulations, including the Americans with Disabilities Act of 1990 (ADA; as amended 2008) and Section 504 of the Rehabilitation Act of 1973 (Section 504), does not discriminate on the basis of disability in administration of its education-related programs and activities, and has an institutional commitment to provide equal educational opportunities for disabled students who are otherwise qualified.

Students who believe they have been subjected to discrimination on the basis of disability, or have been denied access to services or accommodations required by law, have the right to use this grievance procedure.

II. *Applicability*

The grievance procedure set forth below is applicable to undergraduate and graduate students of the University. In general, it is designed to address disputes concerning the following:

1. Disagreements regarding a requested service, accommodation, or modification of a University practice or requirement;
2. Inaccessibility of a program or activity;
3. Harassment or discrimination on the basis of disability;
4. Violation of privacy in the context of disability.

As a general proposition, this grievance procedure supplants the Student Academic Grievance Procedure and the Student Non-Academic Grievance Procedure (both of which are set forth in this bulletin) for disability-related grievances. Questions of applicability will be decided by the Director of the Diversity and Access Office.

III. *Compliance Officers*

Stanford University's Compliance Officers are responsible for administering this grievance procedure as well as ensuring compliance with applicable laws. The Director of the Diversity and Access Office is the designated ADA / Section 504 Compliance Officer. That office is located in the Mariposa House, 585 Capistrano Way, Stanford, CA 94305-8230, 650-725-0326 (Voice), 650-723-1216 (TTY), 650-723-1791 (Fax), email: disability.access@stanford.edu.

Additional Compliance Officers may be designated from time to time by the Provost from those faculty and staff members knowledgeable concerning disability issues and the legal mandates of state and federal disability statutes.

IV. *Informal Resolution*

Prior to initiating the formal complaint procedure set forth below, the student should, in general, first discuss the matter orally or in writing with the individual(s) most directly responsible. If no resolution results, or if direct contact is inappropriate under the circumstances, the student should then consult with the Compliance -Officer at the Diversity and Access Office who will attempt to facilitate a resolution. (The informal resolution process may involve consultation with the Associate Vice Provost for Student Affairs; see Additional Resources below.)

If the Compliance Officer is not successful in quickly achieving a satisfactory resolution (that is, generally within seven calendar days), the Compliance Officer will inform the student of his or her efforts and the student's right to file a formal complaint.

V. *Formal Complaint*

If the procedure set forth above for informal resolution does not yield a successful resolution, then the student may file a formal complaint in the following manner:

A. *When to File Complaint:* Complaints must be filed as soon as possible, but in no event later than 10 days after the end of the quarter in which the concern arose.

B. *What to File*: a complaint must be in writing and include the following:

1. The grievant's name, address, email address and phone number;
2. A full description of the problem;
3. A description of what efforts have been made to resolve the issue informally;
4. A statement of the remedy requested.

C. *Where to File Complaint:* the complaint is to be filed with the Compliance Officer at the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford CA 94305-8230, 650-725-0326 (Voice), 650-723-1216 (TTY), 650-723-1791 (Fax), email: disability.access@stanford.edu.

D. *Notice of Receipt*: upon receipt of the complaint, the Compliance Officer reviews the complaint for timeliness and appropriateness for this grievance procedure, and provides the grievant with written notice acknowledging its receipt.

E. *Investigation*: the Compliance Officer or his or her designee (hereafter collectively referred to as the "grievance officer") will promptly initiate an investigation. In undertaking the investigation, the grievance officer may interview, consult with, and/or request a written response to the issues raised in the grievance from any individual the grievance officer believes to have relevant information, including faculty, staff, and students.

F. *Representation*: the grievant and the party against whom the grievance is directed each have the right to have a representative. The party shall indicate whether he or she is to be assisted by a representative and, if so, the name of that representative. For purposes of this procedure, an attorney is not an appropriate representative.

G. *Findings and Notification:* upon completion of the investigation, the grievance officer will prepare and transmit to the student, and to the party against whom the grievance is directed, a final report containing a summary of the investigation, written findings, and a proposed disposition. This transmission will be expected within 45 calendar days of the filing of the formal complaint. The deadline may be extended by the Compliance Office for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure. The final report may also be provided, where appropriate, to any University officer whose authority will be needed to carry out the proposed disposition or to determine whether any personnel action is appropriate.

H. *Final Disposition:* the disposition proposed by the grievance officer will be put into effect promptly. The grievant or any party against whom the grievance or the proposed disposition is directed may appeal. The appeal to the Provost (as set forth below) will not suspend the implementation of the disposition proposed by the grievance officer, except in those circumstances where the Provost decides that good cause exists making the suspension of implementation appropriate.

VI. *Urgent Matters*

Whenever the application of any of the time deadlines or procedures set forth in this grievance procedure creates a problem due to the nature of the complaint, the urgency of the matter, or the proximity of the upcoming event, the Compliance Officer will, at the request of the grievant, determine whether an appropriate expedited procedure can be fashioned.

VII. *Remedies*

Possible remedies under this grievance procedure include corrective steps, actions to reverse the effects of discrimination or to end harassment, and measures to provide a reasonable accommodation or proper ongoing treatment. As stated above, a copy of the grievance officer's report may, where appropriate, be sent to University officer(s) to determine whether any personnel action should be pursued.

VIII. *Appeal*

Within ten calendar days of the issuance of the final report, the grievant or the party against whom the grievance is directed may appeal to the Provost the grievance officer's determination.

An appeal is taken by filing a written request for review with the Compliance Officer at the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford CA 94305-8230; (650) 723-0755 (Voice), (650) 723-1216 (TTY), (650) 723-1791 (Fax), email: disability.access@stanford.edu.

The written request for review must specify the particular substantive and/or procedural basis for the appeal, and must be made on grounds other than general dissatisfaction with the proposed disposition. Furthermore, the appeal must be directed only to issues raised in the formal complaint as filed or to procedural errors in the conduct of the grievance procedure itself, and not to new issues.

The Compliance Officer willforward the appeal to the Provost, and also provide copies to the other party or parties. If the grievance involves a decision that is being challenged, the review by the Provost or his or her designee usually will be limited to the following considerations:

1. Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
2. Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
3. Given the proper facts, criteria, and procedures, was the decision a reasonable one?

A copy of the Provost's written decision will be expected within 30 calendar days of the filing of the appeal and will be sent to the parties, the Compliance Officer and, if appropriate, to the University officer whose authority will be needed to carry out the disposition. The deadline may be extended by the Provost for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure. The decision of the Provost on the appeal is final.

TITLE IX OF THE EDUCATION AMENDMENTS OF 1972

It is the policy of Stanford University to comply with Title IX of the Education Amendment of 1972 and its regulations, which prohibit discrimination on the basis of sex. The Title IX Compliance Officer is the Director of the Diversity and Access Office, who has been appointed to coordinate the University's efforts to comply with the law. Anyone who believes that, in some respect, Stanford is not in compliance with Title IX and its regulations should contact the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford, CA 94305-8230, (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email). Grievance procedures to address complaints of discrimination on the basis of sex are set forth in the "Student Non-Academic Grievance Procedure". See also Administrative Guide Memo 23 at http://adminguide.stanford.edu/23.pdf.

TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

It is the policy of Stanford University to comply with Title VI of the Civil Rights Act of 1964 and its regulations, which prohibit discrimination on the basis of race, color, and national origin. The Title VI Compliance Officer is the Director of the Diversity and Access Office, who has been appointed to coordinate the University's efforts to comply with the law. Anyone who believes that, in some respect, Stanford is not in compliance with Title VI and its regulations should contact the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email). Grievance procedures to address complaints of discrimination on the basis of race, color, and national origin are set forth in the "Student Non-Academic Grievance Procedure." See also Administrative Guide Memo 23 at http://adminguide.stanford.edu/23.pdf.

GRIEVANCES

A Stanford undergraduate or graduate student who believes that he or she has been subject to an improper decision on an academic matter may file a grievance pursuant to the Student Academic

Grievance Procedurs (in the "Academic Policies and Statements" section of this bulletin). For other types of grievances, students should review the section that follows on the Student Non-Academic Grievance Procedure, and consult concerning applicable procedures with the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

STUDENT NON-ACADEMIC GRIEVANCE PROCEDURE

POLICY

The following is the policy:

1. *Applicability*
   a. It is perhaps inevitable in any university that some students may at times feel improperly treated, and that concerns about unfairness (including potential discrimination and harassment) may also at times arise.
   In this regard (and although this grievance procedure is not limited to concerns of discrimination), Stanford University's Nondiscrimination Policy provides in part: "Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, it prohibits discrimination, including harassment, against students or applicants for admission, or employees or applicants for employment on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of its educational policies, admissions policies, scholarships and loan programs, and athletic and other University-administered programs."
   b. At Stanford, there are a number of grievance procedures through which students can raise and seek redress for what they believe to be unfair, improper or discriminatory decisions, actions, or treatment. For example:
      1. If the matter involves an academic decision, the Student Academic Grievance Procedure may be the applicable procedure.
      1. If the matter involves a disability-related concern, the Student ADA/Section 504 Grievance Procedure may be applicable.
      2. If the matter involves a student-athlete and his or her sport, the Student-Athlete Grievance Procedure may be applicable.
   c. The purpose of the Student Non-Academic Grievance Procedure is to provide a process for students to seek resolution of disputes and grievances that may not fall within the scope of one of the other grievance processes, including those which may arise in a student's capacity as a student-employee.
   d. This procedure is available to undergraduates and graduate students at Stanford University. It is designed to address individual decisions or individual actions that affect the grievant personally in his or her capacity as a student, but it does not apply to matters proceeding through the Office of Judicial Affairs or through the involuntary leave policy. This is likewise not a grievance procedure to address the concerns of student groups. Similarly and as a general proposition, dissatisfaction with a departmental, school, or University policy or practice of broad or general application is not grounds for a grievance under this procedure; the Director of the Diversity and Access Office (hereafter "the Director") may, in his or her discretion, entertain such a grievance in exceptional circumstances, such as where (for example) the policy or practice is alleged to be contrary to law. In the same way, the Director may entertain a grievance under this procedure brought by a non-student, in an appropriate case.
   e. The Director is responsible for administering this Student Non-Academic Grievance Procedure.
      1. The Director may be contacted at: Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email), http://www.stanford.edu/dept/ocr.
      2. The Director in his or her sole discretion can decide whether to refer a grievance brought under this procedure to another grievance process. In cases involving allegations of sexual harassment in particular, the Director may wish to consult with the Director of the Sexual Harassment Policy Office as to the most appropriate way to proceed; see Section 5.d below. In cases involving student employment, the Director may wish to consult with the University's Department of Human Resources.
2. *Informal Resolution*
   a. As a general proposition (and although particular circumstances may warrant an exception), the student should first discuss the problem and seek a solution with the individual(s) most directly involved.
   b. If no resolution results (or if circumstances make discussion inappropriate with the person most directly involved), the student should then consult with the individual at the next (higher) administrative level in the department, school, residence or University administrative unit. Serious efforts should be made to resolve the issue locally at an informal level without resort to a formal grievance; such efforts may continue even after the formal process is underway.
3. *Formal Grievance*
   a. If informal means of resolution prove inadequate, the student should set forth in writing the substance of the complaint, the grounds for it and the evidence on which it is based, and the efforts taken to date to resolve the matter. It is at this stage that the complaint becomes a formal grievance.
   b. The grievance document should be submitted to the Director. A grievance should be filed in a timely fashion, i.e., normally within thirty days of the end of the academic quarter in which the action that is the subject of the grievance occurred. Except in extraordinary circumstances, delay in filing a grievance will be grounds for rejection of that grievance.
   c. The Director will promptly initiate a review, which should normally be completed within sixty days. The Director may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance officer or other designee, who will look into and/or address the matter as the Director directs. The Director may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
   d. In undertaking this review, either the Director, his or her designee, or the grievance officer may request a response to the issues raised in the grievance from any individuals believed to have information the reviewer considers relevant, including faculty, staff and students.
   e. The Director (or his or her designee) will issue his or her decision in writing, and take steps to initiate such corrective action as is called for (if any). Conduct meriting disci-

pline will be brought to the attention of the appropriate disciplinary process.

4. *Appeal*
   a. If the student is dissatisfied with the disposition by the Director (or his or her designee), he or she may appeal to the Provost (Office of the President and Provost, Building 10, Stanford, CA 94305-2061; phone 650-725-4075; fax 650-725-1347). The appeal should be filed in writing with the Provost within ten days of the issuance of the decision by the Director (or his or her designee); a delay in filing the appeal may be grounds for rejection of that appeal.
   b. The Provost may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance appeal officer, who will review the matter at the Provost's direction. The Provost may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
   c. The Provost should normally complete his or her review of the appeal and issue his or her decision in writing within forty-five days. That decision is final.
5. *General Provisions*
   a. *Time Guidelines*—The time frames set forth herein are guidelines. They may be extended by the Director or Provost, as applicable, in his or her discretion for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure.
   b. *Advisers*—A student initiating or participating in a grievance under this procedure may be accompanied by an adviser in any discussion with the Director, the Provost or their designees, or a grievance or grievance appeal officer under this procedure; any adviser must be a current Stanford faculty, staff member or student.
   c. *Ombuds*—Students should be aware that the University Ombuds (http://www.stanford.edu/dept/ocr/ombuds) is available to discuss and advise on any matters of University concern and frequently help expedite resolution of such matters. Although it has no decision making authority, the Ombuds' Office has wide powers of inquiry.
   d. *Sexual Harassment and Sexual Assault*—For information and resources concerning sexual harassment, students should refer to the web page of the Sexual Harassment Policy Office at http://harass.stanford.edu. For information and resources concerning sexual assault and relationship abuse, students should refer to the web page of the Sexual Violence Advisory Board at http://www.stanford.edu/group/svab/help.shtml.
   e. *No retaliation*—Stanford University prohibits retaliation or reprisals against individuals based on their pursuit in good faith of a grievance under this procedure, or their participation in good faith in the grievance process.
   f. *Standards for Review*—If the grievance involves a decision that is being challenged, the review by the Director, as well as the review by the Provost on appeal, usually will be limited to the following considerations:
      1. Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
      2. Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
      3. Given the proper facts, criteria, and procedures, was the decision one which a person in the position of the decision maker might reasonably have made?

OWNERSHIP AND USE OF STANFORD NAME AND TRADEMARKS

Stanford registered marks, as well as other names, seals, logos, and other symbols and marks that are representative of Stanford, may be used solely with permission of Stanford. Merchandise bearing Stanford's names and marks, such as t-shirts, glassware, and notebooks, must be licensed. For complete text of the currently applicable policy, including the University officers authorized to grant permission to use the Stanford name and marks, see Administrative Guide Memo 15.5, Ownership and Use of Stanford Name and Trademarks at http://adminguide.stanford.edu/15_5.pdf.

COPYRIGHT

Copyright laws protect original works of authorship and give the owners of copyrights the exclusive right to do and to authorize others to do certain things in regard to a copyrighted work, including: make copies, distribute the work, display or perform the work publicly, and create derivative works. Copyright laws apply to nearly all forms of captured content, including traditional works like books, photographs, music, drama and sculpture. The laws also adapt to changes in technologies, and include in their scope modern forms of works like motion pictures, web sites, electronic media, software, multimedia works and some databases. Registration is not required to obtain a copyright, so if in doubt, assume a copyright applies.

Unless an exception to the copyright owner's exclusive rights applies, you must obtain permission from the copyright owner to copy, distribute, display or perform a copyrighted work in any medium for any purpose. Be especially mindful of copyright principles when using the Internet. Just because a work is posted on the Internet does not mean that the owner of the copyright has given you permission to use it. And, you should not be posting material onto the Internet without copyright clearance.

Stanford University Libraries have licenses with many publishers, which permit copying of materials in accordance with the educational, research or administrative functions of the University. In addition, there are four major exceptions to the copyright owner's exclusive rights, which (if applicable) permit limited use without permission. These are: the fair use exception, the library exception, the face-to-face teaching exception, and the distance-learning exception. For a more detailed explanation of these exceptions, the copyright laws and Stanford's copyright policies, please review the University's Copyright Reminder at http://www-sul.stanford.edu/libraries_collections/copyright_reminders/. It is each person's responsibility to be aware of and abide by copyright law; violation may result in civil or criminal liability, and constitutes grounds for University discipline, up to and including discharge, dismissal and expulsion.

PEER-TO-PEER FILE SHARING

The use of file-sharing networks and software to download and share copyrighted works like software, music, movies, television programs, and books can violate copyright laws. Both the person who makes an illegal copy of a copyrighted work available and the person who receives or downloads an illegal copy have violated the law and Stanford policies. Many file-sharing programs have default settings that share copyrighted files, such as music and movies, through the Internet. Before enabling any of these programs students, faculty, or staff must read the fine print, make sure to understand the program itself, and only use such programs lawfully. Under the Digital Millennium Copyright Act (DMCA), cop-

copyright owners are entitled to notify Internet service providers, such as Stanford, that IP addresses linked to the Stanford network are sharing copies of music, movies, or other content without authorization. The law requires the University to respond to such complaints by eliminating access to the infringing materials. Stanford will disconnect students who fail to respond to a DMCA complaint promptly, and Stanford will charge reconnection fees starting at $100 and going up as high as $1,000 for successive DMCA complaints. Furthermore, the University also will suspend or terminate computer access to the Stanford network, including termination of the SUNet ID, to members of the community who continue to violate copyright laws. Finally, the University will take action through the student, employee, or faculty disciplinary processes if necessary. Beyond University consequences, copyright holders may file civil lawsuits against copyright infringers seeking extensive monetary damages. If compelled by a lawful subpoena, Stanford may be required to identify students, faculty, staff, or others who have violated copyright law. For more information about file-sharing, refer to Residential Computing's online resource, File-Sharing and Copyright Law at http://rescomp.stanford.edu/info/dmca.

Except with permission from the Office of Accessible Education or the instructor in question, students may not audio- or video-record lectures. Even with permission, students may only use such recordings for personal use; no posting or further distribution or use is permitted.

DOMESTIC PARTNERS

In October 1990, Stanford University adopted a domestic partners policy. This policy, which implements the University's nondiscrimination policy, makes services that have historically been available to married students available on an equal basis to students with same-sex or opposite-sex domestic partners. These services include access to student housing, a courtesy card that provides access to University facilities, and the ability to purchase medical care at Vaden Health Service. A domestic partnership is defined as an established long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

SEXUAL HARASSMENT AND CONSENSUAL SEXUAL OR ROMANTIC RELATIONSHIPS

For the complete text of the currently applicable version of this policy, see Administrative Guide Memo 23.2, Sexual Harassment, http://adminguide.stanford.edu/23_2.pdf. It is also available from the Sexual Harassment Policy Office homepage, http://harass.stanford.edu.

SUMMARY

Stanford University strives to provide a place of work and study free of sexual harassment, intimidation or exploitation. Where sexual harassment is found to have occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action against those responsible.

POLICY

The following is quoted from the policy:

1. *In General*
   a. *Applicability and Sanctions for Policy Violations*—This policy applies to all students, faculty and staff of Stanford University, as well as to others who participate in Stanford programs and activities. Its application includes Stanford programs and activities both on and off-campus, including overseas programs. Individuals who violate this policy are subject to discipline up to and including discharge, expulsion, and/or other appropriate sanction or action.
   b. *Respect for Each Other*—Stanford University strives to provide a place of work and study free of sexual harassment, intimidation or exploitation. It is expected that students, faculty, staff and other individuals covered by this policy will treat one another with respect.
   c. *Prompt Attention*—Reports of sexual harassment are taken seriously and will be dealt with promptly. The specific action taken in any particular case depends on the nature and gravity of the conduct reported, and may include intervention, mediation, investigation and the initiation of grievance and disciplinary processes as discussed more fully below. Where sexual harassment is found to have occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action against those responsible.
   d. *Confidentiality*—The University recognizes that confidentiality is important. Sexual harassment advisers and others responsible to implement this policy will respect the confidentiality and privacy of individuals reporting or accused of sexual harassment to the extent reasonably possible. Examples of situations where confidentiality cannot be maintained include circumstances when the University is required by law to disclose information (such as in response to legal process) and when disclosure is required by the University's outweighing interest in protecting the rights of others.
   e. *Protection Against Retaliation*—Retaliation and/or reprisals against an individual who in good faith reports or provides information in an investigation about behavior that may violate this policy are against the law and will not be tolerated. Intentionally making a false report or providing false information, however, is grounds for discipline.
   f. *Relationship to Freedom of Expression*—Stanford is committed to the principles of free inquiry and free expression. Vigorous discussion and debate are fundamental to the University, and this policy is not intended to stifle teaching methods or freedom of expression generally, nor will it be permitted to do so. Sexual harassment, however, is neither legally protected expression nor the proper exercise of academic freedom; it compromises the integrity of the University, its tradition of intellectual freedom and the trust placed in its members.
2. *What Is Sexual Harassment?*
   Unwelcome sexual advances, requests for sexual favors, and other visual, verbal or physical conduct of a sexual nature constitute sexual harassment when:
   a. It is implicitly or explicitly suggested that submission to or rejection of the conduct will be a factor in academic or employment decisions or evaluations, or permission to participate in a University activity; *or*
   b. The conduct has the purpose or effect of unreasonably interfering with an individual's academic or work performance or creating an intimidating or hostile academic, work or student living environment.

   Determining what constitutes sexual harassment depends upon the specific facts and the context in which the conduct occurs. Sexual harassment may take many forms—subtle and indirect, or blatant and overt. For example,
   - It may be conduct toward an individual of the opposite sex or the same sex.
   - It may occur between peers or between individuals in a hierarchical relationship.
   - It may be aimed at coercing an individual to participate in an unwanted sexual relationship or it may have the effect of causing an individual to change behavior or work performance.
   - It may consist of repeated actions or may even arise from a single incident if sufficiently egregious.

The University's Policy on Sexual Assault (see Guide Memo 23.3, Sexual Assault, (http://adminguide.stanford.edu/23_3.pdf) may also apply when sexual harassment involves physical contact.

3. *What To Do About Sexual Harassment*
Individuals seeking further information are directed to the following resources:
   - The Sexual Harassment Policy Office (Mariposa House, 585 Capistrano Way, Room 208-209, Stanford University, Stanford, CA, 94305-8230; (650) 723-1583; email: harass@stanford.edu for information, consultation, advice, or to lodge a complaint. Note that anonymous inquiries can be made to the SHPO by phone during business hours.
   - The Sexual Harassment Policy Office web page at http://harass.stanford.edu.
   - Any designated Sexual Harassment Adviser or resource person listed in 3.a or 5.a.

   The following are the primary methods for dealing with sexual harassment at Stanford. They are not required to be followed in any specific order. However, early informal methods are often effective in correcting questionable behavior.

   a. *Consultation*—Consultation about sexual harassment is available from the Sexual Harassment Policy Office, Sexual Harassment Advisers (including residence deans), human resources officers, employee relations specialists, counselors at Counseling and Psychological Services (CAPS) or the Help Center, chaplains at Memorial Church, ombudspersons and others. A current list of Sexual Harassment Advisers is available from the Sexual Harassment Policy Office and at http://harass.stanford.edu/SHadvisers.html. Consultation is available for anyone who wants to discuss issues related to sexual harassment, whether or not "harassment" actually has occurred, and whether the person seeking information is a complainant, a person who believes his or her own actions may be the subject of criticism (even if unwarranted), or a third party.

   Often there is a desire that a consultation be confidential or "off the record." This can usually be achieved when individuals discuss concerns about sexual harassment without identifying the other persons involved, and sometimes even without identifying themselves. Confidential consultations about sexual harassment also may be available from persons who, by law, have special professional status, such as:
      - Counselors at Counseling and Psychological Services (CAPS), http://caps.stanford.edu
      - Counselors at the Help Center, http://www.stanford.edu/dept/helpcenter
      - Chaplains at Memorial Church
      - The University Ombudsperson, http://www.stanford.edu/dept/ombuds

   In these latter cases, the level of confidentiality depends on what legal protections are held by the specific persons receiving the information and should be addressed with them before specific facts are disclosed. For more information see http://harass.stanford.edu/confidential.html.

   For further information on confidentiality, see Section 1(d) above.

   b. *Direct Communication*—An individual may act on concerns about sexual harassment directly, by addressing the other party in person or writing a letter describing the unwelcome behavior and its effect and stating that the behavior must stop. A Sexual Harassment Adviser can help the individual plan what to say or write, and likewise can counsel persons who receive such communications. Reprisals against an individual who in good faith initiates such a communication violate this policy.

   c. *Third Party Intervention*—Depending on the circumstances, third party intervention in the workplace, student residence or academic setting may be attempted. Third party intervenors may be the Sexual Harassment Advisers, human resources professionals, the ombudspersons, other faculty or staff, or sometimes mediators unrelated to the University.
   When third party intervention is used, typically the third party (or third parties) will meet privately with each of the persons involved, try to clarify their perceptions and attempt to develop a mutually acceptable understanding that can insure that the parties are comfortable with their future interactions. Other processes, such as a mediated discussion among the parties or with a supervisor, may also be explored in appropriate cases.
   Possible outcomes of third party intervention include explicit agreements about future conduct, changes in workplace assignments, substitution of one class for another, or other relief, where appropriate.

   d. *Formal Grievance, Appeal, and Disciplinary Processes*—Grievance, appeal, or disciplinary processes may be pursued as applicable.

      1. *Grievances and Appeals*—The applicable procedure depends on the circumstances and the status of the person bringing the charge and the person against whom the charge is brought. Generally, the process consists of the individual's submission of a written statement, a process of fact-finding or investigation by a University representative, followed by a decision and, in some cases, the possibility of one or more appeals, usually to Stanford administrative officers at higher levels. The relevant procedure (see below) should be read carefully, since the procedures vary considerably.

   If the identified University fact-finder or grievance officer has a conflict of interest, an alternate will be arranged, and the Director of the Sexual Harassment Policy Office or the Director of Employee and Labor Relations can help assure that this occurs.

   In most cases, grievances and appeals must be brought within a specified time after the action complained of. While informal resolution efforts will not automatically extend the time limits for filing a grievance or appeal, in appropriate circumstances the complainant and the other relevant parties may mutually agree in writing to extend the time for filing a grievance or appeal.

   A list of the established grievance and appeal procedures is located at http://hrweb.stanford.edu/elr/policies/list_grievance_procedures.html. Copies may also be obtained from the Sexual Harassment Policy Office, http://www.stanford.edu/group/SexHarass.

   Copies of the following may be obtained from Employee and Labor Relations, 651 Serra Street:
   - "Solving Workplace Problems at Stanford: Understanding the Staff Dispute Resolution Policy" (also at http://hrweb.stanford. edu/forms/staffresolution.pdf.)
   - "Solving Workplace Problems at Stanford: Information for Academic Staff – Librarians and Academic Staff – Research Associates"
   - "The Dispute Resolution Process (A User's Guide)"

      1. *Disciplinary Procedures*—In appropriate cases, disciplinary procedures may be initiated. The applicable disciplinary procedure depends on the status of the individual whose conduct is in question. For example, faculty are subject to the Statement on Faculty Discipline http://www.stanford.edu/dept/provost/faculty/policies/handbook/ch4.html#statementonfacultydiscipline, and students to the Fundamental Standard. For additional information related to student judicial affairs, see http://www.stanford.edu/dept/vpsa/judicialaffairs.

The individuals referenced in this section are available to discuss these options and differing methods for dealing with sexual harassment.

4. *Procedural Matters*
   a. *Investigations*—If significant facts are contested, an investigation may be undertaken. The investigation will be conducted in a way that respects, to the extent possible, the privacy of all of the persons involved. In appropriate cases, professional investigators may be asked to assist in the investigation. The results of the investigation may be used in the third party intervention process or in a grievance or disciplinary action.
   b. *Recordkeeping*—The Sexual Harassment Policy Office will track reports of sexual harassment for statistical purposes and report at least annually to the University President concerning their number, nature and disposition.

      The Sexual Harassment Policy Office may keep confidential records of reports of sexual harassment and the actions taken in response to those reports, and use them for purposes such as to identify individuals or departments likely to benefit from training so that training priorities can be established. No identifying information will be retained in cases where the individual accused was not informed that there was a complaint.
   c. *Indemnification and Costs*—The question sometimes arises as to whether the University will defend and indemnify a Stanford employee accused of sexual harassment. California law provides, in part, "An employer shall indemnify [its] employee for all that the employee necessarily expends or loses in direct consequence of the discharge of his [or her] duties as such … ." The issue of indemnification depends on the facts and circumstances of each situation. Individuals who violate this policy, however, should be aware that they and/or their schools, institutes, or other units may be required to pay or contribute to any judgments, costs and expenses incurred as a result of behavior that is wrongful and/or contrary to the discharge of the employee's duties. In general, see Administrative Guide Memo 15.7 (http://adminguide.stanford. edu/15_7.pdf).
5. *Resources for Dealing with Sexual Harassment*
   a. *Advice*—Persons who have concerns about sexual harassment should contact the Sexual Harassment Policy Office, any Sexual Harassment Adviser at http://harass.stanford.edu/SHadvisers.html or one of the other individuals listed below. Reports should be made as soon as possible: the earlier the report, the easier it is to investigate and take appropriate remedial action. When reports are long delayed, the University will try to act to the extent it is reasonable to do so, but it may be impossible to achieve a satisfactory result after much time has passed.

      Likewise, anyone who receives a report or a grievance involving sexual harassment should promptly consult with the Sexual Harassment Policy Office or with a Sexual Harassment Adviser.

      There are a number of individuals specially trained and charged with specific responsibilities in the area of sexual harassment. In brief, they are:
      - *Sexual Harassment Advisers* (http://harass.stanford.edu/SHadvisers.html) serve as resources to individuals who wish to discuss issues of sexual harassment, either because they have been harassed or because they want information about the University's policy and procedures. There is usually at least one Adviser assigned to each of the schools at the University and to each large work unit; most of the residence deans also have been appointed as Sexual Harassment Advisers. Advisers are also authorized to receive complaints.
      - *The Director of the Sexual Harassment Policy Office* is responsible for the implementation of this policy. The Director's Office also provides advice and consultation to individuals when requested; receives complaints and coordinates their handling; supervises the other Advisers; encourages and assists prevention education for students, faculty and staff; keeps records showing the disposition of complaints; and generally coordinates matters arising under this policy. Because education and awareness are the best ways to prevent sexual harassment; developing awareness, education and training programs and publishing informational material are among the most important functions of the Sexual Harassment Policy Office (http://harass.stanford.edu).
      - As stated above, individuals with concerns about sexual harassment may also discuss their concerns informally with psychological counselors (for example through CAPS or the HELP Center), chaplains (through the Memorial Chapel), or the University ombudsperson. For more information, see http://harass.stanford.edu/resources.html.
   b. *External Reporting*—Sexual harassment is prohibited by state and federal law. In addition to the internal resources described above, individuals may pursue complaints directly with the government agencies that deal with unlawful harassment and discrimination claims, e.g., the U.S. Equal Employment Opportunity Commission (EEOC), the Office for Civil Rights (OCR) of the U.S. Department of Education, and the State of California Department of Fair Employment and Housing (DFEH). These agencies are listed in the Government section of the telephone book. A violation of this policy may exist even where the conduct in question does not violate the law.
6. *Consensual Sexual or Romantic Relationships*
   a. *In General*—There are special risks in any sexual or romantic relationship between individuals in inherently unequal positions, and parties in such a relationship assume those risks. In the University context, such positions include (but are not limited to) teacher and student, supervisor and employee, senior faculty and junior faculty, mentor and trainee, adviser and advisee, teaching assistant and student, coach and athlete, and the individuals who supervise the day-to-day student living environment and student residents. Because of the potential for conflict of interest, exploitation, favoritism, and bias, such relationships may undermine the real or perceived integrity of the supervision and evaluation provided, and the trust inherent particularly in the teacher-student context. They may, moreover, be less consensual than the individual whose position confers power or authority believes. The relationship is likely to be perceived in different ways by each of the parties to it, especially in retrospect.

      Moreover, such relationships may harm or injure others in the academic or work environment. Relationships in which one party is in a position to review the work or influence the career of the other may provide grounds for complaint by third parties when that relationship gives undue access or advantage, restricts opportunities, or creates a perception of these problems. Furthermore, circumstances may change, and conduct that was previously welcome may become unwelcome. Even when both parties have consented at the outset to a romantic involvement, this past consent does not remove grounds for a charge based upon subsequent unwelcome conduct.

      Where such a relationship exists, the person in the position of greater authority or power will bear the primary burden of accountability, and must ensure that he or she—and this is particularly important for teachers—does not exercise any supervisory or evaluative function over the other person in the relationship. Where such recusal is required, the recusing party must also notify his or her supervisor, department chair or dean, so that such chair, dean or supervisor can exercise his or her responsibility to evaluate the adequacy of the alternative supervisory or

evaluative arrangements to be put in place. Staff members may notify their local human resources officers. To reiterate, the responsibility for recusal and notification rests with the person in the position of greater authority or power. Failure to comply with these recusal and notification requirements is a violation of this policy, and therefore grounds for discipline. The University has the option to take any action necessary to insure compliance with the spirit of this recusal policy, including transferring either or both employees in order to minimize disruption of the work group. In those extraordinarily rare situations where it is programmatically infeasible to provide alternative supervision or evaluation, the cognizant Dean or Director must approve all evaluative and compensation actions.

b. *With Students*—At a university, the role of the teacher is multi-faceted, including serving as intellectual guide, counselor, mentor and advisor; the teacher's influence and authority extend far beyond the classroom. Consequently and as a general proposition, the University believes that a sexual or romantic relationship between a teacher and a student, even where consensual and whether or not the student would otherwise be subject to supervision or evaluation by the teacher, is inconsistent with the proper role of the teacher, and should be avoided. The University therefore very strongly discourages such relationships.

7. *Policy Review and Evaluation*—This policy went into effect on October 6, 1993, and was amended on November 30, 1995, and on May 30, 2002. It is subject to periodic review, and any comments or suggestions should be forwarded to the Director of the Sexual Harassment Policy Office.

RESOURCES

The following is a summary of resources concerning sexual harassment available to members of the Stanford Community:

A brochure containing the policy, a list of current sexual harassment advisers, confidential resources, and other helpful information is available online at http://harass.stanford.edu, and in printed form from the Sexual Harassment Policy Office at Mariposa House, 585 Capistrano Way, Room 208-209, Stanford University, Stanford, CA, 94305-8230; (650) 723-1583; email: harass@stanford.edu. Copies of the University policy on sexual assault, which complements this sexual harassment policy, as well as all other documents mentioned in this section, are also available at the Sexual Harassment Policy Office.

All faculty, staff, and students who have questions regarding this policy and its enforcement can consult with a Sexual Harassment Adviser or can be directed to the local Personnel Officer or Regional Human Resources Manager. Faculty members should contact their dean or department chair, and students should contact the Director of the Sexual Harassment Policy Office or the Dean of Student Affairs.

Sexual Harassment Policy Office—telephone: (650) 723-1583; email: harass@stanford.edu.

Director: Laraine Zappert (Clinical Professor, Psychiatry and Behavioral Sciences)

Assistant Director: Nanette Andrews

SEXUAL ASSAULT

The University's Policy on Sexual Assault is published in complete form in the Administrative Guide Memo 23.3, available at http://adminguide.stanford.edu/23_3.pdf, and on the Judicial Affairs Office web site at http://www.stanford.edu/dept/vpsa/judicialaffairs/index.html.

SUMMARY

The following summarizes the policy on Sexual Assault and provides information on resources available to members of the Stanford community.

Background—This policy has been enacted by Stanford University in accordance with California State Law, Assembly Bill 3098, Postsecondary Education: Student Safety, July, 1990.

Policy—Sexual assault is unacceptable and will not be tolerated at Stanford University. Any member of the Stanford community who commits sexual assault at or on the grounds of the University, or at any of the University's off-campus facilities or activities, or at the facilities or activities of any affiliated student organization, will face maximal institutional sanctions, in addition to any prosecutions external authorities may undertake. Stanford University is committed to providing information on services, resources, and treatment available to victims of sexual assault. A comprehensive website containing a list of resources can be found at http://www.stanford.edu/group/svab/.

Definition—For purposes of this policy, sexual assault is defined as the commission of an unwanted sexual act, occurring without consent of both individuals, or occurring under threat or coercion. It can occur either forcibly and/or against a person's will, or when a person is incapable of giving consent (if under 18 years of age; if intoxicated by drugs or alcohol; if developmentally disabled; if temporarily or permanently mentally or physically unable to do so). Sexual assault includes but is not limited to rape, forcible sodomy, forcible oral copulation, rape with an object, sexual battery, forcible fondling, and threat of sexual assault.

Notification—With the consent of the victim, charges of sexual assault received by University offices or personnel shall be communicated promptly to the Department of Public Safety, 711 Serra Street, telephone 9-911 for emergency response or (650) 723-9633 during normal business hours, or, in the case of a student, to the sexual assault response team at YWCA Sexual Assault Center at Stanford at Vaden Health Service, 866 Campus Drive, telephone 725-9955.

Legal Reporting Requirements—Health care professionals are expected to fulfill legally mandated reporting requirements.

Emergency Services Available to Victims—Victims of sexual assault are urged to seek immediate attention from emergency police, medical, and counseling services. On the Stanford campus and in the immediate vicinity, the following provide 24-hour response and will arrange for police assistance, medical assistance, emotional support services, and advocacy and support:

"911" Emergency Network: dial 9-911 from University phones or 911 from outside phones

Santa Clara Valley Medical Center, 751 South Bascom Avenue, San Jose, telephone (408) 885-5000

YWCA Sexual Assault Center at Stanford, for students, at the Vaden Health Service, telephone (650) 725-9955

Stanford Hospital and Clinics, 300 Pasteur Drive, Stanford, telephone (650) 723-5111

Non-Emergency Resources—Additional resources for students are available at Vaden Health Service at (650) 723-3785, including short-term counseling, referral to long-term therapy, follow-up pregnancy testing, and testing and treatment for sexually transmitted diseases. Additional services for faculty and staff are available at the University's HELP Center, Galvez House (723-4577), including general counseling, information, support, and referral. The University ombudsperson (723-3682) is available to all in the Stanford community for general counseling, advice, and advocacy.

Ongoing Case Management Procedures—Both informal procedures and formal grievance procedures for case management of sexual assault charges are given in the University's policy on Sexual Harassment appearing as Administrative Guide Memo 23.2 and published annually in this bulletin. Victims are to be kept informed by those responsible for those procedures of the status of any disciplinary proceedings and the results of any disciplinary action or appeal. The office of the Dean of Student Life is available to help student victims deal with academic difficulties that may arise because of the victimization and its impact.

Information Requests and Disclosure—The University offices responding to charges of sexual assault have established protocols for limiting the disclosure of information and for handling inquiries from the press, concerned students, and parents.

Information about Options—The University offices responding to charges of sexual assault will inform victims, at a minimum, of the options of: criminal prosecution, civil prosecution, the disciplinary process, the appropriate grievance procedure, alternative housing assignments, and academic assistance alternatives.

POLITICAL ACTIVITIES

For the complete text of the currently applicable version of this policy, see Administrative Guide Memo 15.1, Political Activities, available at http://adminguide.stanford.edu/15_1.pdf.

SUMMARY

The following summarizes the policy on Political Actvities:

Stanford University, as a charitable entity, is subject to federal, state, and local laws and regulations regarding political activities: campaign activities, lobbying, and the giving of gifts to public officials.

While all members of the University community are naturally free to express their political opinions and engage in political activities to whatever extent they wish, it is very important that they do so only in their individual capacities and avoid even the appearance that they are speaking or acting for the University in political matters.

In the limited circumstances where individuals must speak or act on behalf of the University in the political arena, they must do so in accordance with the provisions of this Guide Memo.

POLICY

The following is quoted from the policy:

1. *Summary of Legal Requirements and Restrictions*
   a. *Campaign Activities:* contributions of money, goods, or services to candidates for political office and in support of or opposition to ballot measure campaigns are subject to a wide variety of political laws. Depending on the jurisdiction and the campaign, political contributions may be prohibited or limited and, in nearly all cases, are subject to a complicated series of disclosure rules. Because of the University's tax-exempt status, the University is legally prohibited from endorsing candidates for political office or making any contribution of money, goods, or services to candidates. It is important, therefore, that no person inadvertently cause the University to make such a contribution.
   b. *Lobbying:* lobbying can generally be described as any attempt to influence the action of any legislative body (for example, Congress, state legislatures, county boards, city councils, and their staffs) or any federal, state, or local government agency. Laws regulating lobbying exist at the federal, state, and local levels but can differ widely in scope, depending on the jurisdiction. Some laws, for example, only regulate lobbying of the legislative branch. Others, however, also cover lobbying of administrative agencies and officers in the executive branch (for example, lobbying for federally-funded grants). To one degree or another, however, most lobbying laws require registration and reporting by individuals engaged in attempts to influence governmental action.

      Tax-exempt organizations are permitted to lobby, and the University engages in lobbying on a limited number of issues, mostly those affecting education, research, and related activities. There is usually some threshold of time or money spent on lobbying that triggers registration and reporting requirements. Regardless of thresholds, however, no University employee—other than the following individuals, on matters under their jurisdiction—may lobby on behalf of the University without specific authorization:
      - President
      - Provost
      - Deans of the Seven Schools
      - Vice Provost and Dean of Research
      - Vice President for Business Affairs and Chief Financial Officer
      - Executive Director of Human Resources
      - Director of the Stanford Linear Accelerator Center
      - Director of the Hoover Institution
      - General Counsel
      - Vice President for Public Affairs

      The Vice Provost and Dean of Research may grant permission to faculty members to lobby on behalf of the University for specific purposes. The Director of Government and Community Relations may grant permission to staff members to lobby on behalf of the University for specific purposes. All lobbying on behalf of the University should be coordinated with the Director of Government and Community Relations.
   c. *Giving of Gifts to Public Officials and Staff:* almost all jurisdictions have strict rules on the extent to which gifts and honoraria may be given to public officials (both elected and non-elected officials and, often, staff). In some cases gifts and honoraria are prohibited; in others they are limited; and in most cases they are subject to detailed disclosure. In addition, in some jurisdictions such as California, gifts to both state and local public officials can result in a public official's disqualification from participation in any governmental action affecting the interests of the donor. Meals, travel, and entertainment are the most common types of gifts, but gift rules can also apply in cases where public officials attend a reception or receive tickets to sporting or other events.

      As a non-profit organization, the University generally does not give gifts to public officials and, in those limited cases where it does give such gifts, it must do so in accordance with all applicable laws and regulations. Therefore, any University employee who, on behalf of the University, wishes to make a gift to a public official must receive prior approval from the Director of Government and Community Relations before making such a gift.
   d. *Reporting of Political Activities:* the University must report most of its political activities above certain thresholds. Therefore, any University employee engaging in such activities on behalf of the University should carefully review the remainder of this Guide Memo and should discuss the relevant activities in advance with the Director of Government and Community Relations.
2. *Prohibited and Restricted Political Activities*
   a. *In General:*
   b. No person may, on behalf of the University, engage in any political activity in support of or opposition to any candidate for elective public office (including giving or receiving funds or endorsements), nor shall any University resources be used for such purpose.
   c. No person may, on behalf of the University, lobby (or use University resources to lobby) any federal, state, or local legislative or administrative official or staff member unless specifically authorized to do so. Any lobbying activity, even when authorized, must be conducted in compliance with this Guide Memo, other applicable University policies, and applicable law.
   d. No person may, on behalf of the University, give a gift (or use any University resources to give a gift) to any federal, state, or local official or staff member, except in compliance with this Guide Memo, other applicable University policies, and applicable law.
   e. No person supporting candidates for public office or engaging in other political activities may use University space or facilities or receive University support, except in the limited ways described in section 3A, below.
   f. No person may use for lobbying activities federally-funded contract or grant money received by the University.

Even the foregoing activities that are only restricted, rather than prohibited, may be subject to limitations imposed by law. Therefore, any person engaging in the activity, or contemplating doing so, should consult with the Director of Government and Community Relations.

g. *Guidelines for Avoiding Prohibited Partisan Political Activities:* the following guidelines should assist in preventing the involvement or apparent involvement of the University in political activities in support of or opposition to any candidate for elective public office, that is, partisan political activities. Except in the limited circumstances set forth in section 3.b., below:
   1. *Use of Name and Seal:* neither the name nor seal of the University or of any of its schools, departments, or institutions should be used on letters or other materials intended for partisan political purposes.
   2. *Use of Address and Telephones:* no University office should be used as a return mailing address for partisan political mailings, and telephone service that is paid by the University, likewise, should not be used for partisan political purposes. (Obviously, a student's dormitory room and telephone service that are personal to the student may be used for these purposes.)
   3. *Use of Title:* the University title of a faculty or staff member or other person should be used only for identification and should be accompanied by a statement that the person is speaking as an individual and not as a representative of the University.
   4. *Use of Services and Equipment:* University services, such as Interdepartmental Mail; equipment, such as duplicating machines, computers, and telephones; and supplies should not be used for partisan political purposes.
   5. *Use of Personnel:* no University employee may, as part of his or her job, be requested to perform tasks in any way related to partisan political purposes.

3. *Permissible Activities*
   a. *In General:* as noted above, the federal, state, and local laws which limit the partisan political activities that can take place in University facilities and with University support in no way inhibit the expression of personal political views by any individual in the University community. Nor do they forbid faculty, students, or staff from joining with others in support of candidates for office or in furtherance of political causes. There is no restriction on discussion of political issues or teaching of political techniques. Academic endeavors which address public policy issues are in no way affected.

      Because the University encourages freedom of expression, political activities which do not reasonably imply University involvement or identification may be undertaken so long as regular University procedures are followed for use of facilities. Examples of permissible activities are:
      1. Use of areas, such as White Plaza, for tables, speeches, and similar activities.
      2. Use of auditoriums for speeches by political candidates, but subject to rules of the Internal Revenue Service, the Federal Election Commission, and the California Fair Political Practices Commission, and other applicable laws. Arrangements must be made with University Events and Services. (See also Guide Memo 82.1, Public Events, for more information.)

      To reiterate, because tax and political compliance laws impose restrictions, and even prohibitions, on certain political activities and on the use of buildings and equipment at a non-profit institution such as the University, any such activities must be in compliance with these legal requirements. Individuals taking political positions for themselves or groups with which they are associated, but not as representatives of the University, should clearly indicate, by words and actions, that their positions are not those of the University and are not being taken in an official capacity on behalf of the University.
   b. *Limited University Political Activities:* limited activities relating to specific federal, state, or local legislation or ballot initiatives are permissible where (1) the subject matter is directly related to core interests of the University's activities; (2) the President has determined that the University should take a position; and (3) the individuals who speak or write on the University's behalf are specifically authorized to do so.

4. *Responsibility for Interpretation:* the Director of Government and Community Relations, in consultation with the General Counsel, is the administrative officer responsible for interpretation and application of the above guidelines. Questions on whether planned student activities are consistent with the University's obligations should be directed to the Dean of Students, who will consult with the Director of Government and Community Relations and/or the General Counsel. All other questions on whether planned activities are consistent with the University's obligations should be addressed directly to the Director of Government and Community Relations or the General Counsel.

CAMPUS DISRUPTIONS

The University's policy on campus disruption applies to students, faculty, and staff. It is published in its complete form on the Judicial Affairs Office web site at http://www.stanford.edu/dept/vpsa/ judicialaffairs/index.html.

POLICY

The following is quoted from the policy:

Because the rights of free speech and peaceable assembly are fundamental to the democratic process, Stanford firmly supports the rights of all members of the University community to express their views or to protest against actions and opinions with which they disagree.

All members of the University also share a concurrent obligation to maintain on the campus an atmosphere conducive to scholarly pursuits, to preserve the dignity and seriousness of University ceremonies and public exercises, and to respect the rights of all individuals.

The following regulations are intended to reconcile these objectives.

It is a violation of University policy for a member of the faculty, staff, or student body to:

1. prevent or disrupt the effective carrying out of a University function or approved activity, such as lectures, meetings, interviews, ceremonies, the conduct of University business in a University office, and public events.
2. obstruct the legitimate movement of any person about the campus or in any University building or facility.

Members of the faculty, staff, and student body have an obligation to leave a University building or facility when asked to do so in the furtherance of the above regulations by a member of the University community acting in an official role and identifying himself or herself as such; members of the faculty, staff, or student body also have an obligation to identify themselves, when requested to do so by such a member of the University community who has reasonable grounds to believe that the person(s) has violated section (1) or (2) of this policy and who has so informed the person(s).

APPLICATION

The following are examples to illustrate the policy:

The policy has been applied to the following actions: refusal to leave a building which has been declared closed; obstructing the passage into or out of buildings by sitting in front of doorways; preventing University employees from entering their workplace;

preventing members of a class from hearing a lecture or taking an examination, or preventing the instructor from giving a lecture, by means of shouts, interruptions, or chants; preventing others from hearing a scheduled speaker by means of shouts, interruptions, or chants; refusing to leave a closed meeting when unauthorized to attend; and intruding upon or refusing to leave a private interview.

It should be understood that while the above are examples of extraordinarily disruptive behavior, the application of the policy also takes situational factors into consideration. Thus, for example, conduct appropriate at a political rally might constitute a violation of the Policy on Campus Disruption if it occurred within a classroom.

There is no "ordinary" penalty which attaches to violations of the Policy on Campus Disruption. Each case is fact-specific; considerations would include: the gravity of the offense, and prior similar misconduct. As a general rule, the more serious the offense, the less it matters that the violation had otherwise not done wrong.

USE OF THE MAIN QUADRANGLE AND MEMORIAL COURT

POLICY

The following is quoted from the policy:

The Main Quadrangle and Memorial Court are part of Stanford University's academic preserve due to their locations at the heart of the campus. To protect and enhance their historic status, University policy limits activities primarily to established or traditional ceremonies and events.

To schedule an event, approval must be obtained in advance from the Office of Stanford Events (see below). Unscheduled events, protests, or activities are prohibited.

Requests for waivers to this policy must be submitted in advance and in writing to the Office of Stanford Events. Exceptions may be granted only in extraordinary cases.

RESOURCES

The following is a summary of resources available:

For instructions on use of the Main Quadrangle/Memorial Court, contact the Office of Special Events and Protocol (OSEP) at (650) 724-1387, http://stanfordevents.stanford.edu.

Note: other venues on campus (such as White Plaza) are made available to Stanford students, faculty, and staff for events other than scheduled "established or traditional ceremonies and events" including those that may involve amplified sound. For further information on the use of such other venues, contact Student Activities and Leadership (SAL) at (650) 723-2733, http://studentaffairs.stanford.edu/sal.

Office of Special Events and Protocol (OSEP)

OVAL POLICY

The Oval is considered to be the initial and official visual entrance to the Stanford University campus. Given this historic and aesthetic status, it is in the best interests of the University community and visiting members of the public to maintain its open and pristine space, to help preserve its natural beauty and environmental integrity. The Oval also presents the formal academic image of the University, leading directly to departments, classrooms and other academic space, and faculty and graduate student offices, and thus is subject to the University's Noise Policy.

The University prohibits formal or informal events of any kind to take place in the Oval. Gatherings of Stanford students, faculty, and staff such as demonstrations, rallies, or dances may take place in White Plaza, which can be reserved through the Office of Student Activities. Weddings also are not allowed in the Oval but are in certain circumstances allowed in Memorial Church (refer to Memorial Church wedding ceremony guidelines).

The Oval is considered a pedestrian zone and appropriate use of its space includes walking, running, reading, relaxing, and other limited recreational use of the lawn area (such as quiet, very small picnics and Frisbee), unless or until such use damages or otherwise harms the property.

Cooking food or use of any grill/barbecue or open flame is strictly prohibited. Fireworks or the use of other incendiary devices represent a safety hazard to the area and are therefore prohibited. Amplified sound from items such as boom boxes, musical instruments, or the use of bullhorns or amplified speakers is also prohibited. Only authorized Stanford service vehicles are permitted inside the Oval areas.

As the official entrance to the University, the Oval offers public access to general parking spaces in the marked areas surrounding the outer perimeter of the Oval; drivers are expected to obey all traffic signs and limitations. Buses are subject to additional restrictions.

For further information regarding this policy, contact the Executive Director of Special Events and Protocol, 724-1387 or see http://osep.stanford.edu/policies/oval.html.

NOISE AND AMPLIFIED SOUND

POLICY

The following is quoted from the policy:

Stanford is not only an academic institution but a residential community as well. It is the responsibility of all faculty, students, and staff to moderate noise especially during an event or activity held on campus. Supporting the mission of the University and respecting those who are studying, researching, or otherwise carrying out academic-related activities is a Stanford priority. The campus must require a conducive atmosphere to ensure these endeavors are accomplished and supported. Disturbing noise in or around a residence or other campus buildings which infringe on the rights of other residents or members of the University community is considered a violation of this policy. As part of the event planning process, the event sponsor must obtain all appropriate approvals regarding the use of amplified sound during an event or activity.

RESOURCES

Information regarding whether and how the use of amplified sound is permitted is available from the following sources, which must be consulted for prior approval:

a. The Office of Student Activities: phone: 723-2733, or see http://studentaffairs.stanford.edu/sal/policies/noise
b. Registrar's Scheduling Office: email reg-events@stanford.edu, or see http://studentaffairs.stanford.edu/registrar/faculty/events.
c. Office of Special Events and Protocol (OSEP) at (650) 724-1387, or see http://stanfordevents.stanford.edu.

PROHIBITION OF THE POSSESSION OF DANGEROUS WEAPONS ON CAMPUS

The University's policy prohibiting weapons on campus is published in its complete form on the Judicial Affairs Office web site http://stanford.edu/dept/vpsa.judicialaffairs/index.html.

POLICY

The following is quoted from the policy:

Except for authorized academic purposes, the knowing possession by any student on any Stanford campus of the following is prohibited: firearms, explosives, or any instrument or weapon of the kind commonly known as blackjack, slingshot, billy club, sandclub, sandbag, or metal knuckles.

Notwithstanding the paragraph above, a student who is a resident of a Stanford campus may store a weapon on such campus if both of the following conditions are met:

1. The student has complied with all state and federal regulations regarding the use and possession of said weapon, or, in the case of a foreign campus, with the laws of the country in which the campus is located.
2. The student stores such weapons with the Stanford Department of Public Safety (SDPS) or, in the case of a foreign campus, in a facility provided by the director of such campus.

Students may remove their weapons from storage only in accordance with regulations established by the SDPS or by the director of the foreign campus at which the weapon is stored. A student who is a resident of a Stanford campus may bring any of the above weapons on campus for purposes of storage only if the student has previously notified the SDPS of the intention to do so, but in no event more than six hours after arrival on the campus. When the student removes the weapon from storage, it must be taken off campus as soon as is practicable, but in no event more than one hour after such removal.

The term "Stanford campus" shall include all the lands and facilities of Leland Stanford Junior University, whether owned or leased, and whether located in the United States or abroad.

CONTROLLED SUBSTANCES AND ALCOHOL

STUDENT CONDUCT

Student conduct is guided by the Fundamental Standard. Implicit in the Standard is the understanding that students are responsible for making their own decisions and accepting the consequences of those decisions.

In order to make informed decisions about alcohol and other drug use, students should educate themselves about the health and safety risks associated with their use, as well as about state and local laws on possessing, serving, and consuming alcohol. It is widely recognized that the misuse and abuse of drugs ("controlled substances")* and the abuse of alcohol are major contributors to serious health problems, as well as to social and civic concerns. Among the health risks associated with the use of illicit drugs and the abuse of alcohol are various deleterious physical and mental consequences including dependency, severe disability, even death. Information concerning the known effects of alcohol and specific drugs is available from the Alcohol and Other Drug Abuse Prevention Program at Vaden Student Health Service.

The goal of this University's policy is to reduce the abuse and illegal use of alcohol and other drugs, and the human and material costs associated with it. The University, as an educational institution, approaches student conduct issues from a perspective that places emphasis on individual responsibility and development. Education about and prevention of alcohol and other drug-related problems will continue to be the primary emphasis and goal. However, the University expects students, as individuals and as members of groups, to conduct themselves in accordance with this and all other University policies governing student conduct.

* Controlled substances are those defined in 21 U.S.C. 812; they include, but are not limited to, such substances as marijuana, heroin, cocaine, and amphetamines.

POLICY

The University's policy on controlled substances and alcohol is published in its complete form in the Administrative Guide as Administrative Guide Memo 23.6, available at http://adminguide.stanford.edu/23_6.pdf, and on the Judicial Affairs Office web site http://stanford.edu/dept/vpsa/judicialaffairs/index.html.

The following is quoted from the policy:

It is the policy of the University to maintain a drug-free workplace and campus. The unlawful manufacture, distribution, dispensation, possession, and/or use of controlled substances or the unlawful possession, use, or distribution of alcohol is prohibited on the Stanford campus, in the workplace, or as part of any of the University's activities. The workplace and campus are presumed to include all Stanford premises where the activities of the University are conducted. Violation of this policy may result in disciplinary sanctions up to and including termination of employment or expulsion of students. Violations may also be referred to the appropriate authorities for prosecution.

This policy will be reviewed at least biennially.

APPLICATIONS

The following are examples to illustrate the policy:

No University funds or funds collected by the University may be used in a way that violates the alcohol policy. In student residences, house funds (funds collected by the Student Financial Services or other University offices) may not by used to buy alcohol because the majority of undergraduates are under the legal drinking age of 21. The decision to use student-collected funds to buy alcohol should be made lawfully, thoughtfully, fairly, and in a way that respects the views of all students. Students must not be required to contribute to a student-collected fund for the purposes of purchasing alcohol. No alcoholic beverages may be served at all-freshman house events in common area spaces (e.g., lounges, hallways, patios/outdoor areas).

Party planners are responsible for planning and carrying out events in compliance with this policy. At least one house or organization officer must assume responsibility for an event's compliance with the policy, and their names must be made available to Stanford's Department of Public Safety and the University upon request.

CONSEQUENCES OF VIOLATION

Educational and rehabilitative measures will be the preferred response to infractions of the Policy unaccompanied by more egregious misconduct. Penalties are calibrated according to the severity of the violation. Misbehavior associated with drug or alcohol use and abuse may result in one or more of the following University consequences:

Individuals who violate the University Residence Agreement may lose their University student housing privileges and/or be reported to the Judicial Affairs Office.

Individuals who violate the University's terms and conditions for student organization recognition as defined in the *Student Organization Handbook* may be subject to expulsion from the student organization.

Student groups which violate the Policy may face suspension of social privileges, as well as the loss of University recognition, meeting space, and housing or other related privileges.

Students should understand that inebriation is never an excuse for misconduct, that the careless or willful reduction, through the use of alcohol or other intoxicants, of their own ability to think clearly, exercise good judgment, and respond to rational intervention may invoke more stringent penalties than otherwise might be levied.

Penalties will be imposed according to the facts and circumstances of each case. They can be imposed singly or in combination by the Office of Residential Education/Graduate Residences, the Office of Student Activities, the Dean of Students Office, and the Office of Judicial Affairs.

CIVIL LIABILITY

While the law regarding civil liability is complex, it is important to know that under some circumstances party hosts, sponsors, bartenders, or others might be held legally liable for the consequences of serving alcohol to underage drinkers or to obviously intoxicated persons. Social hosts or party planners could be sued and found personally responsible for damages to the injured party(ies) including:

Specific damages. These are damages which are measurable. For example, when bodily injury results in medical expenses or lost wages.

General damages. These are damages which cannot not be specifically measured in terms of dollar amount. For example, pain and suffering resulting from bodily injury.

Punitive damages. These are damages which are intended to serve as an example to others and to discourage behavior which is deemed highly undesirable to society.

CRIMINAL LIABILITY

Stanford University is not a sanctuary from the enforcement of state and local laws. Students and others on campus who violate the law may be and have been arrested and prosecuted. Primary responsibility for law enforcement, including that related to alcohol, rests with law enforcement agencies, primarily the Stanford University Department of Public Safety. Uniformed officers who patrol the campus and respond to calls are deputized by the Sheriff of Santa Clara County and are fully empowered and authorized to stop vehicles, make arrests, and enforce all laws. Laws are subject to change; consequently, the following information is illustrative but must not be relied on as a complete and current citing of relevant laws. More information is available at the Stanford Department of Public Safety, 711 Serra Street.

Generally, it is a criminal offense:

1. To provide any alcoholic beverage to a person under 21.
2. To provide any alcoholic beverage to an obviously intoxicated person.
3. For any person under age 21 to purchase alcohol.
4. To be under the influence of alcohol or another drug in a public place and unable to exercise care for one's own safety or that of others.
5. For persons under 21 to possess alcohol in any public place or any place open to the public (for example, public places in student residences).
6. To operate a motor vehicle while under the influence of alcohol or any other drug. Presumed to be driving under the influence (DUI) with a blood alcohol level (BAL) of 0.08% or higher.
7. To ride a bicycle while under the influence of alcohol, drugs, or both.
8. To have an open container of alcohol in a motor vehicle; and, for persons under 21 to drive a vehicle carrying alcohol or to possess alcohol while in a motor vehicle.
9. To have in one's possession, or to use, false evidence of age and identity to purchase alcohol.
10. To possess an open container of alcohol in a public place or any place open to the public. Applies in Palo Alto jurisdiction.
11. To be in possession of an unregistered keg. All kegs sold must be registered at the time of purchase. Identification tags must be placed on all kegs in order to allow kegs to be traced if the contents are used in violation of the law.

WHERE TO GET HELP

In the event of life threatening emergencies call 9-911 from on-campus and 911 from off-campus.

*Campus Resources—(*Area Code 650) Counseling and Psychological Services, 24 hours (723-3785); The Alcohol and Other Drug Abuse Prevention Program (723-3429); Stanford Alcohol and Drug Treatment Center (723-6682); Vaden Health Service's Medical Advice Line, 24 hours (723-4841); The Bridge, 24-hour Peer Counseling (723-3392).

The Alcohol and Other Drug Abuse Prevention Program at Vaden Health Service: provides information and referral, educational training and workshops, and non-clinical consultations for groups and individuals. The program utilizes a harm reduction approach to prevent problems associated with the use of alcohol, tobacco, and other drugs (723-3429).

The Student Activities and Leadership: provides workshops and training, publications, and party planning consultations. Web site: http://studentaffairs.stanford.edu/sal/planning (723-2733).

Community Resources—Alcoholics Anonymous (650) 592-2364, Alanon (650) 873-2356 or (408) 379-1051.

HAZING POLICY

Hazing is not permitted at Stanford University. No individual, recognized student organization, club, team, or any other Stanford-affiliated student group is permitted to plan, engage in, or condone hazing, on or off the Stanford campus.

DEFINITION OF HAZING AT STANFORD UNIVERSITY

Hazing includes any activity done in connection with a student organization, regardless of whether the organization is officially recognized at Stanford, that causes or is reasonably likely to cause another student to suffer bodily danger, physical harm, or significant personal degradation or humiliation, even if no bodily danger, physical harm, or significant degradation or humiliation in fact results. Hazing might occur during initiation or pre-initiation into a student organization, but is not limited to these time frames. Any individual who plans or intentionally assists in hazing activity has engaged in hazing, regardless of whether that individual is present when the hazing activity occurs.

CONSEQUENCES OF A VIOLATION

Stanford University expects its students to conduct themselves in socially responsible and respectful ways. Thus, participation in hazing, either as an individual or as part of any student group, may result in serious individual and organizational consequences including, but not limited to: disciplinary action up to and including expulsion; permanent loss of organizational recognition; and loss of eligibility to remain a member of any club, team, or other Stanford-affiliated student group. Consent, implied or expressed, is not a defense to any complaint or charge alleging a hazing violation.

A number of University offices may take institutional action, including: the Organizational Conduct Board; Judicial Affairs; or other University offices, such as the Vice Provost for Student Affairs or the Department of Athletics.

APPLICATIONS

Stanford's hazing policy is distinct from and broader than California Penal Code section 245.6, which prohibits: "any method of initiation or preinitiation into a student organization or student body, whether or not the organization or body is officially recognized by an educational institution, which is likely to cause serious bodily injury to any former, current, or prospective student of any school, community college, college, university or other educational institution in this state." A violation of Penal Code Section 245.6 that does not result in serious bodily injury is punishable as a misdemeanor, while a violation that results in death or injury is punishable as a felony or a misdemeanor.

Nothing in this hazing policy prevents Stanford from taking institutional action against hazing activity that falls outside the narrower definition of Penal Code section 245.6.

Stanford's hazing policy is not intended to prohibit student recruitment or new or continuing member activities that are positive and educational in nature, designed to instill a group ethos or unity. Its intent is to deter those behaviors that cause or are likely to cause danger, harm or humiliation to another student.

Stanford's hazing policy is not intended to apply to customary athletic events or other similar institutionally-approved contests or competitions.

Questions should be directed to the Office of Student Activities, (650) 723-2733.

SMOKE-FREE ENVIRONMENT

The University's policy on a smoke-free environment is published in its complete form in the Administrative Guide as Administrative Guide Memo 23.4, available at

http://adminguide.stanford.edu/23_4.pdf, and Judicial Affairs Office web site at http://www.stanford.edu/dept/vpsa/judicialaffairs/index.html.

Applicability—This policy applies to all academic and administrative units of Stanford University, including the SLAC National Accelerator Laboratory, and all campus student housing. This policy does not supersede more restrictive policies which may be in force in compliance with federal, state, or local laws or ordinances.

Note also that the School of Medicine has adopted a more restrictive policy; see http://med.stanford.edu/tobaccofree.

POLICY

The following is quoted from the policy:

1. *Policy*
   It is the policy of Stanford University that the smoking of tobacco products in enclosed buildings and facilities and during indoor or outdoor events (and the selling of tobacco products) on the campus is prohibited.
2. *Guidelines*
   a. *Smoking-Prohibited Areas*—Specifically, smoking is prohibited in classrooms and offices, all enclosed buildings and facilities, in covered walkways, in University vehicles, during indoor and outdoor athletic events, and during other University sponsored or designated indoor or outdoor events.
      - Ashtrays will not be provided in any enclosed University building or facility.
      - "Smoking Prohibited" signs will be posted.

   b. *Outdoor Smoking Areas*—Smoking is permitted in outdoor areas, except during organized events. Outdoor smoking areas should be located far enough away from doorways, open windows, covered walkways, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. To accommodate faculty, staff, and students who smoke, Vice Presidents, Vice Provosts, and Deans may designate certain areas of existing courtyards and patios as smoking areas in which case ashtrays must be provided. Costs associated with providing designated smoking areas and ashtrays will be absorbed by the specific academic or administrative unit(s).
3. *Enforcement*—This policy relies on the consideration and cooperation of smokers and non-smokers. It is the responsibility of all members of the University community to observe and follow this policy and its guidelines.
   a. *Smoking Cessation Information*—Smoking cessation programs are available for faculty and staff through the Center for Research in Disease Prevention, and the Health Improvement Program (HIP). Students may contact the Health Promotion Program (HPP) through the Student Health Center for smoking cessation information or programs.
   b. *Repeated Violations*—Faculty, staff, and students repeatedly violating this policy may be subject to appropriate action to correct any violation(s) and prevent future occurrences.
4. *Implementation and Distribution*—Copies of this policy will be disseminated by the Manager of HR Policy/Staff and Labor Relations and the Vice Provost for Student Affairs to all faculty, staff, and students, and to all new members of the University community.

VISITOR POLICY/UNIVERSITY STATEMENT ON PRIVACY

Stanford University has an interest in ensuring that the privacy of its students, faculty, and staff is respected, and that no activities interfere with education, research, or residential life.

The University is private property; however, some areas of the campus typically are open to visitors. These areas include White Plaza, public eating areas (such as those at Tresidder Union), outdoor touring areas, and locations to which the public has been invited by advertised notice (such as for public educational, cultural, or athletic events). Even in these locations, visitors must not interfere with the privacy of students, faculty, and staff, or with educational, research, and residential activities. The University may revoke at any time permission to be present in these, or any other areas. Visitors should not be in academic or residential areas unless they have been invited for appropriate business or social purposes by the responsible faculty member, student, or staff member.

No commercial activity, including taking photos or similar audio or visual recordings that are sold to others or otherwise used for commercial purposes, may occur on the campus without the University's permission. Requests for permission should be submitted to the Director of University Communications or, as appropriate, the Dean of Students, the Department of Athletics, or the Office of Public Events. Recognized student groups and official units of the University will be granted such permission so long as they do not violate privacy or property interests of others; so long as any sale of their products is predominantly on campus to students, faculty, and staff; and so long as they comply with applicable University policies and procedures.

Violaters of this policy may be subject to criminal and/or civil liability, as well as University disciplinary action.

COMPUTER AND NETWORK USAGE

For a complete text of the currently applicable version of this policy, see Administrative Guide Memo 62, Computer and Network Usage Policy, available at http://adminguide.stanford.edu/62.pdf.

POLICY

The following is quoted from the policy:

Users of Stanford network and computer resources have a responsibility not to abuse the network and resources. This policy provides guidelines for the appropriate and inappropriate use of information technologies.

SUMMARY

The following summarizes the policy on Computer and Network Usage:

In particular, the policy provides that users of University information resources must respect software copyrights and licenses, respect the integrity of computer-based information resources, refrain from seeking to gain or permitting others to gain unauthorized access, including by sharing passwords, and respect the rights of other computer users.

This policy covers appropriate use of computers, networks, and information contained therein. As to political, personal and commercial use, the University is a non-profit, tax-exempt organization and, as such, is subject to specific federal, state, and local laws regarding sources of income, political activities, use of property, and similar matters. It also is a contractor with government and other entities, and thus must assure proper use of property under its control and allocation of overhead and similar costs. For these reasons, University information resources must not be used for partisan political activities where prohibited by federal, state, or other applicable laws, and may be used for other political activities only when in compliance with federal, state, and other laws, and in compliance with applicable University policies. Similarly, University information resources should not be used for personal activities not related to appropriate University functions, except in a purely incidental manner. In addition, University information resources should not be used for commercial purposes, except in a purely incidental manner or except as permitted under other written policies of the University or with the written approval of a

University officer having the authority to give such approval. Any such commercial use should be properly related to University activities, take into account proper cost allocations for government and other overhead determinations, and provide for appropriate reimbursement to the University for taxes and other costs the University may incur by reason of the commercial use. Users also are reminded that the .edu domain on the Internet has rules restricting or prohibiting commercial use, and thus activities not appropriately within the .edu domain and which otherwise are permissible within the University computing resources should use one or more other domains, as appropriate.

The University's Information Security Officer is authorized in appropriate circumstances to inspect or monitor private data (including email), such as when there is a reasonable cause to suspect improper use of computer or network resources.

For further information on the topic of peer-to-peer file sharing, see the section above on Copyright.

CHAT ROOMS, BLOGS, AND OTHER FORUMS USING STANFORD DOMAINS OR COMPUTER SERVICES

For a complete text of the currently applicable version of this policy, see Administrative Guide Memo 66, Chat Rooms and Other Forums Using Stanford Domains or Computer Services, available at http://adminguide.stanford.edu/66.pdf.

POLICY

The following is quoted from the policy:

1. *Definition*
   From time to time, University departments, faculty, students and others may host electronic communication forums, such as chat rooms, newsgroups, bulletin boards, blogs, or web sites, whereby various parties may contribute their thoughts on various subjects and where such communication is made available for others to read and comment upon. For purposes of this policy, these sites are collectively referred to as forums.
2. *Establishment of Forums*
   a. *Connection with University Activities*—Forums that either use the Stanford.edu, Stanford.org, or other Stanford domains, or use University computing facilities, should be established only in connection with legitimate activities of the University.
   b. *University Role*—Unless specifically sponsored by an academic administrative unit of the University, the University's role in connection with these forums will be solely as a passive Internet service provider.
   c. *Terms of Use*—In all cases, as a condition to establishing a forum, forum homepages (where they exist) and each individual forum page should contain a header that states: Subject to Terms of Use and all pages should include a link to the page maintained by the University entitled "Terms of Use." The URL is http://www.stanford.edu/home/atoz/terms.html.
3. *Operation of Forums*

All forums shall be operated in compliance with the Terms of Use, as modified from time to time, and the University's various policies regarding computer facilities and services.

PROTECTION OF SENSITIVE DATA

Stanford University maintains sensitive non-public data protected by laws and agreements, including Social Security numbers, financial information, health information, and student records. It is incumbent on every member of the Stanford community with access to such data to be familiar with and abide by Stanford's data classifications requirements provided at http://www.stanford.edu/group/security/securecomputing/dataclass_chart.html. Members of the Stanford community should also familiarize themselves with applicable laws and University policies on privacy as provided by the University, including Administrative Guide Memo 63, Information Security, http://adminguide.stanford.edu/63.pdf, Administrative Guide Memo 64, Identification and Authentication of Systems, http://adminguide.stanford.edu/64.pdf, Administrative Guide Memo 65, Electronic Commerce, http://adminguide.stanford.edu/65.pdf, and Administrative Guide Memo 67, Information Security Incident Response, http://adminguide.stanford. edu/67.pdf. For information on best practices for securing mobile computing devices, see http://www.stanford.edu/group/security/securecomputing/mobile_devices.html.

CAMPUS SAFETY AND CRIMINAL STATISTICS

Stanford University complies with the Jeanne Clery Disclosure of Campus Security Policy and Crime Statistics Act. A copy of Stanford's policies and statistics under this act are posted on the Department of Public Safety web site at http://stanford.edu/group/SUDPS/safety-report.shtml. A paper copy can be obtained by calling the Stanford Department of Public Safety at (650) 723-9633.

STANFORD BULLETIN

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